CAPITAL PROJECT MANAGEMENT, CONSTRUCTION MANAGEMENT AND ORGANIZATION FOR BLUE QUILLS FIRST NATIONS COLLEGE

by

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LIST OF ABBREVIATIONS AND SYMBOLS USED

@	at
approx.	approximately
avg.	average
E	East
Hr.	hours
ha.	hectare
igal	imperial gallon
igpm	imperial gallon per minute
Kgs.	kilograms
kPa	kilopascal
m	metre
mm	millimetre
m^3	cubic metre
N	North
psi	pound per square inch
FTE	Full-Time Equivalent
S	South
sq.m.	square metre
sq.ft.	square foot
W	West
wk	week
111°22'30"	111 degrees, 22 minutes and 30 seconds

ABSTRACT

Since the First Nations signed Treaties with the Federal Government in the Nineteenth Century, the latter was supposed to assist the former in improving their lives. For several decades, the government established the policies entitled Day Labour Project and Day Labour Method of Construction to assist the First Nations in constructing their own buildings. The concern is that the policies have been ineffective because their cost guidelines prevent First Nations from submitting bids for many capital projects. In the fall of 1998, a new document called First Nations Construction Contracting Guidelines maintains that projects of more than $30,000 will be tendered publicly with the required bid bonds. These new cost guidelines are even tougher than the previous ones. Consequently, under the new policy, the majority of capital projects within the reserves, including schools, health centres, multipurpose buildings and so forth, are still being constructed by outsiders. First Nations members have not been given significant employment and on-site training opportunities on these projects–either under the old policy or the new one.

This thesis uses Blue Quills First Nations College, located on its own reserve near St. Paul, Alberta, as a study project. Blue Quills is one of the first colleges owned and operated by First Nations. Seven First Nations share in the ownership and management of the Blue Quills First Nations College. This institution needs new facilities and so a project management team is required to manage the construction of this project and skilled labour is necessary to construct the facility. An analysis of First Nations culture and the landscape also suggests that this College is the ideal institution to provide the needed project management and construction management programmes for First Nations members in a manner that complements and utilizes First Nations tradition and culture. With this training and education, First Nations should ideally be able to gain the confidence of the Federal Government and be allowed to construct their own projects.

The development of education and training programmes for local members is urgent in order for First Nations to improve their quality of leadership and workmanship in both project management and construction management. This thesis concludes that only through such programmes will First Nations become capable of competing with outsiders.

An analysis based on case studies, and previous project management and construction management strategies concludes that direct community involvement with local First Nations members to manage and construct the facilities is more successful than without that direct involvement. It is suggested that Blue Quills First Nations College adopt a strategy that features direct community involvement. The proposed organizational structure of this College will improve the existing fundraising process and also establish a process to develop future facilities. This thesis concludes that the problem of expensive bid bonds and contract security bonds be solved through the First Nations co-operating with one another.

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CHAPTER 1: INTRODUCTION

From working with several First Nations in Alberta, I have learned that the majority of First Nations projects are managed and constructed by non-native general contracting companies. Furthermore, not many First Nations members were hired by those companies during construction. The Federal Government has established policies for sponsoring projects that are to be built by First Nations members. These policies go under the name of "Day Labour Project" (Indian and Northern Affairs Canada 1988a: 1), and "Day Labour Method of Construction" (INAC 1981: 5); but, because of biases and political reasons, the Federal Government has not fully supported these policies. During interviews, officials of Indian and Northern Affairs Canada (INAC) stated that such policies were cancelled in the fall of 1998 because some projects handled by the First Nations were out of control. Although a "Test Project" was successfully completed in 1997, which is described in Case Study 1 in Chapter 2, it was not mentioned by INAC. These government officials seem to persist in the belief that First Nations do not have the skilled labour or experience necessary to manage and construct capital projects. In addition, during the interviews, INAC officials mentioned that the INAC Minister claimed the Federal Government was under pressure by general contractors who insisted that they be allowed to bid on First Nations projects funded by the Federal Government. Thus a new document called First Nations Construction Contracting Guidelines was issued in November 1998 (INAC 1998c).

1.1 OBJECTIVES OF THE THESIS

I intend to find ways to satisfy both parties—the Federal Government and First Nations—so that the latter can prove their competence to manage and build their own projects. Success in project and construction management can help pave the way for public works and housing in a well-organized First Nations (Aboriginal) self-Government.

The objectives of this thesis are to provide answers to the following questions: Why is it in the best interests of First Nations members to manage and build their own capital projects? How can First Nations members prove competency in project management and construction? What is and ought to be the organization regime of the College? and How can First Nations deal with bid bond and contract security?

The answers to the questions include:

1. Management education and technical training for First Nations members and the development of courses relevant to project management and construction management to be offered by Blue Quills First Nations College for local Band members.
2. Organizing Blue Quills First Nations College so it can manage and construct future projects and find future funding sources.
3. Forming an organization regime for project and construction management and choosing appropriate leadership styles for project leaders.
4. Entering into joint ventures with several First Nations to fulfil the bid bond and contract security requirement.

1.2 METHOD OF STUDY

First, Blue Quills First Nations College, a reserve which will need many new educational facilities, is used as a specific example requiring project and construction management as it relates to and represents all First Nations in Alberta or in other provinces.

Secondly, case studies were examined in order to compare the projects managed and/or constructed by First Nations members with projects constructed by general contracting companies.

Thirdly, I visited Blue Quills First Nations College, and interviewed College staff and Elders for information on First Nations culture, their concerns and needs.

1.3 CONTENTS OF CHAPTERS

Chapter 1 describes the issues of Project Management and some of the solutions provided by Project Management.

Chapter 2 describes the case studies and discusses the options of project management.

Chapter 3 describes the background information on site, availability of natural and human resources, tradition and culture, landscape and narratives and possible building materials of Blue Quills First Nations College.

Chapter 4 describes project management and construction management.

Chapter 5 describes the contents of conventional management education for the short term and also the additional First Nations traditional and cultural content for the long term.

Chapter 6 describes the organization of Blue Quills First Nations College for project and construction management, bid bond and contract security, and funding options for its future projects.

Chapter 7 describes the advantages and disadvantages of each project management option for Blue Quills First Nations College.

Chapter 8 describes several leadership theories and styles; compares several leadership styles; and suggests options for Blue Quills First Nations College.

Chapter 9 concludes the discussions of project and construction management.

1.4 DEFINITIONS

1.4.1 Band

Each Band contains a group of First Nations people living within a Reserve. The Band's money is in trust with the Crown. Each Band has its own governing Band Council. Community members choose the chief and councillors by election or, sometimes, through traditional custom. The Band members share common values, traditions and practices rooted in their ancestral heritage (INAC 1997a: 1).

1.4.2 First Nations

Although First Nation is not a legal term, both status and non-status Indian people have called themselves "First Nations people" since 1970 in order to replace the words *Indian in Canada*. Indian people also refer to their Bands or communities as First Nations (INAC 1997a: 1; INAC 1997b: 3).

1.4.3 Former Day Labour Projects

> "A project where the Band or the Department hires the supervisor and labour force directly. The workers are local residents, usually Band members, who may have varying degrees of skill, and who construct all or various parts of the building project" (INAC 1988a: 1).

Under this definition, the Federal Government provides funding for Band projects that will be built by skilled or unskilled local Band members with local materials and equipment. The projects are intended to provide training and employment for local members. This document became obsolete in Fall 1998 and was replaced with Construction Contracting Guidelines for First Nations and Aboriginal Communities.

1.4.4 Construction Contracting Guidelines For First Nations and Aboriginal Communities

These Guidelines specify several issues. First, a call for public tender is required "to ensure best value except when the cost is minor and public advertising is not feasible; or in the case of emergency" (INAC 1998c: 4). This means that outside general contractors can bid on the project. Secondly, a bid bond worth 10% of tender price is required for any project exceeding $30,000 (INAC 1998c: 31, 63). This means that even a minor maintenance project requires a bid bond. Furthermore, contract security is required after the bid is accepted which includes a Performance Bond and a Labour and Material Payment Bond worth 50% of the total contract value (INAC 1998c: 32, 88). Although these guidelines require that the successful general contractor guarantee to the use of local trades, labour,

materials and equipment (INAC 1998c: 69 and 70), it seems that INAC assumes that projects exceeding $30,000 will be done by outside general contractors who can provide bid bonds. The guidelines in turn include the requirements of capital projects.

1.4.5 Capital Projects and Major Crown Projects

A capital project is defined as a project to improve a capital asset "when the performance, value or capability of that asset is significantly increased or its useful or economic life is extended by more than one year" (Treasury Board of Canada Secretariat 2000a). According to this definition, a capital project is one that costs over a half million dollars.

However, if a total project cost exceeds 100 million dollars with high risk assessment, this project is called a Major Crown Project (MCP) (TBC 2000a).

Funding for those services mentioned in the Aboriginal Self-Government Agreement is allocated according to specified operation and maintenance schedules (INAC 1995 and 1997c). When these services were studied closely, I discovered that the capital projects or Major Crown Projects are not included in the agreement. This is because these projects involve the highest funding. Any project considered a capital project will be tendered publicly under the scrutiny of INAC. Bid bonds are required to be attached to bids.

The requirement for a bid bond on capital projects can prevent First Nations from submitting bids because First Nations do not have such amounts of money and are unable to obtain bid bonds from insurance

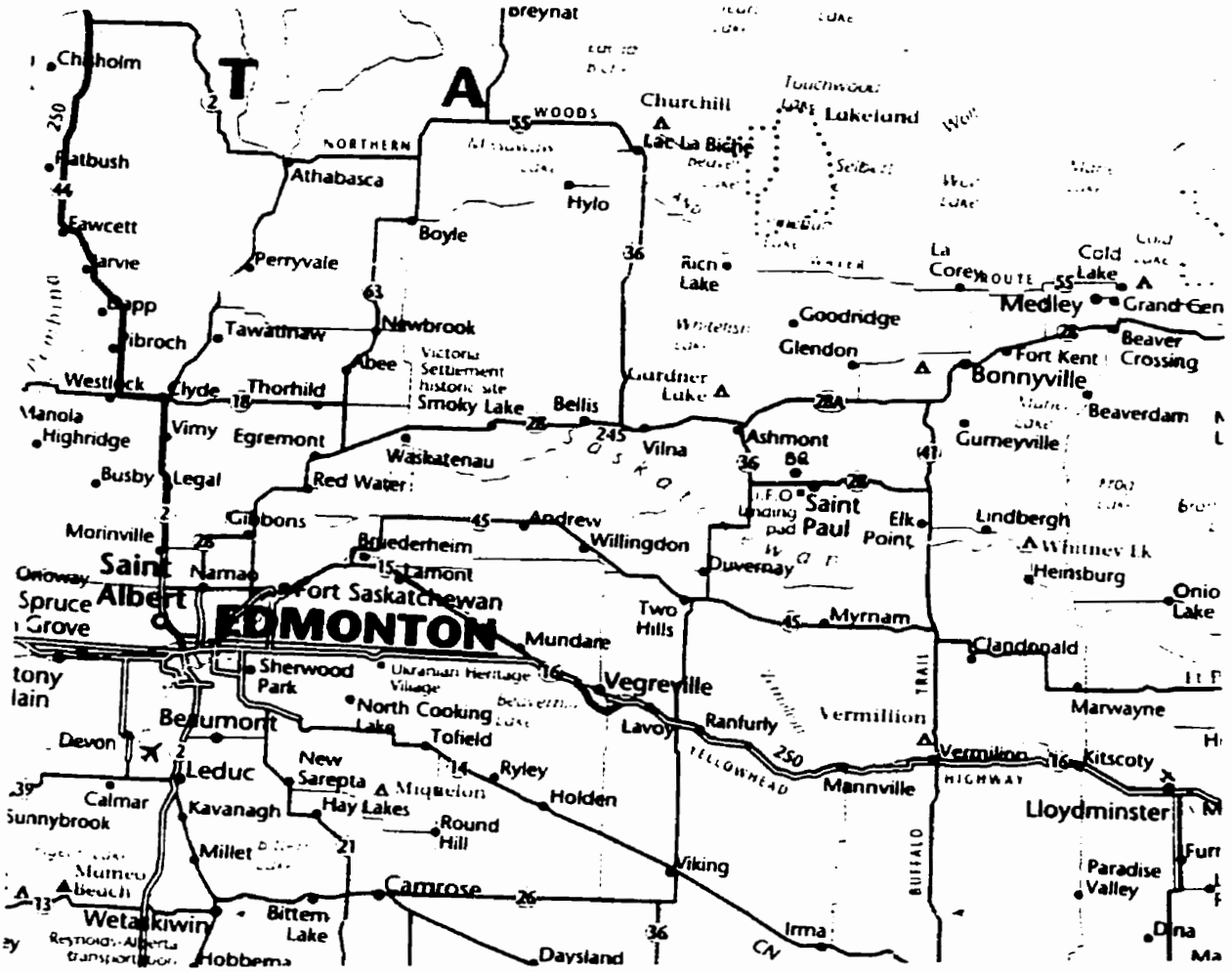
companies. In other words, INAC still controls the money and the decision making. First Nations cannot proceed with project planning, design and construction without INAC approval. I understand that a capital project sometimes spans one to two years from planning to completion of construction. Therefore the duration of each capital project is affected by the funding process, the administrative decisions of the current Chief and Council, and the availability and skills of the local labour force.

In this thesis, based on the potential sizes and values of projects and possible INAC funding, Blue Quills First Nations College will have projects in both categories—Capital Projects and Major Crown Projects. Alternatively, if INAC funding is not required, the College can select any project management and construction methods and control how to manage and build their facilities themselves similar to Case Study 4 mentioned in Chapter 2.

1.5 LOCATION OF BLUE QUILLS FIRST NATIONS COLLEGE

Blue Quills First Nations College is located about 200 kilometres northeast of Edmonton, 5 kilometres west of St. Paul, and 800 metres north of Highway 28. The St. Paul airstrip is on the south side of the College. It is located within the east half of Section 11, Township 58, Range 10, West of the 4th Meridian (Privy Council 1996); between 474 000 m E and 476 000 m E; and between 5 982 000 m N and 5 984 000 m N; and at the intersection of Longitude 111°22'30" W and Latitude 54°00'00" N (Alberta Environment 2000).

(Figure 1 - Location of Blue Quills First Nations College, and Figure 2 - Aerial Photo of Blue Quills First Nations College)



● BQ = Blue Quills

FIGURE 1 - LOCATION OF BLUE QUILLS FIRST NATIONS COLLEGE

(International Travel Maps 1999)

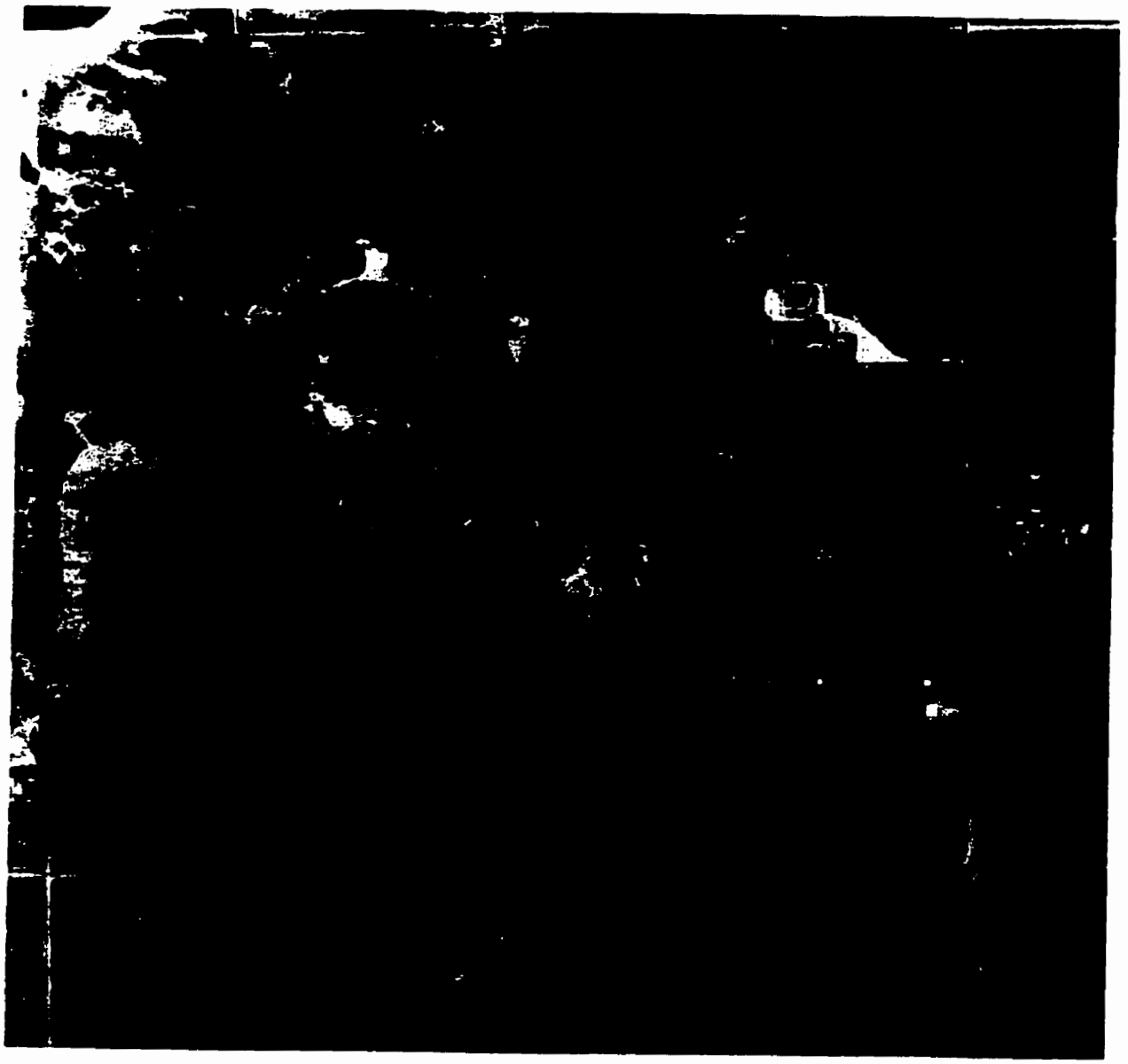


FIGURE 2 - AERIAL PHOTO OF BLUE QUILLS FIRST NATIONS COLLEGE

(Alberta Environment 1998)

CHAPTER 2: CASE STUDIES

2.1 CASE 1: PAKAN ELEMENTARY AND JUNIOR HIGH SCHOOL

2.1.1 General Description

The Pakan Elementary and Junior High School at Goodfish Lake, Alberta is owned by Whitefish Lake Band Administration No. 128 and built by Band members.

The Whitefish Lake Band Administration (WLBA) was faced with inadequate school facilities for the Band's children. Originally a school was built in 1959, an additional gymnasium in 1974, and a three-classroom addition in 1982. The total instructional area was 403 square metres for six classrooms. Due to a sloping site, each of these additions was built on a different level and attached to the original school building. Students from grade six to grade twelve were required to study at off-reserve public schools and spend at least two hours on a school bus each day.

Since 1959, INAC provided Pakan Elementary and Junior High School with maintenance funding and education funding based on the number of students. But in the fall of 1993, INAC expected WLBA to take over authority for education and the existing buildings but made no mention of a new school building. Actually, a new WLBA school had been at the top of the priority list; however, INAC officials said that there was no funding available to conduct a feasibility study. So INAC retained an architect for the WLBA for a study to see whether the school could be upgraded with accessibility for physically disabled people. INAC deducted the cost of this study—which did not include

any input from local members or the Chief and Council—from the Band's capital budget. The study recommended that INAC upgrade the existing facilities with escalators or elevators but without any additions. The WLBA felt this study was unacceptable and requested that INAC pay for a full-scale feasibility study for a new school design and construction. The WLBA appointed its Band Administrator as a project manager to monitor this study. INAC nominated three architects, and the WLBA project manager also nominated three. Once the architect was selected, the project manager recommended that the Chief and Council appoint a study committee from the community.

In early 1994, the project manager, members of the feasibility study committee and the architect looked for possible school sites within the reserve. Seven sites were identified of which the architect evaluated five. Questionnaires were sent to the local community for its input. Once the study had been completed, the WLBA approached INAC for funding to design the new school.

Surprisingly, in April 1994, a new WLBA school was no longer at the top of the priority list as other First Nations that already had new schools filled up the priority list. After hearing objections from the Band, INAC gave approval to the WLBA to proceed with the design stage. INAC had nominated three architects and expected the WLBA to appoint one of them. However, based on previous experience of using an INAC recommended consultant, the WLBA wanted to appoint its own architect: the one who had completed the feasibility study.

In October 1994, the WLBA was able to retain its architect for the design stage. The WLBA also used the same project manager but

established a new design committee. During design, the committee members invited local members to give comments and suggestions. When working drawings and specifications were completed, Chief and Council requested that INAC allocate funding for new construction.

In June 1995, INAC insisted the project be publicly tendered to attract a general contractor. However, Chief and Council had confidence that their members could build this school and submitted a construction organization regime to INAC. Some items such as mechanical and electrical systems would be subcontracted to outsiders provided local members could be trained under these subcontractors. After several months of negotiations, INAC gave its approval for the WLBA to take over project management and allowed WLBA two years to complete construction. The conditions for this approval included that the WLBA would be responsible for any cost overruns; that any loan was to come from an approved financial institute; and any interest on borrowed money was the WLBA's responsibility.

Current rules for INAC tendering are prohibitive because most Bands do not have bonding and recognized construction companies to carry out the work. These current rules had to be put aside to permit this project to be managed by the Band. INAC felt that the construction of a school of this size, because of the scope and nature of the work, would make a good "Test Project." See Section 2.1.9.

INAC acknowledges that the project was managed and constructed by the Band construction committee, the architect and a Band project manager, with an INAC official observing. INAC also acknowledges that all phases of construction and quality were monitored and adjusted continuously in order to meet deadlines and costs.

In September 1995, construction began and a total of 163 skilled and unskilled members were employed for different work phases. Some members returned from off-reserve to work on the project. Concrete, sand, and gravel were supplied locally (Cleo Hunter 2000; Ernest Jackson 2000).

In July 1997, the 3,250 square-metre school was completed below budget and on time.

2.1.2 The Band Project Manager

Mr. Ernest Jackson, having completed senior high school with outstanding marks, was one of three First Nations students from Alberta selected to attend the University of Alberta in 1971. He completed a Bachelor of Science Degree in 1973. After graduation, he worked in the construction industry in Edmonton for a few years and was team leader for several trades. Later, he was elected to the Band Council for several terms and now he is the Band Administrator. The Chief and Council chose Mr. Jackson, based on his education and experience, to be the project manager for the Pakan School Project right from the feasibility study phase through to the completion of construction of the school.

2.1.3 The Feasibility Study Committee Members

The committee was formed by three parties: the Band Chief and Council, the Band Education Department, and Indian and Northern Affairs of Canada (INAC). The Band Chief and Council was represented by one councillor and two representatives from Tribal Chief Ventures Inc. (TCV)—one registered engineering technologist

(technical service advisor) and one education director. (A description of TCV is included in Chapter 6.) The Band Education Department was represented by three college-educated board members to represent the parents and teachers council. INAC had five representatives which included a project development officer, a project engineer, a capital program officer, a capital finance management officer and a school facility program officer.

2.1.4 The Role of Feasibility Study Committee

The role of this committee included evaluation of the existing school and whether or not it was feasible to be retained for modernization, renovation and addition; evaluation of several possible sites for the new school and their environmental aspects and site infrastructures; probable budgets for construction costs and life-cycle costs for both the existing school and the new school; evaluation of projected student enrolment and the facility accommodation and spatial analysis; and soft costs such as professional fees and administration costs.

2.1.5 The Design (or Building) Committee Members

Because the Band wanted to maintain continuity in the development process, a majority of the previous feasibility committee members were appointed to become new Design Committee members. Only one representative from the Education Department was replaced. INAC retained the original five representatives from the previous committee.

2.1.6 The Role of Design Committee

The role of this committee included developing Band education programmes such as Career Technology Studies; establishing zones for different noise levels and community activities and meeting community requirements after school hours; determining building materials and methods of constructions that could be handled by local members; developing summer and winter physical education programmes; and outlining potential school expansion and site infrastructure.

2.1.7 The Construction Committee Members

Because the Band wanted efficiency in monitoring the quality and progress of the school project, two additional community members with construction experience and trades certificates were added to the design committee to form the construction committee. INAC was represented by four committee members: a project development officer, a project engineer, a capital finance management officer and a field service inspector.

2.1.8 The Role of Construction Committee

The role of this committee included overseeing the quality and progress of construction in alignment with the established construction schedule, to monitor the construction costs, to negotiate the contracts with subtrades, and to solve any personnel issues.

2.1.9 Test Project

INAC acknowledges that the project was managed and constructed by the Band Construction Committee, the architect and the Band project manager, with an INAC official observing. Before construction started, the Band Project Manager established a construction schedule and invited all local members who owned materials, who owned and operated equipment, and who were certified trades people to submit quotations. Once all qualified quotations had been accepted, the project manager put the remaining work up for bidding by outside sub-contractors. Three bids were obtained for each subtrade. The successful bidders were required to hire as much local labour as possible in order that local members could have the opportunity to gain site experience. The project manager then calculated the cost of construction and readjusted the construction schedule. He also appointed the superintendent, the site foreman, the purchasing and inventory officer, the safety and health officer and an accounting clerk. He arranged for local members from his previous skilled and unskilled member list to sign an employment agreement. An incentive program was implemented to encourage members to complete their contracted services. Absences from work to deal with problems within the immediate family were allowed.

INAC also acknowledges that in order to meet time deadlines and cost estimates, all phases of construction and quality were monitored and adjusted continuously by the Band construction committee, the architect and the Band project manager, with an INAC official observing.

2.1.10 Analysis

I have observed that when they submit and appoint consultants recommended by INAC officials, First Nations are quickly awarded funding. The problem is that if they always rely on outside consultants, First Nations will never learn how to manage and construct their own projects. For more than one hundred years, dependence on INAC has been a key factor in preventing First Nations from learning these valuable project and construction management skills–skills that would enable the First Nations Self-Government to handle, in particular, public works and housing.

There were several "firsts" on this project for both INAC and WLBA. Having a First Nations-appointed architect on an INAC-funded project was one such innovation. Having a First Nations' project and construction management on an INAC-funded project was also unprecedented.

INAC officials, however, seem hesitant to recognize that this school was a successful project. I believe that if recognition were given, other First Nations would follow the same procedures and learn proper ways of managing their team and constructing their own buildings. INAC could then no longer regulate the process of funding, nor could it favour any consultants. INAC officials might also feel that their jobs were vulnerable if First Nations people were to gain education, knowledge and experience in project management and construction.

From WLBA's point of view, the project was a great success. In fact, the Chief and Council of the WLBA intend to have an experienced project manager on the reserve for all future projects. They believe

that such projects can provide their Band members with training and employment. During the design stage, the project manager made a list of on-reserve and off-reserve, skilled and unskilled First Nations workers for future construction. He recommended that the design consultant consider certain methods and materials that could be handled by the local members. The project manager reported his research findings to the Chief and Council prior to the construction stage.

Once the project was approved to proceed with construction, the Chief and Council appointed a construction committee in order to separate the construction administration from the Band administration. One reason for this separation was that the Chief and Council were related to many Band members, so an independent committee was given authority to hire and fire local members, thus avoiding problems with favouritism. The separation would also serve to avoid political interference by the Chief and Council.

All reserve contractors were given priority, provided they had experience and proven track records. Local Band equipment was rented based on standard construction rates.

The design and construction committees were able to raise the interest of local Band members and involve them in all stages of the school project. Eventually, members developed a sense of pride in their efforts and involvement, and enjoyed the activities on their reserve. The involvement of local members resulted in the school project becoming a *community* school project. The members refused to accept a gymnasium that was not large enough to accommodate after-school, community and sporting events. A jogging track was

included for winter use. The gymnasium was not only suitable for students' use during winter but it was also designed to meet National Basketball Association requirements for local regional tournaments all year round. The gymnasium included painted courts for volleyball, tennis and badminton.

Not only did the WLBA manage and build its school, it also constructed a seven-kilometre road, a water treatment plant, a lagoon, and outdoor athletic areas. The WLBA, in order to accomplish these other projects, leased heavy equipment and operators from Saddle Lake First Nation. These successes clearly demonstrate the WLBA's competence in construction.

2.2 CASE 2: KISIPATNAHK COMMUNITY SCHOOL

2.2.1 General Description

The Louis Bull School (K4 to grade twelve) at Hobbema, Alberta is owned by the Louis Bull Tribal Administration and was built by a general contractor.

The Louis Bull Tribal Administration (LBTA) was using a modified steel-frame warehouse, built in 1970, as an elementary school. A house, built in 1950, was being used for a kindergarten. The outdoor playground and school building were separated from each other by a road, which was a safety concern. Students were bussed to the community recreation centre for indoor activities. The total instructional area was 936 square metres. In 1994, LBTA intended to build a new school and prepare a feasibility study. However, no further action towards creating a new school was taken. In 1995, two portable classrooms were added, adjacent to the existing school. The addition of these two portable units increased the total instructional area to 1,114 square metres, which supported 184 students from kindergarten to grade six. The capacity of the existing school was only 105 students.

In January 1996 a new Chief and Council decided to re-investigate the quality and space of the existing school facility. The Chief and Council assigned a Band member as project manager and appointed an architect to prepare a new preliminary feasibility study. Having reviewed the preliminary feasibility study, INAC agreed that the capacity of the existing school was deficient.

In November 1996, INAC prepared the scope of work for a feasibility study. The work included reviewing three or four sites, space requirement calculations, and a class C estimate. This estimate is based on the unit cost of construction. The unit cost of construction is, in turn, based on general information about the proposed facility and on market conditions, without considering the actual materials to be used. According to INAC guidelines, "[the class C estimate] is used to obtain preliminary project approval and specific approval to carry out planning and design" (INAC 1984c: 4).

As usual INAC named several architects and engineers who were to be invited to bid on the work. However, after the selection process, the Chief and Council decided to retain the architect who had done the preliminary feasibility study and they also set up a study committee to proceed with the full feasibility study.

When this study was completed in April 1997, a meeting was set up with the Chief and Council, an INAC official and the architect. The official objected to the class C estimate prepared by the architect on the basis that it had not provided a detailed breakdown of the costs of materials. However, the Chief and Council disagreed with the INAC official about the purpose of the class C estimate. The Chief and Council continued to support their chosen architect.

Further mis-communication and conflict arose between the same INAC official and the Band over the issue of funding. But this issue was resolved in June 1997, when an INAC funding agent met with the Chief and Council and specified the conditions under which the design stage of the new school could proceed. One such condition was that the Chief and Council borrow the money from a recognized financial

institution and pay the interest on the loan. INAC would then reimburse the Band. LBTA agreed to this arrangement as a means of accelerating the project.

When INAC and the Chief and Council agreed upon all the specified conditions in November 1997, the INAC official mentioned above prepared the scope of work for design bidding. The Chief and Council continued to retain the same project manager and set up another design committee to take care of design matters. Surprisingly, the scope of work specified designing the building based only on the estimate or building budget, without including site work. The professional fee had to be fixed according to this estimated building budget. Six architects were short-listed from about twenty-five applicants. After interviewing these architects, the Chief and Council and INAC evaluated the architects in several stages. Although the architect who prepared the feasibility study and submitted a fixed fee remained on the list at every selection stage, the INAC official opposed choosing him. The Chief and Council again disagreed with the official and chose this architect. The designing of the new school began in January 1998.

When the new school design was completed in June 1998, the Chief and Council wanted to provide its own project management and build the school with First Nations workers. INAC again refused to approve this approach. At this time, a new Chief and Council were elected and they continued to support the new school project and continued to retain the Band project manager. The new Chief and Council also set up a construction committee and a separate bank account for the school project. The majority of members on the construction committee had served on the design committee.

In September 1998, public tenders were invited on the project. Bids had to meet several requirements in order to be considered, such as: a bid bond had to be attached, and there had to be a commitment to hire local members and use local equipment. One unqualified and two qualified bids were received. The general contractor with the lower bid was chosen and in November 1998 construction began. A total of fifteen local members, most of them unskilled, were hired during construction. In December 1999, construction was completed. In January 2000, the school held its grand opening.

Throughout the project, from feasibility study to construction, the Band project manager monitored the progress of work, the quality of reports, the performance of the general contractor, progress claims and change orders. The Band project manager attended all site meetings and was present for all site visits; maintained a list of skilled and unskilled local members; and liaised with INAC, the general contractor, the architect and the Chief and Council (Lorraine White 2000; Brenda Bull 2000).

2.2.2 The Band Project Manager

Mrs. Brenda Bull had completed management courses at the University of Calgary and she spent time working as a school office manager. On the basis of her education and management experience, the Chief and Council appointed her project manager of the new School Project—right from the feasibility study phase through until the completion of the project.

2.2.3 The Feasibility Study Committee Members

The committee was formed by two parties: the Band and INAC. Seven members from the Band—three from the community, representing parents, housing committee member and infrastructure committee member; two representatives from the education department including a Board of Education member and an education director, and two representatives from the Chief and Council. INAC had four members on the committee: a project development officer, a project engineer, a capital program officer and a capital finance management officer.

2.2.4 The Role of Feasibility Study Committee

The role of this committee were similar to those of the Feasibility Study Committee mentioned in Case 1.

2.2.5 The Design Committee Members

In order to have consistency in the project development process, the Design Committee was formed from the previous Feasibility Study Committee.

2.2.6 The Role of Design Committee

The role of this committee were similar to those of the Design Committee mentioned in Case 1.

2.2.7 The Construction Committee Members

The committee was formed by two parties namely the Band and INAC. Seven members from the Band—two from the community who represent parents and housing committee member; three representatives from education department including two education board members and an education director, and two representatives from the Chief and Council. INAC had four members on the committee: the project development officer, the project engineer, the capital program officer and capital finance management officer. Because the Band wished to monitor the quality and progress of the school project, two additional community members with construction experience and trades certificates were included on the committee.

2.2.8 The Role of Construction Committee

The School Board wanted to be fully operational for the school term in January 2000; the construction period was outlined in the specifications; and the construction was done by outside general contractor. The role of this Committee was limited to observing the quality and progress of construction according to the construction schedule; monitoring whether or not the change orders were valid; and enforcing the special conditions of hiring local members for construction by the general contractor.

2.2.9 The General Contractor

The outside general contractor had a project manager and a site superintendent to manage and supervise the day-to-day construction work. They chaired site meetings and provided construction progress

schedule to the project manager of the Band. The general contractor submitted a monthly progress claim that was reviewed by the architect or his representative before the claim was transferred to the Band project manager for approval.

2.2.10 Analysis

The construction of this school contributed to First Nations growth in confidence, knowledge and ability to handle future construction projects. For example, the Band project manager representing the Chief and Council handled the project efficiently and maintained the accounting process properly, demonstrating that First Nations members can be competent to manage major projects. After the project had been completed, several First Nations attempted to recruit this Band project manager.

The LBTA was able to involve the local community in the project. Several local members served on various project committees.

The LBTA managed to maintain a consistency of "major players." For example, the majority of members who served on the design committee also served on the construction committee. The LBTA was also successful in retaining a First Nations project manager from the beginning to the end of the project. Also, the LBTA was able to retain its chosen architect through the major stages of the project. This consistency kept the learning curve to a minimum on the project from start to finish.

The LBTA was also able to have its own cultural and communal concepts integrated into the project during the design in order to

create harmony between the building, landscape and the natural environment.

Unfortunately, INAC capital project policy did not allow First Nations project management *and* construction management, so the LBTA had to hire an outside contractor. Originally, the LBTA had hoped that the construction project would have resulted in the hiring of local workers and local equipment. The contractor did hire fifteen local workers and a small amount of local equipment. But an important learning opportunity may have been missed. Had a First Nations construction management been allowed, more local workers would likely have been trained and hired; and valuable experience would have been gained, for individuals and for the whole community.

2.3 CASE 3: SUMMIT VILLAGE, 10041 - 149 STREET, EDMONTON, ALBERTA T5P 4V7

2.3.1 General Description

Summit Village is owned by a group of seniors. It was funded by Canada Mortgage Housing Corporation (CMHC), and was built by a general contractor. Communitas Group Ltd. was the project manager.

At the recommendation of Mrs. Lynn Hannley, Managing Director of the Communitas Group, on April 12, 2000, I interviewed Mr. George Abma, Mr. Frank Koning and Mrs. Nell Van Vliet, who are three original members of the church committee that initiated the project.

The seniors of the West End Christian Reform Church believed that they needed a condominium complex for seniors. At first, these church seniors wanted to build this project in the north end between 1977 and 1986, but their church was in Edmonton's west end.

The Church bought a 1.950-ha. (4.818-acre) parcel of land from the City of Edmonton for a new church site. Due to the high cost of construction for a new church, a church committee was established to review the possibility of building the seniors' housing complex on this site so that costs could be shared between the complex and the church.

In 1986, the seniors bought about two acres of land from their church at $375,000. The seniors formed a building committee from the Senior Board in 1987 and bought a set of McKinnon Village drawings from a developer that showed seventy-seven condominium suites.

At that time, each owner, who was selected by the Senior Board, was required to pay $5,000 as a deposit per suite. Each suite was about 123.55 square metres (1,330 square feet). In 1988, the Senior Board decided to change the tenancy agreement from owned suites to rental suites and refunded the $5,000 deposit to the owners. Then each tenant, who was selected by the Senior Board, made a deposit of $2,500, which was equivalent to five shares. This money went into a fund that is used for upgrading the property. (This deposit is returned, without interest, to tenants when they leave the property or to their estates when they pass away.) The chairman of the building committee contacted Canada Mortgage Housing Corporation (CMHC) for funding.

In order for the project to qualify as co-op housing and obtain more funding, CMHC asked the committee to change the scheme to eighty-six suites, including sixteen handicapped suites and two elevators. Twenty-six were one-bed suites with 65 square metres (700 square feet) and sixty were two-bed suites varying from 88 to 341 square metres (950 to 1,120 square feet). Six of the two-bed suites had 341 square metres (1,120 square feet). The committee obtained the mortgage through I.L.M. Mortgage Company from the Bank of Montreal and later the Hong Kong Bank of Canada. This was the first co-op housing project for seniors aged fifty-five or plus in Alberta.

The building committee invited four architects to submit designs based on the CMHC guidelines and received three submissions. After a six-to-seven month selection process, the committee chose its preferred design and retained the architect to prepare the working drawings.

The building was combustible and non-sprinklered. There were seventy-seven stalls in the underground parkade. Forty extra stalls for guests were on grade. The on-grade parking lot was owned by the Church. Residents and visitors could use the parking stalls during the week but not during church services on Sundays.

The seniors did not have the experience to manage the housing development. So the building committee hired Communitas Group Ltd. as a consultant to provide technical resources for different stages of development such as financial arrangements, working drawings and specifications, construction administration, and co-ordination with the prime consultant. In its role as project management, Communitas provided communication between the CMHC and the building committee, monitored the construction progress and offered advice on decisions about construction changes. The Communitas Group charged fees based on a percentage of the capital cost of the project. At that time, eighty-six suites were rented within two weeks. The renters participated in a ground-breaking ceremony in 1989.

Construction began in the Spring of 1989, after five existing houses had been demolished. During construction, Communitas Group, the architect, CMHC, the general contractor and the building committee met once every two weeks. The original general contractor had financial problems in the fall of 1989. After negotiations between this original general contractor and the general contractor who had submitted the second lowest bid, the project resumed within one month. The second general contractor completed the project in June 1990.

The design of Summit Village was based on Dutch housing. The architect said that he visited Amsterdam to conduct his research for this project. The total cost of the project was $6.5 million, including $375,000 in site costs.

After the building was taken over, a handbook was prepared for the renters living on the property. There were fourteen committees, such as finance, maintenance, library, social activities, fire and safety, and shuttle committees. Members of each committee served a term of three years. The maintenance of the on-grade parking lot was shared with the Church.

In 1995 and 1996, the Senior Board reduced the five shares to four shares which was $2,000 for each suite tenant who is called a member and entitled to one vote.

Over the years, some original renters moved to nursing homes or other provinces. To date, there are still over sixty original renters living in the Village. And there is a long waiting list for future renters (Lynn Hannley 2000; Abma, Koning and Van Vliet 2000).

2.3.2 The Project Manager

The Communitas Group has community based project experience. This group can provide project management and administration of the project; provide support on technical issues to the owner; co-operate with the architect, the general contractor and the building committee as a team; recommend a contingency fund for the project to the owner; and provide a monthly financial statement for the owner.

2.3.3 The Role of Project Management

The Communitas Group, equipped with previous experience, acted as a project manager under a contract and was appointed by the Senior Board of Summit Village. This group was required to provide technical support and advice throughout the project; pay all project related bills; administer the progress of construction; and prepare monthly financial statement.

2.3.4 The Role of Building Committee

The Building Committee was formed by senior citizens of the Summit Village project. These committee members realized that they did not have technical knowledge about the construction and details. They invited two other members who were retired general contractors to become advisors serving on the committee with compensation. For the sake of budget issue, these in-house advisors reviewed the proposals and advice provided by the Communitas Group.

2.3.5 Analysis

The building committee had some concerns regarding the construction. For example, the architect forgot to show a beam and exhaust ducts on the plan. The missing items resulted in extra costs.

The quality of construction needed some improvements. For instance, the drywall at the ceiling level on the top floor had a gap. A moulding was used to cover this gap. Also, the foundation wall was cracked.

Every fall, the Senior Board presents the proposed budget to all members. Members either approve or reject the proposal. There are eighty-six votes in total. If the Board wants to spend money beyond the budget, members are required to approve this expenditure. The Board needs to submit an annual report to CMHC for auditing to ensure proper management.

But overall, the building committee felt quite satisfied with the project and with Communitas Group who ensured that project was completed within budget and on schedule. Summit Village was a success, earning recognition from the community, CMHC, and the three levels of government and proving that good project management is critical to the success of any project.

2.4 CASE 4: KEHEW PROFESSIONAL CENTRE, KEHEWIN CREE NATION, ALBERTA

2.4.1 General Description

The Kehew Professional Centre is located on the Kehewin Indian Reserve, some 25 kilometres south of Bonnyville, Alberta. The building is owned by Kehewin Cree Nation. It was project managed by an outside project management consultant and built by local members.

In the Spring of 1994, Chief and Council proposed a community building along Highway 657 on the Reserve. An architectural firm was appointed, and it designed a building containing a medical centre, a day care centre, a fitness centre, and a number of spaces for office rental. Construction started in 1994. However, due to undisclosed reasons, the project was cancelled after concrete piles were installed.

The Kehewin Cree Nation has operated a health centre since 1978. Due to rapid changes in health care, an existing building no longer provided enough space. A dental office and a doctor's office were in the basement and not accessible to physically disabled people. Therefore, in 1996, the Chief and Council negotiated with Health Canada Medical Services Branch (MSB) for a new health centre to replace the existing one. The MSB agreed that if the Band would construct a new building, to include a health centre, the MSB would lease that portion of the building. At the end of 1996, the MSB committed itself to leasing a space of 632 square metres (6,800 square feet).

In April 1997, the Chief and Council selected another site and appointed an architect to design a new multipurpose building containing a health centre, a day care centre, a fitness centre, a pharmacy, and a management office. The total gross floor area was about 2,040 square metres (22,000 square feet). A local Band member was appointed as the project manager. And a representative from each user group was appointed to a building committee. The project was funded and controlled by Kehewin Cree Nation with INAC contributing $200,000. In June 1997, the MSB director re-confirmed the lease and space requirements. At this time, drawings were more than eighty percent complete. A Child Welfare Office took over the Pharmacy space.

In September 1997, after working drawings and specifications were completed, the project manager resigned. The project was also put on-hold due to the delay in financing. In April 1998, the Chief and Council hired an outside project-consulting firm to be the new project manager. All the labourers hired to construct this building were local members, but both mechanical and electrical work was sub-contracted to outsiders. The building was completed in February 1999. In May 1999, there was a grand opening for the health centre, the day care centre, the Child Welfare Office, and an oil well servicing office which is owned by seven north-eastern Bands. In March 2000, a grocery store owned by the Band opened for business.

In order to construct the building within budget, some of the proposed electrical work was modified and an air-conditioning system was delayed. Total construction cost was $2.2 million (Luke Zandstra 2000).

2.4.2 The Band Project Manager

Mr. Gordon Gadwa was a former Chief and managed a construction company within the reserve. He had contracts on the reserve and also in the communities within the vicinity. On the basis of his management and construction experience, the Chief and Council appointed him the project manager for the new Professional Building Project—right from the feasibility study phase through until the completion of the design phase of the project. Mr. Gadwa later resigned from his position. The position was filled by a special Band project manager who was a former banker with excellent financial knowledge which enabled him to monitor the expenditures on this project and negotiate a bank loan.

2.4.3 The Outside Project Manager

Mr. Rudy Genereux of Continental Construction Ltd. was hired as a project manager. His company is located within the region, and his role included ordering materials; assigning work to local members; co-ordinating the major subcontractors; bookkeeping; preparing progress claims; and ensuring job site health and safety.

2.4.4 The Feasibility/Design/Construction Committee

The Chief and Council had a feasibility study prepared for a similar previous project. The Chief and Council did not require a feasibility committee at that time. They preferred having one committee for both design and construction. The committee was formed with four members from the community representing each user department: Health Care, Day Care, Economic Development, and Band

Administration. Each member had an area of expertise appropriate to his or her department.

2.4.5 The Role of Feasibility Study Committee

The role of this committee were similar to those of the Feasibility Study Committee mentioned in Case 1.

2.4.6 The Role of Design Committee

The role of this committee included looking after the spatial and equipment requirements of each department; the outdoor and indoor play areas for children in the Day Care Centre; accessibility by the disabled; security of the Pharmacy storage; and building materials and methods of constructions that could be handled by local members.

2.4.7 The Role of Construction Committee

The role of this committee included overseeing the quality and progress of construction in alignment with the established construction schedule; monitoring the construction costs; negotiating contracts with subtrades; and solving any personnel issues.

2.4.8 Analysis

The Chief and Council wanted to manage and construct this building with their own members. Unfortunately, the Band's project manager resigned before the construction started, so the Band had to hire an outside project manager to handle the day to day work and to co-ordinate the work of the local members. The project manager's role

also included supervision, purchase of building materials and accounting.

Local members were still hired for the construction stage. The same building committee that was there from the design stage remained in place through to the end of the project.

This was a successful project not only because it was completed within budget and within a reasonable time, but also because it provided a valuable learning experience for First Nations people. Local members were hired and gained work experience. Because the Band built this project with its own money, the Band administration gained decision-making experience. (INAC involvement was limited to site inspections.) The experience may have been even more valuable had the Band been able to do its own project management and gain experience in this area.

CHAPTER 3: ANALYSES

Analyses of the site information and First Nations culture are required for designing a curriculum relating to project and construction management and for organizing Blue Quills First Nations College in preparation for its future projects. This information is also relevant for planning and design purposes.

3.1 SITE INFORMATION

The specific site information of the College is not available. I have relied on Alberta Government general maps and the personal interpretation by provincial government officials of aerial photographs.

3.1.1 Geology

The College site is on the same geological formation that encompasses Belly River, Leak Park, Colorado, Viking, Mannville, Duvemay, Cooking Lake, Beaverhill Lake and Elk Point (Hamilton, Price & Langenberg 1999).

3.1.2 Topography

The College site is flat and is about 650 metres above sea level (Alberta Environment 2000).

3.1.3 Soils

The College site is in the Black Soil Region, which has a dry sub-humid climate. The soil has an average of 125 mm (5 inches) of a thin black surface horizon. A lime concentration horizon varies from

762 mm to 1219 mm (30 to 48 inches) in the thin black soil and in the orthic black soil areas, respectively (Alberta Government and University of Alberta 1969: 54; Alberta Bureau of Surveying and Mapping 1983; Schultz 1966: 30).

3.1.4 Hydrology

The College site is within the Northern Saskatchewan River Basin (Alberta 1983). The existing well water is drawn from this underground water system. Upper Therien Lake is 8 km. southeast of the College and south of St. Paul. Lower Therien Lake is 6 km. south of the College.

3.1.5 Vegetation

The College site can produce barley, flaxseed, oats, rye, wheat, canola and hay. It is not in a forestry region (Alberta 1983). Based on the aerial photographs, Mr. Lowell Lyseng, a senior technologist with Alberta Environment identified the types of land and vegetation around the College site:

- forty-foot poplar trees on the east side of the College
- shrub land on the northwest of the poplar
- grassland on the north side of the College
- wetland on the west side of the poplar
- more wet land to the south and west of the College (Alberta Environment 1998; Lowell Lyseng 2000).

3.1.6 Minerals

The College site is located upon gas field, lignite coal, salt, and clay bearing non-marine formations and upon an outcrop of sand and gravel suitable for construction industry materials (Alberta 1983). According to a Privy Council Declaration, the College owns all the surface and underground mineral and mining rights within the College Reserve (Privy Council 1996).

3.1.7 Wildlife Habitat

There is little information on the wildlife in St. Paul region.

3.1.8 Climate and Microclimate

.1 TEMPERATURES: The closet weather station near Blue Quills First Nations College is Cold Lake Station, which is about 121 km. north-east of St. Paul.

	JAN	FEB	MAR	APR	MAY	JUN
mean	-22.9	-12.7	-11.0	3.0	7.3	14.8
max	5.9	6.4	8.4	19.0	20.9	26.6
min	-42.1	-38.3	-33.9	-18.9	-5.2	2.7
	JUL	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
mean	16.0	16.9	8.9	2.6	-12.1	-
max	27.0	31.4	22.5	22.1	5.6	-
min	6.1	6.2	-6.7	-16.3	-30.0	-

FIGURE 3 - TEMPERATURE (C°) 1996 AT COLD LAKE
(Environment Canada 1996)

.2 WIND: According to weather information for the Lac La Biche region (54°46'N and 112°1'W), the winds come from the west and northwest. Lac La Biche is about 137 km. northwest of St. Paul (Environment Canada 1994).

.3 PRECIPITATION: Mean annual precipitation is 400 to 450 millimetres (15.7 - 17.7 inches) (Alberta 1983; Schultz 1966: 24).

	JAN	FEB	MAR	APR	MAY	JUNE
TOTAL	6.2	28.2	11.4	28.0	84.8	82.2
	JUL	AUG	SEPT	OCT	NOV	DEC
TOTAL	44.2	59.2	66.4	18.6	44.0	-

FIGURE 4 - PRECIPITATION (mm) 1996 AT COLD LAKE
(Environment Canada 1996)

.4 HUMIDITY: Humidity information for St. Paul region is not available.

.5 SNOWFALL: Mean annual snowfall is between 100 and 125 centimetres (Alberta 1983).

	JAN	FEB	MAR	APR	MAY	JUN
TOTAL	10.9	-	10.4	17.6	0.0	0.0
	JUL	AUG	SEP	OCT	NOV	DEC
TOTAL	0.0	0.0	-	5.0	64.8	-

FIGURE 5 - SNOWFALL (cm) 1996 AT COLD LAKE
(Environment Canada 1996)

.6 FROST FREE DAYS: The average number of frost free days is 80 or less. The last spring frost occurred after June 5th and the first fall frost occurred before August 25th (Alberta 1983; Schultz 1966: 24).

.7 SUNSHINE: Average sunshine hours per year are between 2100 to 2200 (Alberta 1983). Mr. Max Scharfenberger of Edmonton Space Science Centre provided the information on Sunrises and Sunsets in St. Paul (54°N and 111° W) (Max Scharfenberger 2000).

	JAN	FEB	MAR	APR	MAY	JUN
sun rise	08:43	08:12	07:11	05:56	05:46	04:58
@Azm	130 11	118 18	101 42	080 41	062 07	048 38
sun set	16:12	17:04	18:02	19:01	20:57	21:46
@Azm	229 51	241 20	258 56	279 40	298 13	311 33
	JUL	AUG	SEP	OCT	NOV	DEC
sun rise	04:57	05:38	06:33	07:27	07:26	08:20
@Azm	046 37	057 10	075 01	094 42	114 13	127 56
sun set	21:59	21:21	20:13	18:59	16:49	16:06
@Azm	313 15	302 30	284 37	264 58	245 33	231 57

FIGURE 6 - SUNRISE AND SUNSET AT ST. PAUL YEAR 2000
(Zephyr Services 2000)

.8 HISTORY OF THE LAND USE: The land was previously used as a residential school site and for farming.

3.2 LABOUR SOURCES

The Indian Register Population in 1998 shows the total number of members in each First Nation as:

- Beaver Lake First Nation 738,
- Cold Lake First Nation 1,899,
- Frog Lake First Nation 1,773,
- Heart Lake First Nation 228,
- Kehewin Cree Nation 1,438,
- Saddle Lake and Whitefish Lake First Nations 7,267.

The total population of the seven First Nations is 13,343 (Blue Quills First Nations College 1999: 7; INAC 1998a).

From the following age groups of the seven First Nations, there are many potential students for both university education and management education. Some of them can be trained as journeymen.

First Nations	15-19	20-24	25-29	30-34	35-39	Total
Beaver Lake	63	73	70	72	60	338
Cold Lake	176	184	172	188	147	867
Frog Lake	176	147	154	149	96	722
Heart Lake	19	27	28	19	10	103
Kehewin Cree	191	149	129	92	112	673
Saddle Lake	776	687	668	638	523	3292
Whitefish Lake*	inc.	inc.	inc.	inc.	inc.	inc.
Total	1401	1267	1221	1158	948	5995

FIGURE 7 - POTENTIAL STUDENTS FOR THE BLUE QUILLS FIRST NATIONS COLLEGE BASED ON AGE GROUPS IN 1998 INDIAN REGISTER POPULATION (INAC 1998a)

Note: * Whitefish Lake First Nation population was included in the Saddle Lake First Nation total.

3.3 LOCAL SKILLS AND QUALITY

Several First Nations do not have records of skilled and unskilled workers in their employment offices. Based on the First Nations Community Profile, I have summarized some data for the following First Nations (INAC 1999):

- Beaver Lake First Nation has members for maintaining equipment and appliances.
- Cold Lake First Nation has welders, heavy equipment operators and log builders. This First Nation also has as a member the renowned painter and artist Mr. Alex Janvier, who designed and painted the dome ceiling of the Museum of Civilization in Ottawa and a 1998 $200 gold coin for Royal Canadian Mint. Mr. Janvier is also a professor at the University of Alberta where he is working to revive a rare native language.
- Frog Lake First Nation has 22 skilled and 5 unskilled carpenters, 1 pipefitter, 1 reinforcement installer, and 1 heavy equipment operator.
- Heart Lake First Nation has oil field service workers.
- Kehewin Cree Nation has carpenters and steelworkers.
- Saddle Lake First Nation has heavy equipment operators, carpenters, plumbers, ironworkers and welders. Saddle Lake First Nation also has as a member the sculptor Mr. Stewart Steinhauer, who creates his art by sculpting rocks. Mr. Steinhauer has built his own straw baled house and is presently working for the Banff Fine Arts Centre.
- Whitefish Lake First Nation has carpenters, cement installers, stucco installers, and many other trades skilled and unskilled workers.

3.4 LOCAL MATERIALS & EQUIPMENT

The seven First Nations are located on the same geological formation as that of the College. This formation has gas, lignite coal, salt, sand, and gravel. It also has good topsoil. These First Nations produce only a negligible amount of building materials. Based on the First Nations Community Profile, I have summarized some data for the following First Nations:

- Beaver Lake First Nation has Beaver Lake Development Corporation for contacting work.
- Cold Lake First Nation has welding services, round log mill, maintenance service centre, heavy equipment contracting and logging contracting.
- Frog Lake First Nation has trucks.
- Heart Lake First Nation has logging materials.
- Kehewin Cree Nations has sawmill, steel manufacturing and sewing factory.
- Saddle Lake First Nation has a carpentry shop, a lumberyard, a sand and gravel yard, and heavy equipment for road construction.
- Whitefish Lake First Nation has a cement plant, a carpentry shop, a cedar products shop, a laundry and dry cleaning plant, and a garment factory.

3.5 THE EXISTING COLLEGE FACILITIES

Blue Quills First Nations College has a main building, a Trades Centre, and portables.

The main building consists of three connected buildings—the original building, a gymnasium and a library. The original building, which was built in 1930, has one basement and three storeys above grade facing south, and the north wing has two storeys above grade. It is a reinforced concrete structure with a facing of brick veneer. The floor is concrete. The windows are wood casement. The roof is a built-up flat roof on a wooden deck. And the interior walls are masonry with a plaster finish. The original plans can be seen in the Provincial Archives of Alberta (Provincial Archives of Alberta Accession No. 73.399 item 5).

The gymnasium addition was constructed in 1967 and is connected to the east side of the original building. It was constructed with concrete blocks with a facing of brick veneer. The floor is concrete with tongue and groove plywood on open web steel joists. The roof is an exposed wood deck on open-web steel joists and a built-up flat roof.

Attached to the north wing of the original building is a library building, built in 1985. The library was constructed with stacked concrete blocks and has a facing of brick veneer. The roof is also a built-up roof.

The Trades Centre was built in 1985. The two-storey front portion was constructed with concrete blocks and has a facing of brick veneer. The back portion consists of single story shops. The back portion was constructed with concrete walls and metal siding. The roof of the Centre is a built-up flat roof on a metal deck and has skylights. The interior walls were constructed with concrete blocks.

Three portable classrooms have wood frames and are on elevated supports. The stairs are installed at the entrances. The roofs are pitched with metal roofing material. They are about 12.8 m. x 7.3 m. (42 feet by 24 feet). The exterior wall finishes are siding.

Modernizing the present campus is ruled out as an option because of the age, rigid structure, the health hazards, and safety conditions of the existing Main Building. It also does not meet building code requirements. The Trades Centre can be evaluated further for possible inclusion in a future campus master plan. The portable classrooms are in poor condition, pose health and safety hazards and are not worth keeping.

3.6 INDIAN AND NORTHERN AFFAIRS CANADA (INAC) FUNDING

Annually, INAC provides a total of $802,020 for the core budget, which includes $230,000 for operation and maintenance and $10,000 for training (Debra Cardinal 1999). This core budget has a fixed amount for the staff salaries and educational equipment. However, this amount is hardly enough to meet inflation and the cost of equipment and materials.

3.7 TUITION FEES

Each of the seven local First Nations Communities sponsors tuition fees for its own students attending the College. INAC provides a certain amount of tuition fees to each student through the Band. However, because of tight budgets, the First Nations are unable to provide further subsidy to the College.

3.8 SIGNIFICANT FORM

Moore and Allen stress that function determines the form. There is only one form but it may have many shapes. The shapes are chosen based on cultural or personal preferences (Moore & Allen 1976: 12). The form will not only make the object functional, but also practical and desirable (Eco 1980: 22). This basic principle explains that a building has a function and a variety of designed shapes. Rapoport argues that "the ideal of home is aesthetic, not functional" (Rapoport 1969: 133). I feel that the concepts described by Moore and Allen and Eco are highly desirable.

Mandelbaum describes a Plains Cree's house as a hide covered tipi constructed on a three-pole foundation (Mandelbaum 1979: 87, 267 & 327). Actually, there are many types of tipis based on numbers of poles. Tipis can have 12, 16, 18 or 24 poles, but the basic form is circular.

As for Plains Cree's sweat lodges, Mandelbaum describes them as dome-shaped and made of arched willows, about 1200 mm (four feet) high and about 1800 to 2400 mm (6 to 8 feet) in diameter (Mandelbaum 1979: 90). Alternatively, an erected pole is bent over in an arch until it touches the ground. The pole is fastened to the ground and forms the framework for a domed lodge (Mandelbaum 1979: 268). They are ceremonial structures. (Sacred ceremonies are mentioned in Appendix 3.) A circular hole is dug in the centre for heated rocks. People lift up the cover to enter the sweat lodge (Mandelbaum 1979: 90). There are several types of sweat lodges based on different numbers of rocks and arched willows, such as ladies, men, Turtle, Bear, Sundance, Horse and Servers. The Turtle

Sweat Lodge has 8, 12, 16 or 24 willows. The Sundance Sweat Lodge has 84 willows and 84 rocks.

Both the doors of tipi and sweat lodge will open southward (Mandelbaum 1979: 90). However, the fenced circle for Tea Dance has openings towards the north and south (Meili 1991: 5).

3.9 SPECIAL FEATURES

The "Iron Creek" meteorite or "Manitou stone" had been on display at the Provincial Museum of Alberta, on loan from Victoria College in Toronto since 1972. It weighs 145 kgs (320 lbs). The meteorite was highly respected by both the Cree and Blackfoot people (Goa 1991: 51 & 52). In 1866, Reverend George McDougall removed it from a hilltop near Iron Creek and took it to Fort Victoria, which is about 12 km. from the present town Smoky Lake, Alberta. In 1874, it was sent to Red River in Winnipeg and to Victoria College in Cobourgh, Ontario. In 1886, it was in the Museum of Victoria College and later in the Royal Ontario Museum in Toronto (Freeman and Freeman 1999: 23). Blue Quills First Nations College is in the process of demanding the return of this meteorite to the future College site. (Information for other Sacred Rocks and their sites is included in the Appendix 4.)

3.10 CULTURE AND LANDSCAPE

In order to understand the character and behaviour of First Nations people, their traditional and cultural background needs to be studied. An understanding of character and behaviour is required so that the educational and training programmes and courses for First Nations people can be designed appropriately. Below is a brief summary of

the relationship between First Nations culture and the landscape. Thanks to Elders and other First Nations people who graciously took the time to be interviewed for this thesis and who patiently explained and described their culture. (More detailed information is available in Appendix 5.)

An important feature of First Nations culture is a communal type of government. Decisions traditionally based on consensus were made by the people of the community. They shared their ideas but supported the final decision of the majority. One might imagine that decisions that were not unanimous on occasion might lead to angry feelings. An important practice in helping to keep relationships amicable was the healing circle ceremony. And if one were to picture the harsh life of First Nations people living as nomads, it would not be hard to imagine the build up of stress and depression that would naturally arise from people living close together for long periods. In order to relieve such pressure, the healing circle ceremony provided services to people in the community similar to the counselling services in modern society.

Another aid for achieving harmonious social relationships within First Nations was the Tipi, a tent-type structure with fifteen poles. Each pole represented a value including obedience, respect, humility, happiness, love, faith, kinship, cleanliness, thankfulness, sharing, strength, good child rearing, hope, ultimate protection, and relationship among people. Values of Tipi are mentioned in Appendix 3. Therefore the tipi was more than simply a dwelling: it was a teaching device to teach First Nations members how to behave within a community.

Also important to First Nations culture is the "four concept." This concept has several branches including four corners, four colours, four cardinal directions and four winds. These branches of the "four concept" teaches First Nations people how to learn from and have respect for nature, which provides them their daily living. The "four concept" teaches people how to treat animals and how to prepare themselves for various weather conditions.

The "four concepts" are basic and simple so that people can memorize important knowledge when they could not record it in a simple way during their nomadic life. First Nations understanding of the cycle of the seasons and the daily cycle of time is also based on the "four concept."

First Nations Culture, like modern western society, recognizes different levels of knowledge. One important feature of First Nations culture is the high value that is placed on Elders who are respected because of their age which signifies experience and wisdom. It is not age in itself that is valued, but the natural development of people, they become wiser with the more experience they gain. Elders usually are people over age fifty-five with knowledge of spiritual rites and who are well respected in the community. Occasionally a younger person who has achieved a high level of spiritual knowledge and a high level of respect in the community may become an Elder. In the past, because of their experience and wisdom, Elders knew the landscape that they had travelled. They could record the important features of that landscape by means of narratives so that the people in the community could remember these features. Therefore their stories tied both landscape and history together and became their cultural settings that moulded their daily life. They knew how to find

the best hills or mountains for worshipping their Creator. And they knew the sacred rocks that provided them with information to plan for their hunting seasons and to make preparation for winters and defence.

The tribal story helps people to envision the difference between scientific management and tribal leadership. Every family, college, corporation and institution needs tribal storytellers. Failing to listen to the story is to lose one's history, one's historical context and one's binding values. "Without the continuity brought by custom, any group of people will begin to forget who they are" (De Pree 1989: 72).

3.11 BUILDING MATERIALS

When I explore the possible alternatives for designing new buildings, I keep in mind both local materials and local labour. The Blue Quills First Nations College has the availability of local members to provide the labour. However local materials are limited so, when making the design, I cannot restrict myself to using local materials.

3.11.1 Straw Bales

Straw materials are available around the College site and from Reserves. These materials can be used to infill the exterior walls. Normal wood framing construction can be handled by local members. For example, the maintenance crew of Sinte Gleska University and students of St. Francis Indian School in Rosebud, South Dakota built the Sinte Gleska University with straw-bale construction (Amelar 1999; Stevens 1998: 67). Stewart Steinhauer, a local member in

Saddle Lake First Nation used straw bales for constructing his house. The house is 190 square metres (2,060 square feet) and has a sloped roof and varies from about 2.1 to 5.0 metres (7 to 15 feet) high. Steinhauer used about six hundred straw bales that were 50 cm. wide, 40 cm. high and 90 cm. long (18 inches wide, 14 inches high and 3 feet long). Wood posts and beams were used as framework. Walls were formed by stacking the bales. These baled walls were reinforced with vertical steel dowels connected to a concrete slab. A stucco finish was applied to both the inside and outside of the straw walls. Stewart Steinhauer says the straw bales provide an excellent R-value. (I estimate the R-value to be between 25 to 35, depending on the density of the straw.) He estimated that he needed 6 to 8 ha. (15 to 20 acres) to produce the straw and required about one month to dry the straw before he could make it into bales (Stewart Steinhauer 2000). (Further information is mentioned in Appendix 6.)

However, prior to applying these straw bales for the purpose of building fire separation walls, the project manager will consult the fire commissioner of Human Resources Development Canada—Labour Branch for permission.

3.11.2 Conventional Wood Framing

Many local members especially journeymen carpenters are familiar with conventional wood framing construction involving wood trusses, rafters, joists, posts and beams. The wood is either 38 mm x 89 mm (2 inches x 4 inches) or 38 mm x 140 mm (2 inches x 6 inches). The length of wood varies from 2.4 metres to 4.8 metres (8 feet to 16 feet. Wood more than 3.6 metres (12 feet) long comes at a premium cost. Heavy lumber can be used for structural purpose.

3.11.3 Logs

If poplar logs are available, a log-house type of construction can be used. Logs are piled on top of one another. The gap between the logs can be fixed by means of a tongue-and-groove method, or by using a sort of plaster to seal the gaps. Logs are be prepared and dried in the workshop at least a few months ahead. If logs were to be used, the quantity and quality of logs would have to be checked so that the project would not be delayed due to a supply shortage. (Further information is mentioned in Appendix 6.)

3.11.4 Concrete Blocks

Conventionally, concrete blocks are made of cement and lightweight ballasts. Sometimes blocks made of concrete mixed with straw can be used for construction. The weight of these blocks is lighter than that of conventional concrete blocks. However, these lighter blocks may not be used for load bearing walls even if reinforcement is used. Regular concrete blocks such as 200 x 200 x 200 mm; 400 x 200 x 200 mm can be used for building.

3.11.5 Bricks

Clay bricks are common building materials; however, bricks are delivered from the suppliers. In the present market, bricks come in a variety of colours and are mostly metric in size. I feel that bricks are not First Nations traditional building materials.

3.11.6 Metal Buildings

Pre-finished materials such as metal sheets can be used. Pre-engineered structural material can be considered; however, this material may have the drawback of creating an industrial sort of image. Another disadvantage is that the pre-finished structural materials may be calculated to meet only the minimum standards. Furthermore, additional loads and further modification to the structure may be difficult with pre-engineered materials. This type of construction is related mostly to the design-built method. I feel that the committee is required to be cautious if the design-built method is used because every process will be controlled by the contractor.

3.11.7 Tilt-up Panels

Tilt-up panels can be made from concrete. Pre-designed and pre-formed moulds with or without architectural features can be made on site. Then the panels are cast in-situ, that is, concrete is poured into these moulds. When the foundation of the building is complete, workers use a crane to tilt these panels up and to position them according to plan. This method is suitable for construction that involves repeating wall patterns. Odd panels will be dealt with individually.

3.11.8 Prefabricated Wood Panels

Wood panels can be designed and prefabricated in workshops either on site or nearby. They can then be delivered to site for installation. The method is efficient if site work is well prepared in advance.

3.11.9 Rammed Earth

Rammed-earth is defined to describe both the material and the process of wall building with earth. The earth containing sand, clay and gravel, is tamped into the shape of a wall or building block. When the earth dries out, it hardens into a solid wall or block (Merrill 1947: 53). (Refer further information on rammed-earth in Appendix 8).

A historical earth-lodge village site from the 1600's was preserved on Siksika First Nation, Alberta (Many Guns and McMaster 2000). Mr. Jorg Ostrowski has built his rammed-earth greenhouse at 9211 Scurfield Drive, and some rammed-earth houses in Calgary, Alberta (Jorg Ostrowski 2000). In British Columbia's Gulf Islands, a 557 square metres (6,000 square feet) rammed-earth mansion was designed and constructed. The floors are made with puddled earth which is a pourable cement-earth mixture (Down 2000). (Refer further information on Mandan, earth lodges in Appendix 8).

CHAPTER 4: PROJECT MANAGEMENT

Within project management, there are several subdivisions such as construction, maintenance, planning, personnel, training, communication, administration. These subdivisions relate and integrate with one another in the management of a project. For instance, when a project begins, the project manager and the committee initiating the project need to establish their planning procedures and strategies, and determine their goals within the planning management stage. During the design stage, various departments are contacted for advice and details. Communication among all subdivisions and teams is essential to the project. During construction, allocation of resources and training is required. Administration of both project and construction management is important in order to monitor the progress of construction and costs. Therefore, construction management is a part of project management. Certifications and requirements for project manager, construction manager and superintendent are discussed in this Chapter.

4.1 PROJECT MANAGEMENT

In 1917, Henri Fayol, the father of Management Science, identified five integrated management functions related to accountability, responsibility, and legality: planning, organizing, directing, controlling and staffing (Kezsbom, Schilling and Edward 1989: 3). Successful project management requires people who have been involved in recruitment, leadership, development and commitment (Kezsbom, Schilling and Edward 1989: 5). Gray suggests that project management activities are non-routine and need to be conducted "within certain time and resource constraints" (Gray 1981: vii). The formal definition is:

> "the planning, organizing, directing, and controlling of company resources (i.e money, materials, time, and people) for a relatively short-term objective. It is established to accomplish a set of specific goals and objectives by utilizing a fluid, systems approach to management by having functional personnel (the traditional line-staff hierarchy) assigned to a specific project (the horizontal hierarchy)" (Kezsbom, Schilling and Edward 1989: 6).

The Federal Government describes project management as:

> "Project Management is the systematic planning, organizing and controlling of allocated resources to accomplish project cost, time and performance objectives. Project management is normally reserved for focused, non-repetitive, time-limited activities with some degree of risk and that are beyond the usual scope of program (operational) activities for which the organization is responsible" (TBC 2000a).
>
> "Project Management: The consolidation of the management of a project under a single responsible person (Project Manager or Project Officer) to whom resources are dedicated for the duration of the project" (INAC 1986a: 7).

Many scholars such as Ryder and Mercer discuss project management as it relates to the contractor (Ryder and Mercer 1980: 69 to 82). In this thesis, I assume that the project management led by a project manager representing Blue Quills First Nations College begins before consultants are retained to do any feasibility studies or designs.

4.1.1 Project Manager

"A Project Manager is accountable as the company representative for time, cost and general overall project performance, and is responsible for promoting close and harmonious relation with the owner/client, and the design consultants. The major objectives of the project team under the overall leadership of the Project Manager include client relations, project costs, project schedule, project quality, labour

relations not within the control of the project team and the productive effort required to meet specific project requirements and contractual obligations. The Project Manager provides leadership in connection with overall project matters and strategy. He/she may be responsible for managing one or more projects" (CCA 2000).

4.2 CONSTRUCTION MANAGEMENT

> "Construction Management is that group of management activities, over and above normal architectural and engineering services, related to a construction program—carried out during the pre-design, design, and construction phases—that contributes to the control of time and cost in the construction of a new facility" (Heery 1975: 39).

The Federal Government also describes the Construction Management:

> "Construction Management is a method and in the construction industry to plan, simplify, and coordinate work in progress" (INAC 1981: 1).

In other words, both construction management and project management begin when the consultant—either architect or engineer—begins to develop the design, drawings and specifications for tender and the construction contract.

4.2.1 Superintendent

"A Superintendent provides the overall on-site administrative and technical management for a project. Possessing wide-ranging technical and managerial skills, the Superintendent's role is normally one of independent project supervision for small to medium-size projects or directing on major segment of a more extensive project. It is a position above the job-site foreperson. The Superintendent ensures the total construction effort is in accordance with design, budget and schedule, and reports to a Project Manager or Owner" (CCA 2000).

4.3 MANAGEMENT ORGANIZATIONS ESTABLISHED IN ALBERTA

Based on different qualification criteria, two organizations such as Project Management Institute and Canadian Construction Association in Canada can certify project management professionals, project managers, construction managers and superintendents. Blue Quills First Nations College can evaluate their accreditation requirements in the following sections.

4.4 PROJECT MANAGEMENT INSTITUTE (PMI)

Project Management Institute (PMI) is a global organization for certifying professionals. Its headquarter is located in United States of America (PMI 2000).

4.4.1 History of Project Management Institute (PMI)

In 1969, a group of individuals in the field of project management around the world, formed Project Management Institute (PMI). These professional individuals believe that project management skills are needed for success in the global marketplace and PMI's leadership has grown rapidly. These individuals are working in project management in the information-technology, utility, financial services, marketing, telecommunications, construction, pharmaceutical and automotive industries. At present, there are over 20,000 Project Management Professionals (PMPs) in 26 countries.

4.4.2 Project Management Professional Certification

PMI offers many one-day to four-day seminars for members to gain knowledge and techniques on project management for earning sixty valuable Professional Development Units (PDUs) every three years towards their Project Management Professional (PMP) Certification. These PDUs will be related to the following categories:

Category 1: Formal Academic Education.
Category 2: Self-directed Learning and Professional Activities.
Category 3: PMI Registered Education Providers — accredited schools and professional associations.
Category 4: Other Providers — organizations recognized by PMI.
Category 5: Service to Professionals or Community Organizations.

PMI develops seminar materials and facilitator guides to assist its Colleges, Chapters and Specific Interest Groups (SIGs) and align organizations in offering fundamental project management training.

PMI is an authorized CEU sponsor member of the International Association for Continuing Education and Training.

In 1984, PMI began the Project Management Professional (PMP) Certification Program. On March 21, 1999, the PMI Board of Directors approved the charter and role of the Certification Board Centre (CBC) which is responsible for all decision-making regarding certification-related matters and maintains the standards. In 1999, PMI's Certification Program Department became ISO 9001 certified (PMI 2000).

The PMP candidate will pass an examination to demonstrate an accountable understanding and knowledge of project management. Also, he will fulfil one of the following Categories:

Category 1:

1. The candidate holds a baccalaureate or equivalent university degree and has a minimum of 4,500 hours of project management experience within the five process groups including initiating process, planning process, executing process, controlling process and closing process (Duncan 1996: 29 to 34).

2. The candidate will have at least three years non-overlapping project management experience within a six-year period prior to the application.

Category 2:

1. The candidate does not hold a baccalaureate or equivalent university degree but holds a high school diploma or equivalent secondary school credential, and has a minimum of 7,500 hours of project management experience within the five process groups including initiating process, planning process, executing process, controlling process and closing process (Duncan 1996: 29 to 34).

2. The candidate will have at least five years non-overlapping project management experience within a eight-year period prior to the application.

4.4.3 Accreditation

PMI has established accreditation standards for university and college graduate degree programs in project management.

4.4.4 Northern Alberta Institute of Technology

The Northern Alberta Institute of Technology (NAIT) offers a course "PMI-NAC Exam Preparation" for students to write the Project Management Professional (PMP) Certification examination (NAIT 2000).

The Northern Alberta Institute of Technology (NAIT) also provides the following twelve modules for Project Management Certificate (NAIT 2000):

PMC101 Introduction to Project Management.
PMC102 Client Service Principles: An Inside-Out-Approach.
PMC103 Team-Building & Facilitative Leadership.
PMC104 Project Scope Management.
PMC105 Project Time Management.
PMC106 Project Management Tools.
PMC107 Project Cost Management.
PMC108 Project Communication Management.
PMC109 Project Risk Management.
PMC110 Project Quality Management.
PMC111 Project Procurement Management.
PMC112 Project Human Resource Management.

4.4.5 Standards

PMI is recognized as a Standards Development Organization by the American National Standards Institute (ANSI). PMI publishes "A Guide to the Project Management Body of Knowledge" (PMBOK Guide) approved by ANSI.

4.5 CANADIAN CONSTRUCTION ASSOCIATION (CCA)

Canadian Construction Association has a CCA Gold Seal Certification Program for Construction Project Managers, Superintendents and Estimators (Canadian Construction Association 2000).

4.5.1 History of Gold Seal Program

The Construction Management Institute (CMI) was established in 1891 and continued to exist until 1991 when it merged with the Canadian Construction Association (CCA). The CMI provides construction management educational courses, and it works to improve the quality and mobility of managers. In the mid-eighties, federal and provincial governments along with the Canadian Construction Association (CCA) worked to develop the Gold Seal Program.

In 1986, the CMI began to define the profiles for Project Managers, Superintendents and Estimators. In 1988, a management profile was defined and approved for corporate managers. In 1990, the province of New Brunswick established the Department of Advanced Education and Training. Through 1991 and 1992, six banks of examination questions were developed. In 1992, CCA with Employment and

Immigration formed a Gold Seal Development Committee under the Industrial Adjustments Services Program to develop the policies, procedures and criteria for Gold Seal Certification and a syllabus of education for each occupation.

4.5.2 Gold Seal Certificates

Based on the CCA guideline, there are two options for candidates to obtain the certification. First, Gold Seal Certificates are based on a candidate's education, experience, a two-year Grandfathering period and the successful completion of Gold Seal examination. Secondly, Certification can be obtained by examination with 3-year experience with 100 Gold Seal points, or by senior practitioner with fifteen-year experience and 50 Gold Seal points.

Candidates are recommended to gain knowledge on the following courses:

- Overview of the Construction Industry,
- Construction Safety,
- Communication.
- Law and Contracts for the Construction Industry,
- Construction Estimating,
- Management of Human Resources in the Construction Industry,
- Construction Job site Controls,
- Construction Planning - scheduling,
- Project Costing Control and Accounting.

4.5.3 Gold Seal Accreditation Board

The Gold Seal Accreditation Board (GSAB) has developed a process to assist in accrediting institutions and their courses to meet the Gold Seal National Curriculum Standard. In 1998, GSAB identified some institutions based on the their availability of the courses which are of immediate benefit to Gold Seal candidates.

4.5.4 Accreditation Program

The Accreditation Program includes the following organizations:

- The Southern Interior Construction Association offers 30-hour courses with facilitators and speakers instead of traditional lectures and instructors. Courses include Construction Contract Law, Computerized Estimating, Planning and Computerized Scheduling, Productivity Improvement and On-site Management.

- The Ontario Road Builders' Association (ORBA) has developed courses on Effective Communications and Negotiating Skills, and Financial Management for Non-Financial Manager.

- The Merit Contractors Association has adopted Interactive Video Instruction. It offers Construction management Skill Course, and Supervisor Training Program.

4.5.5 University of Alberta

In Alberta, Faculty of Extension, University of Alberta offers the Construction Administration Certificate Program to "assist entry-level

practitioners as well as seasoned personnel to develop the competencies needed to be effective administrators of construction projects in a wide range of sectors." The program includes "a multi-disciplinary approach integrating engineering, administrative, accounting, legal, social, and psychological knowledge with problems and challenges in practices." The courses include:

- Fundamentals of Project Management,
- Contract Law and Construction Documents,
- Resolving Construction Disputes,
- Constructability Seminar,
- Coping with Stress,
- Conflict and Confrontation,
- Computer Assisted Project Planning.

The programme requires 251 credit hours - 209 in required courses and 42 of elective enrichment (University of Alberta 2000).

4.5.6 University of Calgary

In Alberta, Faculty of Continuing Education, University of Calgary offers the Construction Administration Certificate Program for entry level, junior management or job supervisory personnel in the construction industry. The courses focus on the interaction of legal, regulatory and technical aspects of construction, and the development of skills and knowledge in business, management and interpersonal relations. The programme requires 170 hours of compulsory courses of instruction and minimum 130 hours of optional courses and seminars (University of Calgary 2000).

Compulsory courses include:

- Fundamentals of Construction Project Management,
- Construction Planning and Scheduling,
- Construction Costing,
- Contract Law and Documents,
- Construction Administration Comprehensive Seminar.

Optional courses and seminars include:

- Avoiding Construction Disputes,
- Construction Bonding and Insurance,
- Control Systems in Construction Projects,
- Human Behaviour in Organizations: Elective Management,
- Identifying Mechanical and Electrical Systems,
- Management Communications: Interpersonal Skills,
- Open Choice from the General Management Certificate,
- Resolving Construction Disputes,
- Constructability Seminar,
- Understanding Construction Specifications.

4.5.7 Northern Alberta Institute of Technology

The Northern Alberta Institute of Technology (NAIT) offers a two-year Construction Engineering Technology program which "is designed to provide students with opportunities to acquire a broad knowledge of technical, engineering, and management aspects of the construction and related industries. Basic skills taught include drafting, surveying, computing, estimating, structural analysis and various project management activities within an environment in which the student can develop communication skills and compatible attitudes that will contribute to success as a Construction Engineering Technologist."

"Estimating and tendering; contract management and administration; supervision techniques; quality control; property assessment; surveying and layout of construction projects; construction project planning, scheduling and cost control; construction productivity improvement; drafting and blueprint reading; plan checking and building code application, coordination of mechanical subtrades and elements of wood, formwork, concrete and steel design (NAIT 2000)." This Program can assist the graduates to become the junior project managers.

4.6 COMMUNITY BASED PROJECT MANAGEMENT EDUCATION

A community-based education is important because a "student does not need to leave the family to take a course" (Charles Wood 2000). When a group of friends work together, they can create a team spirit. When they successfully complete a project, they will "take pride in their accomplishment" (Lewis 1995: 105).

A community based project management programme will benefit the First Nations community because students will learn how to manage and construct projects in the community, without unnecessary reliance on outsiders. The programme will involve students in their community and it will teach them decision-making skills that will benefit the community, especially as First Nations prepare themselves for future independence, i.e. self-government.

The people living in a community are the ones who know best what types of buildings they need and in what priority they need them. Community members who have been educated in project management are best able to establish community-appropriate design programmes

and guidelines for such things as size, functional spaces, materials, features, and height of the buildings. Because they live in the community, their attitude towards their projects will be one of pride and responsibility.

4.7 COMMUNITY PROJECT MANAGEMENT: SUCCESSES

First Nations people want to build their own buildings for themselves and for future generations. The case studies presented in this thesis offer some insights into community based project initiation and management and into management skills development.

The case studies show that First Nations communities have been able to establish goals for various project phases. For instance, in order to gain experience required for future projects, First Nations communities have appointed project managers for the study, design and construction phases of projects.

First Nations communities have shown they understand their problems and can find solutions to them. For example, when an experienced project manager resigned from their project, the Kehewin Cree Nation (Case Study 4 in Chapter 2) looked for an outside project management company to help them so that the project could continue. Similarly, when the seniors of Summit Village (Case Study 3 in Chapter 2) had no technical experience, they relied on the experienced Communitas Group to manage their project.

The experience with the Pakan Elementary and Junior High School (Case Study 1 in Chapter 2) shows the wisdom of keeping the Band administration separate from construction administration. Such a

separation helps a Chief and Council to avoid problems with nepotism and political interference.

Relationships among the local members seem to improve greatly when they work together on the same project. Local members take pride in the work that they have done, in part, because a successful project demonstrates that they do not need outsiders to do the work for them. They develop respect for themselves and others involved in the project. A sign of this pride and respect is that vandalism against locally managed and constructed buildings is reduced significantly.

The four case studies mentioned in Chapter 2 represent four typical options: In Case 1, the community uses its own project management, construction management and local members for the Pakan School project. In Case 2, the community uses its own project management but uses an outside general contractor for construction. In Case 3, the community uses outside project management to provide technical services and carry out the actual day to day contract administration duties and uses an outside general contractor for construction. In Case 4, the community uses outside project management and its own local labour force. The pros and cons of each of these approaches will be discussed in the Chapter 7.

CHAPTER 5: MANAGEMENT EDUCATION

If the new College facilities were constructed, I would recommend that all crew members including project managers, construction managers, superintendents, foremen, journeymen, and trainees attend the project management and construction management courses in the classrooms prior to working on site. The courses could help them to understand the essence of objectives, planning, scheduling, cost, quality control, co-operation and teamwork. The courses can be accredited by the Canadian Construction Association.

Some educational programmes need to be instituted so that local members can be trained to the skill levels required to work on unconventional construction such as that involving solar energy or green projects.

As Stallworthy and Kharbanda mention in their book, *Total Project Management*, there are about fifty-two types of project management courses, both nationally and internationally, for specific, general and tailor-made topics (Stallworthy and Kharbanda 1983: 121). It is not practical for First Nations members to take several general management courses and then try to apply the knowledge from these courses to a particular project. Specific knowledge is required for a specific project. The Blue Quills First Nations College needs a tailor-made course for its projects. To become a certified construction project manager and superintendent, the candidates are required to pass the Gold Seal Program criteria established by the Canadian Construction Association.

I suggest the following outlines for both project management and construction management courses, which would be further developed by Blue Quills First Nations College. (References for the Gold Seal Program, Canadian Construction Association, proposed project management, construction management and trade courses are included in Appendix 7.)

5.1 SUGGESTED CONTENT OF THE PROJECT MANAGEMENT COURSE

The Project Management Course will be designed to help the persons who have the ability to lead the project from day one to the end. They will be guided to understand the general requirements of each particular project such as facilities for laboratory, administration, teaching and its constraints, such as time, site condition and budget. These persons are required to have some practical knowledge about how a project progresses from stage to stage. The course will discuss the topics that are covered in conventional project management courses. Later, First Nations traditional and cultural topics will be included in the course to suit First Nations project management policies.

5.1.1 Planning and Scheduling

Planning and Scheduling will cover the techniques of time management and progress milestones by means of several monitoring methods. Each method of planning and scheduling has its advantages and disadvantages, based on the characteristic of each project. The project milestones are not necessarily rigid and time is estimated. Sometimes a project requires minor modification to suit the current conditions such as the labour supply and the weather. For example, the Work Breakdown Structure Method is used to breakdown a total project into many small units. This breakdown allows each unit to be completed at a specified time–either at the same time as other units or at a certain time before other units that come at later stages in the project.

The Critical Path Method (CPM) is another example; it uses arrows to

show the performance sequences of work orders and it shows the total time for the large project. The Gantt Chart is useful for small-scale project but may not be used for complicated project with many broken down tasks.

The purpose of scheduling is to set each task with the start dates, estimated duration time for different phases and completion date. As mentioned before, some tasks can be carried out concurrently with their own schedule.

The completion date is important to any project and will be established well beforehand. It can affect the operation of the facility with reference to items such as installation of equipment, furniture and move-in. For instance, the College needs to start the new semester in September which, in turn, dictates that the new facilities be completed not later than the end of June. This gives sufficient time for computer system installation, networking system, furniture layout and teaching appliances.

5.1.2 Project Control System

The Project Control System is based on reporting and feedback technique; it audits and corrects the difference between the project's actual progress and its scheduled progress. Performance and quality of work can also be evaluated with this system.

One of the major roles of the project manager is to coordinate the team members to begin and end the task on time and budget. If there are potential problems such as progress, schedule, performance, quality of work, the project manager is responsible to solve and

correct the problems as soon as possible in order to save time and cost. The Gantt Chart by means of a bar format shows the estimated schedule and actual progress. The chart can be used as a visual summary in the report to track the schedule.

5.1.3 Cost Estimation System

The Cost Estimation System will establish the possible budget of the project based on the available information on the project at various stages. For instance, at the feasibility study stage, INAC uses a Class C cost estimate (INAC 1984c). The cost estimate is a total cost based on unit price. But at the tender stage, INAC uses a Class A cost estimate (INAC 1984c). The estimate is required to be very accurate because all the necessary information is indicated and specified; and at this stage the difference between the estimated cost of the project and the actual cost will be no more than five per cent.

This system also provides the project manager with the knowledge and skills to prepare, assemble and submit bids.

5.1.4 Resource Allocation

The Resource Allocation System is based on construction methods and building materials used for the project. For instance, if steel frames and columns are used, cranes and welders will be required for the project. The project manager needs to pick the right people to finish the work with quality and efficiency; and order the right materials delivered to site at a specific time. Sometimes, this system is combined for both project management and construction management.

5.1.5 Accounting System

The Accounting System records all the expenses and revenues of the project. This system detects any cost overruns early enough so that the management can be warned in time and solutions can be found. The money is available for paying salaries, materials, insurance, permits and renting equipment and instruments.

5.1.6 Law and Contracts

The participants will obtain an overview of the concepts of law relating to the construction industry and different types of contracts and documents. This knowledge can provide the participants for preparing contracts for the major subtrades and for understanding the contracts during bidding process.

5.1.7 Communication

The participants will learn the processes and procedures of proper communication within the construction industry. Both written and verbal instructions need to be documented and distributed among the attendants for their records and actions.

5.2 SUGGESTED CONTENT OF THE CONSTRUCTION MANAGEMENT COURSE

The Construction Management Course (like the Project Management Course) will be designed to help persons who have the ability to construct the project from day one to the end. They will be guided to understand the criteria of each particular project and its constraints

such as time, site condition, budget. These persons have some practical knowledge about how a project progresses from stage to stage. If it is a simple and uncomplicated project, usually the construction manager acts as project manager. For the complicated and large project, construction manager reports to the project manager. Therefore, the roles of construction manager overlap with those of project manager. Construction manager is also called site superintendent. The course will discuss the topics that are covered in conventional construction management courses. Later, First Nations traditional and cultural construction methods will be included in the course to suit First Nations policies.

5.2.1 Construction Scheduling System

The Construction Scheduling System measures the project's progress at different stages. Normally, the construction schedule matches the project manager's schedule. Any actual deviation between the two schedules will be dealt with immediately so that the project is not jeopardized.

5.2.2 Planning

Planning for construction during the pre-tender and pre-contract stage can provide information and advice for the design team. During the contract and tender stage, suppliers can be invited to make bids based on the drawings and specifications so that the project will have the specified products at a fair cost.

5.2.3 Resources Allocation System

The Resources Allocation System helps the project to arrange labour, materials and equipment in advance.

5.2.4 Project Control System

The Project Control System is based on reporting and feedback technique; it audits and corrects the difference between the project's actual progress and its scheduled progress. Performance and quality of work can also be evaluated with this system.

5.2.5 Quality and Cost Control System

The Quality and Cost Control System ensures that the quality of construction and workmanship are up to standards and within budget.

5.2.6 Law and Contracts

The participants will obtain an overview of the concepts of law relating to the construction industry and different types of contracts and documents. This provides knowledge in preparing contracts for the major subtrades and understanding contracts during bidding.

5.2.7 Communication

The participants will learn the processes and procedures of proper communication within the construction industry. Both written and verbal instructions need to be documented and distributed among the attendants for their records and actions.

5.3 APPRENTICESHIP AND INDUSTRY TRAINING

Local First Nations members can be sponsored by their own First Nations to attend technical training courses at Blue Quills First Nations College to gain skills and experience. Local members can also obtain their journeyman certificates from the following programmes (Alberta Apprenticeship and Industry Training 2000):

1. Apprenticeship Training Program
2. Interprovincial Standards (Red Seal) Program (R)
3. Qualification Certificate Program (C) and
4. Registered Apprenticeship Program.

I recommend that specific trade courses be offered at Blue Quills First Nations College that would enable students to work on the construction of the College's new facilities. (The proposed trade courses are included in Appendix 7.)

5.4 COMMUNAL APPROACH TO MANAGEMENT AND TECHNICAL COURSES

In order to standardize the procedure or project management, according to Lewis, "It helps to have the entire team trained in the basics" (Lewis 1995: 110). The First Nations students—potential workers and managers—will attend courses in the classrooms to learn the basics. The classroom work will also allow students to develop personal contacts that will help to create a team spirit, which will be important later on the construction project. This training can provide them with the confidence to work on site and also with the skills to be an effective part of the local labour force.

These local members can be trained to construct the proposed facilities at Blue Quills First Nations College. Once the local members become qualified journeymen, they can work for their own reserves, local communities and industries. And once a pool of journeymen is created, the Blue Quills First Nations College will have a supply of trades people that "both industry and communities need ... for infrastructure and housing projects" (Charles Wood 2000).

Continuous education will be provided to the members. After they have practised skills on site, they return to classroom for discussion and technique improvement. This will provide the opportunity for the members and the instructors to exchange their experiences and techniques, for as Lewis says, "no learning takes place without feedback" (Lewis 1998: 291).

5.5 SHORT TERM ALLIANCES WITH EXISTING INSTITUTIONS

In the short term, several institutions, such as the University of Alberta, Athabasca University, Northern Alberta Institute of Technology, University of Calgary, Grant MacEwan Community College, or Lakeland College, could offer start-up programmes for conventional courses and materials. And Blue Quills First Nations College could evaluate the course materials during this stage. By relying on other institutions for the conventional course content, the College could save time and eliminate the trial and error process that it would have to go through to develop its own courses from the very beginning. Over the longer term, once everything was organized, Blue Quills First Nations College could offer its own courses that would include First Nations traditional and cultural content, as discussed below.

5.6 A CULTURAL APPROACH TO PROJECT MANAGEMENT

The project management course at Blue Quills First Nation College would have a major focus on First Nations Culture criteria. First, the course would revive First Nations communal decision making which is based on seeking consensus. The teaching of the Leadership and Management Programme at Blue Quills First Nations College would be based on the traditional First Nations government. First Nations need to create their own world based on their own culture. The College will help them in this and also prepare them for success in modern society. The project management course would relate to First Nations life and knowledge. Students would be encouraged to heed their original Life Force and learn modern society's Forced Life as well. (See First Nations Culture and Landscape in Chapter Three and Appendix 5.)

First Nations students may have family issues that may prevent them from attending classes regularly or concentrating on the course work. Therefore, Blue Quills First Nations College applies healing circle practices and the sweat lodge ceremony in its curriculum for all students and staff during the semester. These ceremonies and practises are the First Nations counselling services to the students. Based on the traditional Four Corners Principles, both teachers and students will help each other to understand any given project. The College will encourage the students how to behave, think and respect others based on the concept of Tipi. Furthermore, the College believes that First Nations members be allowed to live and work according to traditional cosmology and that they be able to work according to the natural cycles of the sun as opposed to the time dictated by the clock. Therefore, their pace of work and study will be

different from that in non-First Nations society. Elders will be invited, not only to provide healing circles and sweat lodge ceremonies, but also to teach oral traditional knowledge as it relates to planning and design, and construction in ways that respect the natural environment. The Elders will help the College convert the existing landscape into a learning environment.

If INAC fund is involved, Blue Quills First Nations College will apply the concept of "Test Project" developed by Whitefish Lake Band Administration #128 for their Pakan School as described in Case Study 1 in Chapter 2.

CHAPTER 6: ORGANIZATION OF BLUE QUILLS FIRST NATIONS COLLEGE

6.1 BOARD OF GOVERNORS

The history of Blue Quills First Nations College is described in Appendix 1. Seven reserves own the Blue Quills First Nations College. A representative from each reserve becomes a member of the board of governors. The College does consider inviting certain non-First Nations people into its organization. For instance, the board of governors expands to accept outsiders who are respected in the community such as bankers, Members of Parliament and Members of the Legislative Assembly. The new members are encouraged to promote the College and to help with fundraising. The College's openness to outsiders presents a positive image to the three levels of government and to the public sectors.

The Board of Governors establishes several committees to handle different tasks. Examples of these committees are the Planning Committee, the Feasibility Study Committee, the Design Committee, the Construction Committee, and the Operation and Maintenance Committee. Further special task force committees and sub-committees can be formed. Budgets, priority of projects and guidelines can be established by members from various committees. Each committee includes representatives from the Board of Governors, the project management team, and the construction management team. If these various bodies plan a project together, they will likely achieve better results. (Members can sit on more than one committee.)

6.2 PROJECT MANAGEMENT REGIME

When Blue Quills First Nations College wants to put into place its project management and construction management, it can prepare a regime to outline activities, personnel roles and organizational structure. By doing this, the College can demonstrate that it has done a procedure analysis of its project; and it can present this regime to other First Nations, financial institutions, funding agencies, and INAC for to request their support for funding.

6.3 ROLE OF INDIAN AND NORTHERN AFFAIRS CANADA (INAC)

If it is involved in the new Blue Quills First Nations College Facilities, INAC will need to take a positive and flexible approach in order that this unique educational facility be successful. Since the 1970's, when INAC took over Blue Quills First Nations College, these seven First Nations have not received adequate funding from INAC to manage and operate the College. This is because, presently, INAC has outdated educational accommodation guidelines for K4 to grade twelve. Under these guidelines, the College is funded as a high school and barely gets enough money for the proper operation of a secondary school. It is certainly not adequately funded for a university.

INAC will need to expand the current funding policy or develop a new funding policy that takes into account funding not only for K4 to grade twelve, but also for post-secondary institutions such as universities. Sooner or later, INAC will have no choice but to resolve the funding issue, and it's better for INAC to begin gradual funding increases now. I believe the simplest and most effective way to increase funding is to expand the core budget for Blue Quills First

Nations College. In this way, INAC can avoid being forced into legal and political conflicts.

INAC will be dealing with educated First Nations people at the Blue Quills First Nations College. INAC will encourage its staff to have a professional and respectful attitude towards First Nations cultural and traditional ways. Furthermore, INAC will be dealing with university level programmes for Blue Quills First Nations College. INAC will have senior staff with the qualifications and understanding necessary to deal with higher education programmes.

If it becomes involved in the study, design and construction of the College, INAC will recognize the competence of First Nations people in the area of project management and construction. INAC will let First Nations design their own College in their cultural and traditional ways so that they can develop a learning environment suitable for First Nations members.

6.4 ROLE OF ELDERS

According to Patricia Makokis, Elders are the bearers of traditional wisdom and teachers of the young (Patricia Makokis, 1999). They are honoured as wise and spiritual people because of their experience and knowledge about landscape, history and culture. (See First Nations Culture and Landscape in Chapter 3 and Appendix 5.) Because of this knowledge, which was passed down orally from their ancestors, they can guide the First Nations people's behaviour according to their culture. Elders can also provide information about the harmony between the built environment and the natural landscape. Elders can participate in all phases of planning, design and construction. They

can provide assistance to the teachers and students about courses and personal issues.

6.5 TRIBAL CHIEFS VENTURES INC. (TCV)

Tribal Chiefs Ventures Inc. is an organization formed by six out of the seven First Nations who own Blue Quills First Nations College. TCV, which is located in St. Paul, has a technical and engineering section that provides technical advice on environmental aspects, building evaluations and inspections, planning, and construction to the six First Nations and the College.

6.6 ROLE OF ARCHITECTS

An Architect has a gift of talent to envision a space, and is able to plan and design a place, blending with the harmony of the environment. Prior to the acceptance into the school of Architecture, the candidate has to complete two years of university education and submit a personal portfolio of his potential talent to the admission committee. Then the student has to be trained under many outstanding professors and professional mentors from the qualified school of architecture for four to five years.

After graduation, he is required to fulfil a two to three year internship to obtain practical experience. Subsequently, he has to pass both written and oral examinations of the Association of Architects in order to be qualified as a registered or licensed architect. This complete process may take an architect at least nine to ten years.

Based on his education, experience and practice, an Architect is good at planning, facility programming, feasibility studies, facility evaluation, building code analysis, contract documents and contract administration for projects.

Architects will be the leading designers for the new Blue Quills First Nations College and advisors to the College on building codes, fire and safety issues, accessibility for disabled people, and technical processes. At the beginning of the first project, architects will educate and train the College study team on how to complete feasibility studies with proper site selections, budgets and priorities. Architects will train and coach the College design team on how to program its criteria, design processes, and analysis of the designs. Then, architects will continue to advise both First Nations project and construction teams to manage and build the buildings. At least one project will be done under the coaching of the architects so that First Nations members can familiarize themselves with the complete process of an actual project and gain appropriate experience.

The next project will be involved by the team formed by both First Nations members and the architects. First Nations members know when they are required to provide their particular cultural inputs from their Elders for the project. After a few projects, First Nations members, the architects and other consultants (municipal, structural, mechanical and electrical) will understand the major issues of First Nations regarding the relationship of their learning environment and space.

6.7 QUALIFIED WORKERS

Blue Quills First Nations College will offer industry-training courses so First Nations members gain certification. In this way, the College will have a continuous supply of qualified labour to build the new facilities. This skilled labour force will also be a benefit to the First Nations communities outside the College.

6.8 QUALITY CONTROL

Blue Quills First Nations College will continue to train First Nations members to obtain certain certificates for quality controls. For instance, some members will be certified as building inspectors, safety officers, bookkeepers, purchasing officers, and maintenance workers. Also these graduates will be able to work for Tribal Chief Ventures Inc. which is described before in this chapter.

6.9 BID BONDS AND CONTRACT SECURITY

As mentioned previously, First Nations do not have spare money to purchase the bid bonds for tender submissions. Many financial institutions such as banks, credit unions and insurance companies cannot provide the bid bond certificates to First Nations due to the need of guarantees. In order to gain the confidence of these institutions, First Nations can build up their creditability by managing and constructing projects themselves.

Alternatively, several First Nations can join together to take on capital projects. They can share the liability and profit. The advantages of joint ventures include lowering the unemployment rate within the

reserve and training local members. First Nations can contribute shares to establish a pool of money for bond purposes. They can submit their bids on their own capital projects so they can compete with outside general contractors under the INAC policy on Construction Contracting Guidelines for First Nations and Aboriginal Communities (INAC 1998c). They would then have cash bonds to replace bid bonds and contract security and will not need any bond certificates from either banks or insurance companies.

It is feasible to divide one project into small individual units described as Work Breakdown Structure Method in Section 5.1.1 Planning and Schedule of the project management if all tasks can be coordinated and carried out simultaneously by a competent project manager. The total project can be completed without any interruption. On the other hand, if each unit is treated as an individual project, each individual project will have its own funding available and be small enough that bid bond is not required.

Small projects have a disadvantage since they would require small amounts of materials and equipment. The materials and equipment would only be used for that particular project and not shared with others. Thus, the supplier would apply the basic overhead cost and may not be willing to reduce the cost for each order. Blue Quills First Nations College may save the process of bid bond and security bond for small projects but may spend extra cost on construction.

6.10 FUNDING

Constructing the College facilities requires a considerable financial commitment. Offering courses also requires funding. The following

are suggestions for possible funding sources for Blue Quills First Nations College:

6.10.1 Fund Raising

Blue Quills First Nations College intends to hire a Fundraising Co-ordinator to solicit financial support from corporate and government sectors. He also can organize public donation drives. For instance, rooms and lecture halls can be named after or dedicated to any corporation, organization, or individual that contributes the construction cost of that particular portion. He can establish a Blue Quills First Nations College foundation for public donations. He can request that the successful graduates contribute to scholarships or to the equipment fund.

6.10.2 Indian and Northern Affairs Canada (INAC) Fund

As mentioned in Chapter 3, Blue Quills First Nations College receives a limited amount of operation and maintenance fund from INAC annually. However, this amount is not enough to cover all staff salaries or to meet inflation and the cost of equipment and materials.

Treaty Six document specifies the allocations of land, agreement of maintenance of schools for instruction, rights to hunting and fishing, improvements of public works and buildings, provisions of cultivation and carpentry tools, supplies of grains and farm animals such as cattle (Government of Canada, 1964). This Treaty only mentions maintenance of schools for instruction but did not specify post secondary or higher education.

Articles 114 to 122 inclusive mentioned in the Indian Act cover schools. Students from age six until eighteen are required to attend schools. "School includes a day school, technical school, high school and residential school" (Government of Canada, 1996: 57 to 61). Again, the Indian Act does not specify post secondary or higher education.

According to Elder Mike Steinhauer, the term "school" mentioned in the Treaty and Indian Acts means complete education for First Nations. He says education in modern society does not end at grade twelve and should not end there for First Nations students; and, so it stands to reason that the Federal Government honour higher education for First Nations students (Mike Steinhauer 2000).

A federal document, Agenda *for Action with First Nations,* states the following:

> "Investing in Aboriginal Education/Training: develop through broad-based partnerships an improved human resources development framework that links school, training and work opportunities; measures to improve the quality of education and programming to encourage youth to stay in school; and regional bilateral agreements on employment services and other measures to increase employment opportunities" (Minister of Public Works and Government Services Canada, 1998: 7).

It does not refer to higher education or institutions of higher learning. Perhaps, Federal Government was unaware that First Nations people have the desire and ability to attend university, or perhaps INAC does not have staff with expertise in the field of post-secondary education. As a result post-secondary education for First Nations members was overlooked.

During interviews with INAC officials, they preferred not to change the current situation without clear explanations. I believe that since the College is one of universities in Canada operated by First Nations and since INAC has no guidelines for funding higher education institutions, INAC is hesitant to provide further financial support to the College. I also feel INAC may be hesitant to fund any First Nations post-secondary institution because this might set a precedent and lead to demands from other First Nations for similar funding.

6.10.3 Tuition Fees

INAC provides a certain amount of tuition fees (through the Band) to each First Nations student attending Blue Quills First Nations College. But I have learned, through my interviews, that the financing from the First Nations student fund is very strict at the present time, not only for those wishing to attend Blue Quills First Nation College but also for those wishing to attend other chartered colleges and universities. I hope that this strict funding practise will not be permanent because First Nations, who are under tight budgets, are unable to provide further subsidies to the Blue Quills First Nation College. INAC might consider developing an advanced-education policy and establish funding for post-secondary students.

6.10.4 Alberta Government Fund: Wild Rose Foundation

Since the College is under Federal jurisdiction, the Alberta Government has no mandate to extend any financial support. However, the College may be eligible for funding through two provincial programs: The Community Facilities Enhancement Program and The Community Lottery Board Program. The applications can be made on or before

January 1, April 1, July 1 and October 1 of each year and it takes the Wild Rose Foundation about three and a half months to process and make a decision on them. Applications for these programs are made through local Members of the Legislative Assembly (MLA) or through the Mayors of the region. These funds are for community benefit. For the purpose of these programs the Blue Quills First Nations College could be defined as a community because the Wild Rose Foundation cannot fund education institutions including universities, colleges and Indian Bands. Blue Quills First Nations College can apply to either program but not both (Wild Rose Foundation 2000).

6.10.5 Heritage Fund

Blue Quills First Nations College can approach the Canadian Heritage Fund. First Nations intend to carry on their traditional culture, so under Federal Multiculturalism policy, the College may qualify for funding under Natives Citizens' programmes such as the Aboriginal Language Programme and the Aboriginal Women's Programme. Applications will be submitted before November 1 each year (Canadian Heritage 2000).

6.10.6 Historical Building

Blue Quills First Nations College can approach the Alberta Historical Resources Foundation. The Building has a style that can be classified as a Registered Historic Resource or Provincial Historic Resource. Funding could be provided to restore the building to its original condition and to maintain the building. Once designated as a historic resource, the owner cannot take any action until the proposed action is approved by the Community Development Minister (Russell 1993).

6.10.7 Sponsors from Other Reserves

Blue Quills First Nations College is an accredited institution recognized by other universities such as the University of Alberta, Athabasca University, and San Diego State University. The College is the first university to offer traditional, cultural and spiritual courses delivered by First Nations staff. Non-First Nations students who are interested in studying First Nations cultures can enrol in courses.

I believe that eventually Blue Quills First Nations College will not only offer the current education format for seven Plains Cree reserves but also for other First Nations groups such as Slavey, Beaver, Woodland Cree, Chipewyan, Stoney, Blackfoot and Tsuu T'ina in Alberta. Furthermore, several Cree groups across Canada such as Swampy and Prairie can be encouraged to participate in native culture education through Blue Quills First Nations College. When all these other First Nations recognize the value of the College, they can be encouraged to contribute financially.

6.10.8 Royalty Fund from Oil and Gas Production

The seven reserves receive royalties from oil and gas production. In the 1997-1998 Annual Report, the organization chart indicates that Indian Oil and Gas Canada (IOGC) operated under the direction of Chief Executive Office and Executive Director who work with nine members of Board of Directors. The Board provided strategic direction in the areas of developing policy, planning and establishing priorities (INAC 1998b: 8 to 9). The Reports specified that IOGC controls the distribution of royalty revenue and also showed that Cold Lake First Nation had a surface exploration lease (INAC 1998b: 20). Cold Lake

First Nation, Heart Lake First Nation, Kehewin Cree Nation and Saddle Lake First Nation had exploration licences with Oil and Gas companies (INAC 1998b: 21). While Beaver Lake First Nation, Cold Lake First Nation and Frog Lake First Nation had wells (INAC 1998b: 25-26). Perhaps an agreement can be reached so that each reserve donates a percentage of its oil and gas revenue monthly, annually or in a lump sum to the Blue Quills First Nations College. The reserves could also loan some money to the College at low interest rates or interest free.

6.10.9 Residential School Victim Healing Fund

Recently, INAC established a fund to help heal victims of residential schools. This fund sponsors learning programmes but not construction or infrastructure projects.

Blue Quills has applied to this fund but has not yet received a response. The College could also create new courses for project management and technical training and apply for financing under this fund.

6.10.10 Other Possible Funding

Based on existing funding infrastructure, Blue Quills First Nations College may be able to acquire extra funding from other sources in order to make the project workable.

For instance, Blue Quills College can explore the possibility of conducting contract research on business and production for oil and gas companies in northeast Alberta. Fort McMurray and Cold Lake areas are the major centres for the Athabasca Crude oil region.

According to Indian Oil and Gas Canada, First Nations have an estimated 1.5 million hectares of land having potential oil and gas production in Canada (INAC 1998b: 11). In 1997 and 1998, there were about 20 different companies operating oil and gas production in First Nations in Alberta (INAC 1998b: 21). Records from September 1983 show thirteen companies holding oil leases in the Cold Lake area: Amerada, Amoco, BP Canada, IGC Resources, Chevron, Esso, Dome Petroleum, Home Oil, Norcen, Petro Canada, Texaco Canada, West Coast Petroleum and Suncor (McCracken 1984: 105). Both the College and various industries can work together on education programmes, field training, testing and experiments.

6.10.11 Distant Learning and Network Programmmes

Blue Quills First Nations College could create Distant Learning and University Network programmes to focus on First Nations culture for both First Nations people living on remote reserves and in other provinces. These programmes could include courses on Native languages, oral traditional knowledge, Native arts, leadership, and management. These courses would become the College's home-based learning programme, as suggested by Charles Woods, Chairman of the College Board of Governors (Charles Wood 2000). Such a programme could be similar to the current one offered by Blue Quills First College and San Diego State University for a Master of Art Degree in Educational Leadership which requires the students to attend a six-week course each summer for two or three years and to do independent work.

The following examples are for Distant Learning and Network Programmes:

- Master's Degree of Construction Management has been arranged between British Columbia Institute of Technology and University of Bath, England.
- Master's Science Degree of Construction Procurement Management is offered by the Nottingham Trent University, England.
- MBA in Construction and Real Estate is offered by University of Reading, England.
- Master's Science Degree of Construction (Health & Safety) Management is offered by the Liverpool John Moores University, England.
- Certificate in Construction Contract Law and Administration is offered by the Liverpool John Moores University, England.
- Fifty courses are offered by Premier School of Building, England.
- Project Management Study via the internet is offered by School of Construction and Property Management, the University of Salford, England.
- An Online University called Barnes & Noble University has been formed by online bookstore Barnes & Noble and notHavard.com (eduCommerce company) with other investors such as Adam Dell's Impact Ventures, Merill Lynch KECALP, and Austin Ventures to provide free, online education as a sales and marketing tool (Yahoo 2000).

6.10.12 Contract Research in Humanities / Cultures

If the College had better facilities, it could provide weekend programmes such as Conferences and First Nations Council Training Seminars for the local First Nations Communities.

CHAPTER 7: PROJECT MANAGEMENT OPTIONS

It is assumed that the Blue Quills First Nations College has designed its facilities with architectural advice. With reference to the case studies in Chapter 2, Blue Quills First Nations College can select one of the following options for building its future projects. Each option has its advantages and disadvantages.

7.1 CASE 1: FIRST NATIONS HAVE THEIR OWN PROJECT MANAGEMENT, CONSTRUCTION MANAGEMENT AND LOCAL LABOUR

The first case illustrates several advantages for First Nations to have their own project management, construction management and their own local labour force. When a First Nations group has control over project and construction management, First Nations members have the opportunity to learn and practise their management skills. This sort of control by First Nations people also results in more opportunity for First Nations journeymen to learn and practise their skills. Another advantage of First Nations managing and constructing their own projects, as this case demonstrates, is that First Nations members can be involved in planning and designing their own university based on their traditional and cultural knowledge (if building codes and safety and health issues are addressed). In other words, local members can set up a learning environment according to their culture. There are local members from seven First Nations in Blue Quills. If these members are well trained, they will form a large and experienced work force.

While they do not out weigh the advantages, First Nations project and construction management also has disadvantages. Within several First Nations there are large family groups, and there may be some potential conflicts and disputes among the groups. Project management needs to handle the situation carefully. Another potential disadvantage has to do with the schedule of the project. Project management would allow any issue regarding the project to be decided at the traditional pace, and so decision making may not always be made within a scheduled time. Furthermore, even if construction methods based on First Nations tradition are used, members still require to keep in mind that occupational health and safety rules are still in force.

7.2 CASE 2: A FIRST NATIONS MANAGEMENT IS USED BUT A NON-FIRST NATIONS CONTRACTOR IS USED

As in Case 1, local members would have an opportunity to learn and practise their project management skills. While local members will not be working on the construction of the project as managers, they will have the advantage of observing how outsiders construct a project. Having an outside contractor has the advantage of requiring a First Nations project manager to make decisions within a scheduled time. Having an outside contractor working for First Nations project management has the advantage of allowing the project management to specify in the contract agreement that local members and equipment be hired and that local materials be purchased.

One of the possible problems with a First Nations project management hiring a general contractor is that cultural conflicts and disputes may occur between local members and outsiders during the construction process, especially as the general contractor may not be familiar with traditional and cultural construction processes. Another disadvantage of this arrangement is that local members cannot express their traditional and cultural knowledge during construction. A further disadvantage is that an outside general contractor raises the construction cost higher in order to cover any possible risks during construction. Also, while it can be specified in the contract that First Nations members be hired, a general contractor might try to hire only the minimum number of First Nations members specified, or they might hire First Nations members for unskilled labour jobs only. On site training for First Nations people might never happen because this would slow down the contractor and increase costs. The contractor could try to avoid this training as much as possible. When an outside

general contractor competes for a project, he can determine whether or not the drawings and specifications are complete. If the drawings and specifications have some vague areas, the general contractor will likely rely on his own method for constructing the specific area, but he will also likely figure in extra costs for those specific areas. During construction, if the owner does not like the construction method used on those specific areas, the outside general contractor will request a change order at additional cost. There is no trade-off practice on site, so if the owner wants those areas done in a certain way, the extra cost is required to be paid.

7.3 CASE 3: OUTSIDE PROJECT MANAGEMENT IS USED TO PROVIDE TECHNICAL SERVICES AND CARRY OUT ACTUAL DUTIES AND AN OUTSIDE GENERAL CONTRACTOR IS USED

The advantages of the management scenario described in case 3 are outweighed by the disadvantages. On the positive side local members can learn through observation how a project can be constructed by outsiders, and cultural conflict and disputes between local members and outsiders would likely not exist throughout the construction process.

However under this management arrangement, local members likely will not have the opportunity to learn their project management and construction management skills (other than through observation, which in any case might be limited). Local members could not express their traditional and cultural knowledge during construction. Again as in case 2, First Nations members might not be hired for work.

7.4 CASE 4: AN OUTSIDE PROJECT MANAGEMENT AND A FIRST NATIONS LABOUR FORCE ARE USED

This management arrangement at least has the advantage that local members are constructing their building for themselves and for future generations. Under this arrangement local workers and equipment are hired.

But this arrangement also has the obvious disadvantage that local members likely would not have the opportunity to learn or practise their management skills. A second disadvantage is that project consultant fees would have to be paid. It is important for the outside project manager to understand First Nations culture in order to know why First Nations members behave and work in a certain way. This project manager will be patient with local members and help them improve their skills.

CHAPTER 8: LEADERSHIP

8.1 DEFINITIONS

According to Stogdill leadership is defined as "a process of influencing the activities of an organized group in its efforts toward goal setting and goal achievement" (Fiedler and Chemers 1974: 4; Stogdill 1974: 10; Hersey and Blanchard 1993: 94). There are, however, many definitions of leadership. Basically, leadership is an interaction based on an individual's power and influence over a group of individuals to complete certain tasks in order to accomplish his goals in a given situation (Fiedler 1971: 2; Northouse 1997: 3; House and Baetz: 1990 35; Hersey and Blanchard 1993: 95).

Leadership will have three general skills or competencies: diagnosing, a cognitive or cerebral competency for problem analysis; adapting, a behavioral competency for decision making; and communicating, a process competency (Hersey and Blanchard 1993: 5 and 6, 290, 291, 325; Bass 1981: 274). Other basic functions such as planning, organizing, staffing, directing, and controlling happen in a predictable and sequential order (Bass 1981: 274) and are similar to the five integrated management functions identified by Fayol in Chapter 4. Northouse refers to these skills as activities of leadership and to the functions as activities of management (Northouse 1997: 8, 9 and 11).

Leadership effectiveness is evaluated by measuring the performance of the leader's group in accordance with its assigned functions (Fiedler and Chemers 1974: 7). Ralph Stogdill said, "The most effective leaders appear to exhibit a degree of versatility and flexibility that enables them to adapt behaviour to the changing and contradictory

demands made on them" (Hersey and Blanchard 1993: 113). A leader is a person who interacts with a group of individuals in face-to-face contact and takes on the role of superior in a superior-subordinate relationship (Fiedler and Chemers 1974: 9).

Surprisingly, although a person has been appointed to a leadership position, that person may not automatically be able to exercise his or her leadership functions including authority. The new leader is required to demonstrate his or her competencies and personality to meet the standards of subordinates in order to gain their acceptance (Fiedler and Chemers 1974: 19).

Good communication that can maintain and strengthen a common bond of interdependence, mutual interest and interlocking contributions from the leader and subordinates is part of the art of leadership (De Pree 1989: 89).

Some theories and styles of leadership were reviewed relative to project management for Blue Quills First Nations College. They include behavioral theory, situational leadership theory, contingency theory, team leadership theory, structuring and consideration of leadership styles, production-centred and employee-centred leadership styles, close and general leadership styles, and authoritarian and democratic leadership styles.

8.2 BEHAVIORAL THEORY

The behaviour theory of leadership states that leaders present a series of goal-oriented activities to subordinates in various contexts (Hersey and Blanchard 1993: 19; Northouse 1997: 32).

There are two kinds of behaviours: task behaviours and relationship behaviours. Task behaviours help subordinates to set goals and to achieve objectives. Relationship behaviours help subordinates to feel comfortable with themselves, with others, and with their current situation (Northouse 1997: 32). Leaders combine these behaviours to influence subordinates in their goal setting efforts to pursue a goal (Northouse 1997: 33, Bass 1981: 337). These behaviours form the fundamental concepts for the other theories that are discussed in the sections below.

8.3 SITUATIONAL LEADERSHIP THEORIES

The Situational Leadership theory was developed by Hersey and Blanchard based on Reddin's 3-D Management Style Theory. A situation refers to aspects of the environment that affect the individual. These aspects may include physical objects, social relationships, intra-organizational and extra-organizational variables (Fiedler and Chemers 1974: 56 and 57). Different situations demand different kinds of leadership. Leadership is composed of both a directive and a supportive dimension that is applied appropriately in a given situation (Northouse 1997: 53). A leader is required to match his or her style to the competence and commitment of subordinates. Effective leaders can recognize employees' expectations and then adapt their own styles to meet those needs (Northouse 1997: 54).

Situational Leadership has both directive behaviours and supportive behaviours. Directive behaviours assist group members in goal accomplishment through giving directions, definitions and procedures so that the goals will be achieved. Directive behaviours have one-way communication and are similar to task behaviour mentioned in

behavioral theory. Supportive behaviours can help group members feel comfortable about themselves, their co-workers and the situation. Supportive behaviours involve two-way communication and show social and emotional support to others. Supportive behaviours are similar to relationship behaviour mentioned in the Behavioral Leadership theory (Northouse 1997: 54; Fiedler and Chemers 1974: 59; Yukl 1981: 140; Hersey and Blanchard 1993: 120, 187).

The Situational Leadership theory can be applied at many different levels in an organization. The theory is related to the Contingency theory and behaviours such as directive and supportive behaviours, which will be discussed later. Situational Leadership is ideal for use with followers whose commitment and competence change over the course of a project (Northouse 1997: 62).

8.4 CONTINGENCY THEORY

The Contingency theory was developed by Fiedler and Chemers. It explains how effective leadership and performance of a group can result when a leader's motivational style and authority correctly match the characteristics of a particular or favourable situation (Fiedler and Chemers 1974: 73; Stogdill 1974: 21; Bass 1981: 32; Yukl 1981: 132; House and Baetz 1990: 40). Leadership involves either task-motivated or relationship-motivated styles. Task-motivated leaders focus on reaching a goal, whereas relationship-motivated leaders focus on developing close interpersonal relations (Northouse 1997: 75; Fiedler 1971: 10 and 11).

8.5 TEAM LEADERSHIP THEORY

In the Team Leadership theory, leadership takes the form of mediation among the group members to achieve a common objective (Northouse 1997: 162). Although all members of the group can be involved in the process, unless the group is very small and circumstances are quite abnormal, one of the group members shall emerge as a leader based on competence: superior wisdom, knowledge, ability, strength, or cunning. This leader will be able to inspire different types of people through both personality and example in order to make his or her work easier and smoother (Pilcher 1976: 4). The leader ought to have authority to co-ordinate and motivate the team to take appropriate action (Pilcher 1976: 4). If this leader can delegate work to individuals at a lower organizational level, he is better to have well defined terms and limitations of his authority and responsibility (Pilcher 1976: 5).

Team leaders learn to be open and objective in fulfilling the three general skills of a leader as indicated above in the definition section (Northouse 1997: 16). Perhaps, leadership and authority will not be permanent if the team's actions and performance are unsuccessful or unsatisfactory.

8.6 PATH-GOAL THEORY

In the early 1970s, the Path-Goal theory, developed by Robert House and Terrence Mitchell, explained how leaders integrate consideration and initiating structure into their leadership style in a particular setting (Northouse 1997: 34; 88; House and Baetz 1990: 45 & 46; House and Mitchell 1980: 81-94). Leaders select a specific behaviour to

motivate subordinates to move along the path to their goals so that they can achieve a satisfactory work performance (Northouse 1997: 88; Stogdill 1974: 21; Bass 1981: 32; Yukl 1981: 144; Hersey and Blanchard 1993: 121).

The Path-Goal theory relates to several leadership styles such as directive, supportive, participative and achievement-oriented (House and Mitchell 1980: 83; Yukl 1981: 146). The first three styles will be discussed later in this Chapter.

8.7 THEORY X AND THEORY Y

In 1960, Douglas McGregor assumed that people are motivated and that organizations are structured and controlled. He suggests two types of organizational leadership: Theory X and Theory Y. Theory X leadership deals with people who have passive and negative attitudes toward the organizational needs. A directive, structuring and autocratic leader or supervisor is required to direct and motivate people to fulfil the needs. Theory Y leadership deals with people who have positive attitudes, motivation, and a desire for responsibility. A leader or supervisor is required to modify the organizational working environment to satisfy people and to direct people to achieve the organizational needs (Bass 1981: 33; Fiedler and Chemers 1974: 51). Theory X relates to task behaviour in highly structured ways whereas Theory Y relates to relationship behaviour (Hersey and Blanchard 1993: 476).

8.8 DIRECTIVE, SUPPORTIVE AND PARTICIPATIVE LEADERSHIP STYLES

8.8.1 Directive Leadership

Directive leadership is similar to the "initiating structure" concept described in the Ohio States Studies (Northouse 1997: 89). A leader sets clear standards of performance, rules and regulations for subordinates (Northouse 1997: 89 and 90; Yukl 1981: 146). Directive leadership is more effective in structured task situations while non-directive leadership is more effective in less structured conditions (Bass 1981: 326). But House has the opposite findings with both authoritarian and non-authoritarian oriented subordinates who are satisfied with directive behaviour or directive leadership in an ambiguous or unstructured task and are satisfied with non-directive behaviour or leadership in a structured task (House and Mitchell: 1980 85 and 88). Many elements of directive leadership are found on the scale of initiation of structure (Bass 1981: 312).

Under directive leadership, the major roles of a leader include problem solving, decision making and guidance and psychological structure for group members (Stogdill 1974: 386; Bass 1981: 309; House and Mitchell 1980: 88). This type of leadership is used when there is role ambiguity (Yukl 1981: 148; House and Mitchell 1980: 88). Sometimes, under directive leadership, the leader may use manipulation, bargaining, persuasion, or negotiation with group members instead of issuing orders (Bass 1981: 310).

Managers with authoritarian personalities are more directive (Bass 1981: 314 and 315). Both quality and quantity of productivity are enhanced and committees are more effective in solving problems

under directive than under non-directive leadership (Bass 1981: 323). Passive followers favour a more directive leader (Bass 1981: 325).

8.8.2 Supportive Leadership

Supportive leadership is similar to the "consideration behaviour" identified in Ohio States Studies and refers to a style of friendly and approachable leadership interested in the human needs of subordinates (Northouse 1997: 91; Yukl 1981: 146). For instance, when subordinates work on a stressful, frustrating, or unpleasant task, the supportive leader is alert and is able to provide consideration for and support to subordinates or improve the work environment to reduce their stress (Yukl 1981: 149; House and Mitchell: 1980 89). This sort of leadership "offers a human touch" (Northouse 1997: 94).

8.8.3 Participative Leadership

Participative leadership refers to leaders who invite and encourage subordinates to share in discussions, problem solving and decision making. Under this type of leadership, there is power equalization (Northouse 1997: 91; Yukl 1981: 146; House and Baetz 1990: 23; Stogdill 1974: 386; Bass 1981: 309). Consensus is sought (Bass 1981: 310). Participation can clarify certain paths leading to certain goals (Northouse 1997: 94; Yukl 1981: 150). "Commitment increases when people are involved in their own goal setting" (Hersey and Blanchard 1993: 28).

Blake and Mouton report that maximum productivity results from leadership that involves employees in both planning and execution of goals and in commitment to productivity goals (Stogdill 1974: 389).

Participative Management believes every person has a potential talent and is entitled to be involved in decision making and to understand the results (De Pree 1989: 23). Participative management is not democratic because it is the leaders who establish workplace environments and work processes within which people can develop high quality relationships among group members (De Pree 1989: 23).

There are many elements in participative decision-making leadership. (Bass 1981: 312). The more educated and older leaders tend to participate with more highly qualified and skilled subordinates (Bass 1981: 317). Although participation may meet subordinate needs, it still requires direction to achieve goals (Bass 1981: 327). The participative leadership style has several effects on subordinates' attitudes and behaviours. A participative climate increases the clarity of the paths and goals in organizational contingencies. Subordinates select their highly valued goals, individuals increase control over their job, and demands for high performance will come from the subordinates rather than the leader of the organization (House and Mitchell 1980: 90).

8.9 STRUCTURING AND CONSIDERATE LEADERSHIP STYLES

In the late 1940s, Ohio State University studied two types of leadership behaviours: initiating structure behaviour and consideration behaviour. Initiating structure relates to task behaviour and explains the ways that a leader initiates and organizes activities in the group and specifies the standards, time and completion of work. Subordinates need to work toward the goals. Consideration relates to relationship behaviours, such as a leader expressing his concerns

for the welfare of group members in the areas of job satisfaction, self-esteem and fairness. These behaviours are distinct and independent (Northouse 1997: 34; Fiedler and Chemers 1974: 48; Stogdill 1974: 128 and 393; Bass 1981: 358 and 359; Hersey and Blanchard 1993: 101; Fiedler 1971:7). Because different types of situations demand different types of behaviours, a highly structured leadership behaviour will not always be effective (Fiedler and Chemers 1974: 49).

8.10 EMPLOYEE-CENTRED AND PRODUCTION-CENTRED LEADERSHIP STYLES

The Survey Research Centre at the University of Michigan identified two types of leadership behaviour. The first type is called employee orientation or employee-centred behaviour. Leaders with this type of behaviour approach subordinates with a strong human relations emphasis. This leadership style is very similar to the consideration style identified by Bureau of Business Research directed by Ralph Stogdill at the Ohio State University in 1945. The second type of leadership behaviour style identified by the University of Michigan is the production orientation or production-centred behaviour and is similar to the initiating structure style of behaviour identified by Ohio State University (Northouse 1997: 35; Fiedler and Chemers 1974: 48; Hersey and Blanchard 1993: 100 to 102; Fiedler 1971: 7). This second type of leadership behaviour stresses both the technical and production aspects of a job.

Employee-centred and production-centred leadership are at opposite ends of a continuum. If leaders are oriented toward production, they are less oriented toward employees and vice versa (Northouse 1997: 35; Fiedler and Chemers 1974: 48).

Based on earlier Michigan studies, Rensis Likert discovered that the general pattern of management system used by high-producing managers is different from that used by other managers. He found that high-producing supervisors are concerned about their employees' welfare and build effective work groups with high performance goals. These supervisors are called employee-centred and have the best records of performance. Other supervisors who apply constant pressure on production are called production-centred. They are more likely to have low-producing sections (Hersey and Blanchard 1993: 103; Bass 1981: 34).

In the early 1960s, the Blake and Mouton's Managerial/Leadership Grid was designed to explain how leaders help organizations to reach their purposes through two factors: concern for production and concern for people. These factors closely parallel the task and relationship behaviours (Northouse 1997: 36; Stogdill 1974: 22; Hersey and Blanchard 1993: 110; Fiedler 1971: 9; Bass 1981: 34).

There are five leadership styles based on the variance of attitudes of people towards their work. The first leadership style is described as impoverished where minimum work is done to barely satisfy the situation. Secondly, the country club type that gives some personal effort to satisfy the relationship. Thirdly, the task efficiency type where minimum human interference is required to achieve efficient operational result. The middle-of-the-road leadership style maintains the work and morale of people at a satisfactory level. Finally, the team leadership style where work is accomplished by people with same goal (Hersey and Blanchard 1993: 111).

Team leadership style is an approach that is employed as a model by many training and development companies to teach managers how to improve their effectiveness and organizational productivity (Northouse 1997: 44).

8.11 CLOSE AND GENERAL STYLES OF LEADERSHIP

Rensis Likert also discovered that high-producing supervisors make the objectives of their mission and the means to achieve these objectives clear to their employees and then let them do the job in their own way. He found that general rather than close supervision tended to have high productivity (Hersey and Blanchard 1993: 104). Highly productive supervisors more frequently are employee-centred rather than production-centred (Bass 1981: 302). However, another scholar, Hise found productivity is definitely improved by close rather than general supervision (Bass 1981: 296).

8.12 AUTHORITARIAN AND DEMOCRATIC LEADERSHIP STYLES

8.12.1 Authoritarian Leadership Style

The authoritarian or autocratic leader consistently dictates activities and is not interested in the needs of group members for autonomy and development. He praises members only in private in order to maintain his authoritarianism (Stogdill 1974: 365; Bass 1981: 293 and 295). Most of the members are submissive and would find it easy to work under authoritarian conditions (Fiedler and Chemers 1974: 31). The members spend more time in productive work activity than the other groups, but only when the leader is present (Fiedler and Chemers 1974: 49). Their task relates to initiating structure (Bass 1981: 291).

Employees high in authoritarianism and low in the need for independence are found to perform best under autocratic, directive, structuring, task-oriented leaders (Bass 1981: 121). Authoritarian people prefer to work with authoritarian leadership than non-authoritarian individuals (Fiedler and Chemers 1974: 50) and also more concerning about the rank of a leader than were equalitarians (Bass 1981: 125). In task-oriented groups, authoritarians tend to emerge as leaders (Bass 1981: 126).

Companies with authoritarian policies have more positive attitudes toward "structuring" supervisory behaviour than toward "consideration" behaviour (Fiedler and Chemers 1974: 50). A punitive style of supervision leads to high performance on simple tasks but poor performance on complex tasks (Bass 1981: 301). Stogdill comments that, "The degree to which a leader is accepted and the degree of member satisfaction under authoritarian and equalitarian leaders is highly dependent upon a matching of leader personality and follower personality along with a congruent group structure" (Stogdill 1974: 111; Bass 1981: 124).

Under autocratic leadership, a structured communications network is necessary for high performance, whereas under democratic leadership, high performance does not require such a structured communications network (Bass 1981: 296).

8.12.2 Democratic Leadership Styles

Under a democratic leadership style, group decisions are made by majority vote, with equal participation and minimal criticism and punishment. The groups with democratic leaders can achieve their

best performance with their best working attitudes (Fiedler and Chemers 1974: 49). In companies favouring more democratic policies, supervisors' attitudes are more favourable toward considerate behaviour (Fiedler and Chemers 1974: 50).

A democratic leader encourages group members to determine their own policies and understand the mission toward goal achievements, allows them to initiate their own tasks and interactions, praises them sincerely (Stogdill 1974: 365; Bass 1981: 295) and eliminates social barriers between members (Bass 1981: 293). Some leaders may use parliamentary procedures and majority decision making. Others may consult, strive for consensus, and pursue an open, trusting, follower-oriented relationship (Bass 1981: 295). Group members demonstrate less tension and hostility and more friendliness, spontaneity and cohesiveness (Bass 1981: 295). They also tend to feel more satisfied (Bass 1981: 299).

Under a democratic, non-punitive supervisor, the possible results will likely include higher rates of productivity, reduced personnel turnover, and reduced absenteeism (Bass 1981: 296). Employees high in need for independence and low in authoritarianism are found to perform best under democratic leaders (Fiedler and Chemers 1974: 50).

8.13 SUMMARY

Consideration versus initiation of structure is a behavioral matter and refers to how decisions are made and to the structure of tasks and goals and role relationships (Bass 1981: 291). Participative leadership versus directive leadership refers primarily to how decisions are made (Bass 1981: 291). Authoritative leadership relates to a task-oriented

or structured style and democratic leadership relates to a person-oriented or considerate style (Stogdill 1974: 27). Democratic versus autocratic leadership refers to the way that power is distributed (Bass 1981: 291).

A person becomes a leader not necessarily by virtue of possession of traits, but by the pattern of the personal characteristics, activities, and goals of the followers (Fiedler and Chemers 1974: 24; Stogdill 1974: 63). When leaders are not experts at their job, they can neither instruct subordinates to perform their job nor supervise them nor verify their completed work. Leaders rely on their relationship with their subordinates (their referent power) or be willing to provide something in exchange (Fiedler and Chemers 1974: 62). It is impossible for everybody to know and understand everything. People will trust one another to be accountable for their own assignments (De Pree 1989: 104). People ought to believe that every person can offer his bestowed talent to a team (De Pree 1989: 57). This means that all team members will be given the chance to do their best (De Pree 1989: 62). "Today's trust enables the future" (De Pree 1989: 102).

The key elements in the art of working together are dealing with change, dealing with conflict, and reaching our potential (De Pree 1989: 50). These elements are similar to adaptation, diagnosing and decision making mentioned in the discussion on leadership. De Pree suggests a covenant relationship to induce freedom and a shared commitment to ideas, issues, values, goals, and management processes. These relationships also are open to influence; reflect unity, grace and poise; and tolerate risk and forgive errors (De Pree 1989: 51). These relationships are similar to team, consideration, directive, supportive, participative and democratic leadership styles.

8.14 BLUE QUILLS FIRST NATIONS COLLEGE

After having reviewed many theories and styles of leadership, I feel that each theory and each style has its merits and shortcomings. Different behaviours of leadership are affected by different situations. It is true that "a single ideal type of leadership behaviour seems unrealistic" (Hersey and Blanchard 1993: 110).

Leadership can occur at any time to influence the behaviour of an individual or group, without an obvious reason. It may be for one's own goals or for those of others, and may or may not be agreeable with organizational goals (Hersey and Blanchard 1993: 5).

First Nation Government was discussed in Chapter 3 and Appendix 5. Its traditional decision making was based on consensus. This First Nations leadership is not comparable to the leadership in modern non-native society. Blue Quills First Nations College can consider any suitable leadership theories and styles such as team, considerate, directive, supportive, participative and democratic leadership styles for its project management and construction management.

CHAPTER 9: CONCLUSION AND DISCUSSIONS

9.1 CONCLUSION

I conclude that Blue Quills First Nations College is capable of managing and constructing its own facilities. The case studies in Chapter 2 show that local members have construction experience. If the College provides them with proper management courses and training to brush up their knowledge and skills, they will become project managers and construction managers. And if the First Nations carry out the project management and the construction work, more local members can be hired and trained on site. Once the conventional management courses have been established, the College can implement and offer both project management and construction courses and practical training based on First Nations' traditional culture (as mentioned in Chapter 5).

The Blue Quills First Nations College construction project will go a long way towards eliminating unemployment among First Nations people in the area. Local members from seven First Nations can be involved in building the College's facilities, thus increasing their work skills and increasing their future opportunities.

The College can have building forms and designs based on traditional culture and local landscape as discussed in Chapter 3 and Appendix 5. Furthermore, the College can use local building materials such as straw bales and logs again as discussed in Chapter 3 and Appendix 6. The existing site conditions, environment and building materials will affect both project management and construction management with respect to planning, schedules and labour allocation.

Chapter 4 shows that if First Nation members have knowledge and experience in both project and construction management, the communities in which they live can only reap the benefits. By having a better understanding of their own community's needs, they are the ones who could find ways to best solve their community's shortcomings.

Chapter 5 explains how the contents of conventional management education for the short term can be solved by means of utilizing the available courses offered by other accredited institutions. Once Blue Quills First Nations College has organized the courses, the First Nations traditional and cultural content can be included over the long term. At the same time, if the College obtains the status of an accredited institution from the Canadian Construction Association for training project managers and construction superintendents, Blue Quills First Nations College graduates will be qualified professionals.

As discussed in Chapter 6, the seven First Nations do not have additional money to subsidize the operation of the College. Thus the Blue Quills First Nations College could modify and diversify their fundraising methods to attract other First Nations not only from Alberta but from across the nation. The seven First Nations could use their oil and gas royalty fund to establish a special fund that would provide bid bonds and security bonds on tenders. This would then enable the First Nations to compete with outside general contractors and submit bids for any public tenders required by Indian and Northern Affairs Canada.

Having considered the advantages and disadvantages of each project management option in Chapter 7, Blue Quills First Nations College can apply what it believes are the appropriate options for managing and constructing its facilities.

Chapter 8 discusses several leadership theories and styles which explain the behaviour of leaders and the application of leadership styles in various situations. Although the leaderships of Western society and First Nations is different, Blue Quills First Nations College can suggest the appropriate leadership styles for First Nations project managers based on First Nations tradition and culture. For instance, participative leadership and employee-centred leadership are likely to be chosen as they seem to be closely related to First Nations traditions.

9.2 ROLE MODEL

If Blue Quills First Nations College is successful in implementing capital projects under its project management, eventually it will assist all seven First Nations build up their own project organization. Blue Quills First Nations College can become a Role Model.

If First Nations can accomplish their goals set for infrastructure including housing and capital project, First Nations people will accumulate knowledge from trials of established methodology and pilot projects and firm up a procedural manual for themselves on project management. INAC has indicated that "Aboriginal groups will shape their own forms of government to suit their particular historical, cultural, political and economic circumstances" (INAC 1995; INAC 1997c: 2). I suggest that with project management and construction

management education, field training and practical experiences on projects can be documented. The recorded information and then be converted into First Nations own procedural manual on project management as Public Works guidelines under legislative power of self-government.

In addition to capital project procedures, First Nations can include the following items in the Public Works Guidelines such as:

- Establish qualification and role of project manager.
- Establish qualification and role of site superintendent.
- Establish qualification and role of construction manager.
- Establish qualification and role of site office manager.
- Establish qualification and role of site foremen.
- Establish qualification and role of store keeper or inventory clerk.
- Establish qualification and role of safety officer.
- Establish qualification and role of all journeymen and apprentice.
- Establish qualified inspectors to certify quality of work.
- Role of cost estimator may be included in that of project manager.

First Nations can also determine minimum requirements for its project manager such as:

- Qualified technical knowledge background from technical institution such as Blue Quills First Nations College.
- Several years site experience on buildings and civil engineering works.
- Several years of construction management.
- Knowledge of cost estimation, schedules, life cycle evaluation and coordination of subtrades.
- Monitor and work with team members.

- Understanding the intent of working drawings.
- Knowledge of working details.
- Good communication with building committee members, administration department staff, consultants and government representatives.
- Knowledge of building codes.

Case Study 1 proves that First Nations can have administration continuity in spite of political changes and carry out administrative and financing process required for business over a long time span. First Nations need to minimize the disruption of administration during a change of leadership. The disruption may be reduced by separating the Chief and Council from permanent adminstration department. In this way, the outgoing Chief and Council's agenda remain active for the incoming Chief and Council. The separation policy would also have the effect of giving INAC little cause to forget or delay the process of capital project submitted by a former Chief and Council. Similar to the process of Case Study 1, the project manager plays a major role from day one to the end of the project and reports to the committee appointed by the Board of Governors or Chief and Council. In this way, the political change of Board of Governors and Chief and Council will not affect the continuity of the project. At the same time, the committee will monitor the project on funding and project management.

If the project is successful, it will demonstrate First Nations accountability to the Federal Government; achieve economic growth; resolve some social issues through local employment policy and availability of a trained local labour force. This will establish trust with the Federal Government.

"The best results are obtained by the user who is in full control of the design, construction and management of his home. It is of second importance whether or not he builds it with his own hands unless he is very poor..." (Turner and Flitcher 1972: 158). This is a good statement that can be applied similarly to Blue Quills First Nations College projects.

9.3 DISCUSSIONS

1. Lewis suggests "if you have no plan, you have no control" (Lewis 1993: 75; 1995: 26; 1998: 19). For example, planning a project means determining what is required to be done now and what can eventually be achieved. Kharbanda and Pinto stress that planning during the stages of concept and of detailed drawings is important and provides a clear understanding of the project. The committee or project management team can "do thorough homework before sanctioning and proceeding with the project" (Kharbanda & Pinto 1996: 68 & 77). If a project is planned carefully, better results are obtained. Therefore, Blue Quills First Nations College is moving in the right direction by planning ahead for its future facilities for its campus. Some projects will be undertaken with full feasibility studies, soil investigations, detailed drawings and specifications, and quality control on construction. A project manual containing the procedures for each phase of the project will be prepared by the project manager. According to Thomsett a project document is required (Thomsett 1990: 106). This document cannot only create the historical events for this particular project, but also be used for reference for other future projects.

2. Involvement of senior management is recommended. The senior staff are required to show their enthusiasm and moral support for the project from time to time. However, these staff members should not become involved with the daily work of the project. Such involvement would affect the chain of command and weaken the respect and authority of project manager.

3. "Education is a major factor in development. It can bring about slow yet fundamental changes in the attitudes and skill level of the people" (Schultz 1966: 53). First Nations will determine the methods of improving their labour force's construction education. Lewis also reminds us that "people forget what they have been taught" (Lewis 1995: 109). Russell Wright of Blackfoot Reserve, also mentions that it is only human to forget important principles and suggests that continual learning and re-learning is a part of our life cycle (Meili 1991: 50). Therefore, when Blue Quills First Nations College offers the courses for crew members, these members will return to classrooms at regular intervals in order to discuss their on-site practices and procedures. This feedback becomes a communication tool between the mentors and crew members. In addition, improved relationships among the team members can result from the regular classes.

4. Hellard points out cultural changes in the construction industry. Trades, professionals and specialists also have their technical skills and customs. Both cultural changes and practices may affect the project (Hellard 1993: 36). Blue Quills First Nations College deals with local members from seven First Nations and they all have the same culture and tradition, and behaviours. I do not see any cultural differences among local members that would create problems on site.

5. In Canada, especially in Alberta, the seasons are clearly defined by temperature. Once the snow covers the site, survey work cannot be conducted. Ground frost only allows site work construction between May to September. The frost affects soil investigation and the stability of the foundation. Certainly, superstructure work can continue during the cold season if a heating envelope over the building is available. Planning is important for any project.

6. Although Lientz and Rea consider that technology may affect the project, I feel that current building materials have not changed dramatically for quite some time (Lientz and Rea 1999: xvii). Major building materials such as concrete, bricks, concrete blocks, gypsum board, plywood, glass, metal roof, metal deck and structural trusses, have been used in design and building industry continuously for many years. The only major change is the type of electronic appliances in a building.

7. If unproved technology is used in a project, Lewis suggests that a detailed research or feasibility study be prepared (Lewis 1998: 69). I feel that the Blue Quills First Nations College avoid using any unproved technology unless this technology has been approved by Underwriter Laboratory of Canada. Students and journeymen need time and practice with a new technology.

8. In order to follow the schedule and streamline construction, I feel the contract documents including construction drawings and specifications be prepared in full detail. In this way, project managers, construction managers and journeymen do not require interpretation on site. At the same time, errors and delays of work can be avoided. Some scholars have the same opinion about detailed design

(Stallworthy & Kharbanda 1983: 197) and drawings in details (Lewis 1998: 225).

9. Quality controls have been included under project management and construction management. That means that inspections of quality and performance of workmanship will be carried out by First Nations members from the Tribal Chiefs Ventures Inc. Professionally, I would suggest that both inspection and testing of quality control be guided by an independent third party until the First Nations members are qualified.

10. Both Lewis and Thomsett suggest that team members themselves plan the progress schedule for the project (Lewis 1998: 142; Thomsett 1990: 27; Kharbanda and Pinto 1996: 57). This helps to foster a team commitment (Thomsett 1990: 32). E. Anderson says that when a person gains knowledge about the project, this knowledge arouses his emotional motivation which in turn causes him to take action. I feel this approach can create a good team spirit and morale for the project which can be easily monitored by the project manager and the construction manager. These members will be proud of what they have achieved when the project is completed.

11. Other quality controls including project accounting (Lewis 1998: 226) and a project audit (Lewis 1998: 227) are essential to the projects. The project accounting relates to payrolls, overhead cost and other expenses. The accountant or book-keeper will have detailed records so that the project manager can evaluate the spending trend, and compare the budget and schedule. For the accountability purpose, a project audit is required to satisfy the funding agency and the Board of Governors.

12. Lientz and Rea suggest starting with a first successful project which in turn will lead to other successful ones (Lientz and Rea 1999: 6). This is a good psychological approach to instill confidence in local members.

13. During interviews, officials indicated that although INAC had developed many technical documents for in-house staff use as guidelines in 1980s, these documents such as Water Supply and Distribution, Electrical Power Supply and Distribution, Cost Estimating, Road Construction, Solid Waste Collection and Disposal, and Wastewater Collection Treatment and Disposal were neither upgraded nor revised (INAC 1984a; 1984b; 1984c; 1986b; 1986c; 1987). It is assumed that they are obsolete. Through internet access, I have found some publications on project management and risk management prepared in 1994 (TBC 2000a; 2000b). Specific design and construction guidelines from different disciplines such as Professional Engineering Associations, National Research Council of Canada, Underwriters' Laboratories of Canada have to be used for handicap accessibility, health and safety matters.

14. Although it is the intention to train the members within their First Nations projects, there may not be enough projects to provide the necessary training. It may be possible that Band members can work in other communities to gain training and experience on project management and construction management on trades. INAC and First Nations can sponsor Band members to work on other projects to expedite the training. A change in attitude by Band members is necessary to work on other projects because the cultural and traditional ways are not applicable.

APPENDIX 1: BLUE QUILLS FIRST NATIONS COLLEGE

A1 ADMINISTRATIVE STRUCTURE OF THE BLUE QUILLS FIRST NATIONS COLLEGE

A1.1 Governance

Blue Quills First Nations College is governed by seven appointed members, each representing one of the seven local First Nations Communities listed below, plus one Elder from the Saddle Lake First Nation. The seven First Nations communities own and operate Blue Quills First Nations College (Blue Quills First Nations College 1999: 60; Privy Council 1996). They are:

Beaver Lake First Nation,
Cold Lake First Nation,
Frog Lake First Nation,
Heart Lake First Nation,
Kehewin Cree Nation,
Saddle Lake First Nation and
Whitefish Lake First Nation

Blue Quills School was built in the early 1930's and served as a mission residential school for First Nations children (BQFNC 1999: 7).

In 1971, after a peaceful protest against a recommendation by the Department of Indian Affairs to close the school, management and control was assumed by the First Nations people of the region (BQFNC 1999: 7).

A1.2 History

I have summarized the historical events of Blue Quills First Nations College based on newspaper (Windspeaker Special Supplement 1996) and "Moccasin Telegram" materials collected at the Provincial Archives of Alberta.

In 1863, Grey Nuns opened a small school for day students on the Catholic mission.

In 1865, the school was expanded to include boarders.

In 1870, enrolment declined. Between 1870 to 1890, the nuns only boarded girls in the mission convent.

In 1885, a First Nations rebellion forced the nuns to spend the winter on an island in Lac La Biche.

In 1892, the first Indian School for the district of Saddle Lake was erected at Lac La Biche by Rev. Father Henry Gradin and administered by Rev. Grey Nuns of Montreal (PAA Acc. 71.220 Item 5772, Moccasin Telegram 1952-1953, Vol. 3: 3).

In 1893, this school became an industrial (vocational) school run by the federal government.

In 1898, the federal government moved the school to Saddle Lake. Two Oblate brothers built and dedicated a church and school at Saddle Lake. Pupils were sent to the new school called Blue Quills in Saddle Lake (PAA Acc. 71.220 Item 5772, Moccasin Telegram 1952-

1953, Vol. 3: 3). Because of threats by Protestants to burn the new school, Catholics met with the Chief of Blue Quills who gave permission to build a school on his reserve. At that time, Blue Quills Band was one of the Bands that formed the Saddle Lake Indian Reserve.

On December 7, 1931, the new school was called Blue Quills Residential School, St. Paul which was one of first schools for Indians built by the Canadian Government. Fifty-five pupils were transferred from Saddle Lake to Blue Quills Residential School (PAA Acc. 71.220 Item 5772, Moccasin Telegram 1952-1953, Vol. 3: 3; PAA Acc. 71.220 Item 5775, Moccasin Telegram 1955-1956, Vol. 1: 1).

In 1936, one hundred and forty two young boys and girls boarded at this school for ten months each year (PAA Acc. 71.220 Item 5775, Moccasin Telegram 1955-1956, Vol. 1: 1). It continued operating for almost another four decades.

In 1937, a school magazine called Moccasin Telegram was published by Sister Catherine Costello. In 1942, the production of this magazine was stopped. In 1948, Father Etienne Bernet Rollande restarted this magazine under the charity of Rev. Sister V. Metivier (PAA Acc. 71.220 Item 5768, Moccasin Telegram 1948-1949, Vol. 1). The last issue of 1968 Moccasin Telegram can be reviewed at the Provincial Archives of Alberta (PAA Acc. 71.220 Item 5782, Moccasin Telegram 1968).

Then in 1970, rumours indicated that Blue Quills school was being closed without the knowledge of parents or Band councillors. A group organized by Alice Makokis including Stanley Redcrow, Mike

Steinhauer and Edith Memnook met with representatives from all eleven reserves. They supported the idea of Blue Quills school being administered by First Nations. This group met with Indian Affairs officials but the meeting dissolved when the Indian delegates asked the government officials to leave.

On July 15, 1970, a sit-in began at the school and did not end until the delegates met with Indian Affairs Minister Jean Chrétien.

At the end of July, 1970, Deputy Indian Affairs Minister H.B. Robinson travelled to Alberta and offered the delegates a meeting with Chrétien in Ottawa. Later it was decided that twenty-five representatives including a lawyer, two Members of Parliament, and the President of the Indian Association go to Ottawa for a three-day meeting with Chrétien. After lengthy negotiations, a Chrétien official drafted an agreement for Blue Quills School to be administered by First Nations.

In 1975, Band and council members wanted a high school at Blue Quills, and post secondary training to complement it. A university transfer programme called Project Morning Star opened in Fall 1975.

In the mid-1980's, several courses such as Early Childhood Development, Nursing Preparation, High School Upgrading and Social Work Programs were offered. The school also trained students in trades and offered a four-year Bachelor of Arts degree in association with Athabasca University.

In 1988, INAC decided to stop funding high schools on any reserve if a high school continued to operate in Blue Quills because INAC considered the funding duplicated. This resulted in the abandonment of the residential high school in Blue Quills. Instead, Blue Quills concentrated on the mission of the College.

In 1993, administrators successfully obtained the status of Indian Reserve for the school land occupying 97.128 ha. (240 acres) (Privy Council 1996).

APPENDIX 2: EXISTING AND FUTURE FACILITIES OF BLUE QUILLS FIRST NATIONS COLLEGE

A2 EXISTING FACILITIES

I visited Blue Quills First Nations College in August, 1999 to evaluate the following existing facilities (Figure 8 - Existing Facilities).

A2.1 Observation On Physical Conditions of the Existing Facilities

A2.1.1 Main Building - A

.1 The main building consists of three connected buildings: the original building, a gymnasium and a library.

.2 The original building, which was designed by architect R. Guerney Orr (PAA Acc. 73.399 Item 5: Drawing file 614) and was built in 1930, is oriented to the south. It has one basement and three storeys above grade. The north wing has two storeys above grade.

It is constructed with a reinforced concrete structure with a facing of brick veneer. The floor is constructed with concrete. The windows are wood casement. The roof is constructed as a built-up flat roof on a wooden deck. The interior walls are constructed with masonry and a plaster finish. The second floor above the kitchen area has a pitched roof with asphalt shingles and asphalt siding. The basement contains a boiler room, a laundry, a kitchen, a cafeteria, a student lounge and two classrooms. The

main floor has offices and four classrooms. The second floor has three classrooms and bedrooms. The third floor has bedrooms and two classrooms.

.3 The original gymnasium addition was constructed in 1953 and was blessed by Excellency Bishop P. Lussier on June 5, 1953 (PAA Acc. 71.220 Item 5772 Moccasin Telegram 1952-1953, Vol. 10 No. 3: 7). The current addition was constructed to replace the 1953 addition in 1967 and is connected to the east side of the original building. It is constructed with concrete blocks with a facing of brick veneer. The floor is concrete with tongue and groove plywood on open web steel joists. The roof is constructed with an exposed wood deck on open web steel joists and a built-up flat roof. The gymnasium is a single storey with bleachers on the stage on the south side. Above the bleachers is a balcony. The north side has change rooms, washrooms and storage space. The west side is attached to the original building and has a second floor used as a weight room.

.4 Attached to the north wing of the original building is a library building built in 1985. It is constructed with stacked concrete blocks and a facing of brick veneer. The roof is also a built up roof. This library has two storeys with an open concept.

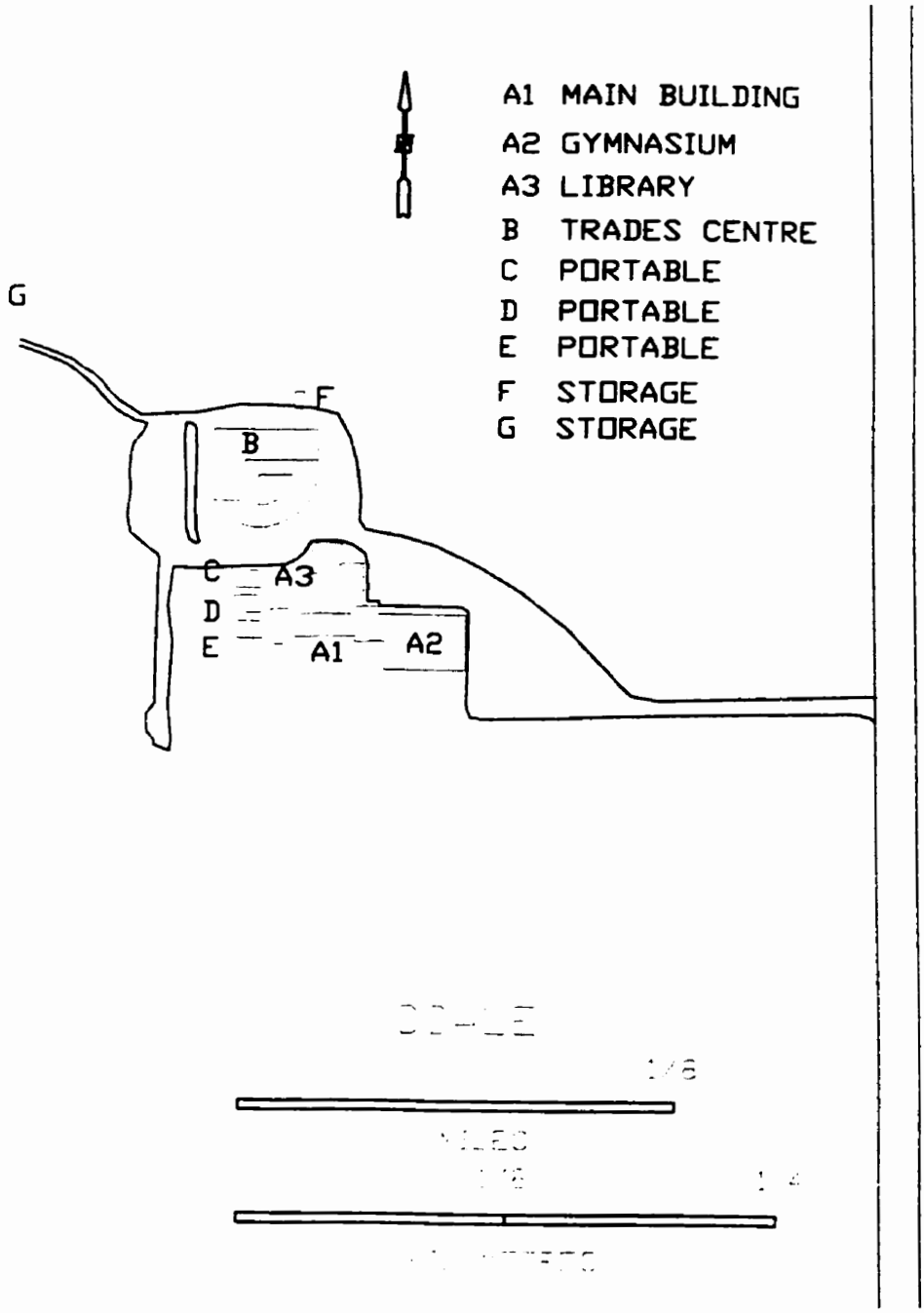


FIGURE 8 - EXISTING FACILITIES (Francis Ng)

A2.1.2 Trades Centre - B

The Trades Centre was built in 1985. The two-storey front portion is constructed with concrete blocks and a facing of brick veneer. The shops at the back are single storey with concrete wall and metal siding. The main floor has concrete on grade. The second floor is concrete. The roof is a built-up flat roof on a metal deck and has skylights. The interior walls are constructed with concrete blocks. The main floor has a carpentry shop, a motor mechanics shop, a plumbing and welding shop, a lounge, one audio visual room, six classrooms and six offices. The second floor has one audio visual room, six classrooms and six offices.

A2.1.3 Portable Classrooms - C, D, E

These portable classrooms are constructed with wood frames and placed on elevated supports. The stairs are installed at the entrances. The roofs are pitched with metal roofing material. They are about 12.8 metres x 7.3 metres (42 feet by 24 feet). The exterior wall finishes are siding.

A2.1.4 Classrooms (Storage) - F , G

These buildings are constructed with wood frames. The roofs are pitched with metal roofing material. Windows are broken. The buildings are poorly maintained and are presently used for storage.

A2.2 INFRASTRUCTURE

According to a study prepared by Associated Engineering Alberta Ltd., for Blue Quills First Nations College, both the existing water supply system and sewage system for the College are inadequate and require upgrading (Associated Engineering Alberta Ltd. 1993).

A2.2.1 Water Supply

An existing single on-site well drilled by Russell's Water Well Drilling, from Ashmont, Alberta in 1992, supplies the water. The 400 mm distribution main has a pressure of 275 kpa (40 psi). This well is 39.0 metres deep with a 127 mm diameter casing, 2.74 metres long well screen and a submersible pump installed at 38 metres. The pumping rate recommended by the driller is 1.5 litres/second (20 igpm). Water from the well is pumped into the water storage reservoir.

The Associated Engineering Alberta Ltd. report reveals that the water has higher levels of iron, manganese, hardness, sulphates, total alkalinity, dissolved solids and turbidity than is recommended by the Canadian Council of Ministers of Environment.

A2.2.2 Water Storage

A 45 m^3 (10,000 igal) underground reinforced concrete reservoir, constructed in 1930 along with the original building, stores the water for the College.

A2.2.3 Water Treatment

An existing water treatment system consisting of pressure tanks and two filters, with potassium permanganate injection pumps is not

working. There are several water softeners in the main building but these are also not working. Bottled water is shipped in.

A2.2.4 Fire Protection

A piped water system with 45m³ (10,000 igal) reservoir provides fire protection for the College. There are four fire hydrants — three of them are located on the east, south-west and north-west corners of Trades Centre. The fourth hydrant is at a westerly location of the College site. The distribution main connected to the hydrants is believed to have a diameter of 150 mm. The College also has fire fighting support from the County of St. Paul and Town of St. Paul Fire Department.

A2.2.5 Sanitary Sewage System

.1 Sewage Collection System

Associated Engineering Alberta Ltd. says in its report that the two sewage systems at the College do not meet "current standards for sewage systems and need to be upgraded to serve a long-term educational facility."

In the north-west corner of the site, a Quonset and a storage shed have a gravity collection system which drains into the septic tank, and from the tank, the sewage is pumped into stand of trees.

The main buildings on Campus are served by a system of shallowly buried gravity sewer lines. The sewage flows into a two chambered septic tank. Originally it was intended that the sewage be pumped from the septic tanks to a sewage lagoon. But at present, the system operates on gravity. This has caused problems with the sewage backing up and discharging through the outfall line. This outfall line is a 150 mm diameter, clay tile pipe. The shallow gravity lines have created problems with freezing and plugging, likely because the grades are too flat.

.2 Sewage Treatment Facility

The sewage treatment facility is a slough/marsh 200 metres (approx.) southwest of the main building of the College. When the water levels of marsh area become high, the water drains to the south-east and eventually makes its way to Upper Therian Lake, after flowing across farmland, Highway 28 and a natural depression.

Associated Engineering Alberta Ltd. concludes that "This facility does not meet current Alberta Environment or Health and Welfare Canada Standards."

A2.2.6 Roadways System

.1 Access Road

A single, gravel access from the county road leads to a poorly defined campus roadway system. There are not enough signs to show directions, and routes to buildings, parking and other sites on campus.

According to the Associated Engineering Alberta Ltd. report, "Upgrading and maintenance of this roadway is required to provide all-weather, safe, reliable emergency vehicle and daily vehicle access."

.2 Vehicle Parking

Two areas are currently designated for parking. On the north side of the main building, an area is designated for 20 vehicles. There is a parking lot for 60 vehicles east of the gymnasium. These 80 stalls are provided with electricity. Associated Engineering Alberta Ltd. says although the east lot is paved, it is in need of improvement.

A2.3 MODERNIZATION

Modernization is ruled out because of the age, rigid structure, and health and safety conditions of the existing Main Building. The Trades Centre evaluated further for possible inclusion in a future campus master plan. Other portable classrooms are not worth being retained due to their poor condition, health and safety hazards.

New facilities will be planned based on the current enrolment and potential student enrolment. No doubt, the College will be designed and built according to the First Nations traditional, cultural, spiritual and spatial needs. Nevertheless, space will still be determined based on certain floor area calculation guidelines. The federal government and Indian Affairs of Canada do not have any space requirements for college or university level education. I therefore refer to the Alberta Government Education Department space requirements as the minimum floor area guideline for the College. Space requirements indicated in the National Building Codes of Canada 1995 (National Research Council 1995) and Alberta Building Codes 1997 (National Research Council 1997) edition are used for calculation.

A2.4 POTENTIAL STUDENTS FOR THE BLUE QUILLS FIRST NATIONS COLLEGE

Although the current physical conditions and space of the College are not favourable, the College, which has an excellent management and administration, can manage the current student enrolment. However, it will be impossible for the College to manage future enrolment increases because the College will be required to serve all the potential students from the seven First Nations. Based on age groups in 1998 Indian Register Population, I can summarize the potential students from seven reserves as shown in Section 3, 3.2 Labour Sources, Figure 7.

If Blue Quills First Nations College can be expanded, these age groups can be classified for planning future College accommodation as shown in Figure 9:

AGE GROUPS	15-19	20–24	25-29	30-39	TOTAL
Education for next 5 years	University	University	University or Advanced	Upgrade or Advanced	
Total 7 First Nations	1401	1267	1221	2106	5995
50% to be students (assumed)	**701**	**634**	**611**	**1053**	**3000**
Teachers (10%)	**70**	**63**	**61**	**105**	**300**
75% to be students (assumed)	1050	950	915	1580	4996
Teachers (10%)	105	95	92	158	450

FIGURE 9 - FUTURE STUDENTS AND TEACHERS RATIOS FOR BLUE QUILLS FIRST NATIONS COLLEGE (INAC 1998a)

There are two issues for developing the new College Campus:

1. Minimum floor areas required for each building be determined.

2. Priority for design and construction of each building be determined.

A2.5 LONG TERM PLAN SPACE REQUIREMENTS FOR ACADEMIC BUILDING BASED ON POTENTIAL STUDENT ENROLMENT

Having forecasted the future growth of students for seven First Nations we need to consider a long term plan for suitable spaces for future activities so that Blue Quill First Nations College can fulfil its educational goal. The Academic Building with classrooms, laboratories and supporting space is evaluated below:

Method of Calculation:

I make the assumption that 50% of the potential students will actually be students of Blue Quills First Nations College, i.e. 3,000 students and 300 teachers. Although the Campus Development Guidelines Update (Alberta Advanced Education 1989) is replaced with the Alberta Advanced Education and Career Development Facilities Accommodation Capacity Study Final Report (RMC Resources Management Consultants (Alberta) Ltd. 1998), I feel the latter cannot be followed easily because the space requirements are based on numbers of stations whose sizes are not well defined. INAC has established School Accommodation Standards for kindergarten to grade 12 (INAC 1992). Currently INAC applies these Standards to Reserve school funding. In this thesis, I have based space requirements in accordance with the space guidelines for area per person indicated in the National Building Codes of Canada 1995 and Alberta Building Code 1997, Occupant Load Table 3.1.16.1. The space requirements will be as follows:

General assumption: (net floor area per functional space)

Instructional space:

(a) Classrooms:
(1.85 sq.m. x 15 hr./wk)/21 x 3,000 = 3,964.28 sq.m.

(b) Laboratories/shops:
(9.30 sq.m. x 15 hr./wk)/21 x 3,000 = 19,928.57 sq.m.

Supporting space:

(a) Learning Resources Centre
(Reading or writing Room):
1.85 sq.m. per student x 3,000 = 5,550.00 sq.m.

(b) Office space:
9.3 sq.m. per teacher x 300 = 2,790.00 sq.m.

(c) Auditorium (large lecture space):
1.85 sq.m. per student x 3,000 = 5,550.00 sq.m.

(d) Athletic Facilities:
1.0 sq.m. x 3,000 = 3,000.00 sq.m.

(e) Food Services (Cafeteria):
1.2 sq.m. per student x 3,000 = 3,600.00 sq.m.

(f) Student Services (Personal Services uses):
4.6 sq.m. per student x 3,000 = 13,800.00 sq.m.

Subtotal (net assignable area): = 45,762.85 sq.m.
Add Flexibility Factor
(15% of subtotal): = 6,864.43 sq.m.

Total Net Area (65% of gross) = 52,627.28 sq.m.

Total Gross Floor Area = 80,965.05 sq.m.

A2.6 LONG TERM SPACE REQUIREMENTS FOR SUPPORTING FACILITIES

Other supporting facilities, which are also evaluated in this thesis, will be designed and constructed at the same time or after the Academic Building. Although some supporting facility spaces have been allowed in the calculation of Academic Building, floor areas of the latter will be readjusted accordingly. They will include:

- Day Care Centre
- Student Residence
- Teacherage (Staff Residence)
- Physical Plant
- Cultural Centre (Fine and Performing Arts Centre)
- Resource Centre
- Research Centre (Museum and Archive)
- Laboratories (for Trades, Science and Engineering)
- Computer Centre
- Gymnasium & Swimming Pool
- College Community / Mall Building
- Auditorium (Large Lecture Space)
- Parking Facility

Buildings with names from Western culture can easily be changed to reflect First Nations tradition. Examples: Elders' Circle for Cultural Centre, Oral Traditional Knowledge Centre for Resource Centre and so forth.

A2.7 BUDGET

This budget is not included in this thesis because it will be affected by the design, materials and construction methods of the project. The

real cost of the project will be known when the design, detailed drawings and specifications are available for final cost estimation. However, Kharbanda and Pinto warn against underestimating the cost (Kharbanda and Pinto 1996: 72). I feel that the budget and cost estimate for the project not be changed greatly if a full feasibility study is conducted properly.

A2.8 PRIORITY OF FACILITIES

Creating a College Campus from scratch is very difficult. But it is not impossible to construct all of the facilities at the same time. However, sufficient resources, funding and time are required for this task. It is wise to establish several major criteria for the construction priority of buildings (Leona Makokis 2000). The first criterion is based on ensuring the health and safety of staff and students. The second is based on meeting the urgent needs of staff and students. The third is based on whether a building itself can generate revenue to cover construction costs.

Once the priority list is set up, a proposed building is selected and becomes a project. The next step is to proceed with a full feasibility study for this selected project and determine the budget, schedule and location. The third step is to prepare the design and specifications. The fourth step is to construct the building in accordance with the drawings. The priority of buildings is listed in order of decreasing priority.

- Infrastructure including water and sewage and or Physical Plant
- Student Residence/Housing and Teacherage
- Office building for Tribal Chiefs Ventures

- Academic Building with classrooms
  Library/Resources Building
  Daycare Centre
- College Community/Mall building
- Cultural Centre
- Recreation Centre
- Research Centre
- Laboratories Building
- Computer Centre
- Auditorium
- Parking Facilities

A2.9 PLAN OF BLUE QUILLS FIRST NATIONS COLLEGE

Having calculated the long term space requirements for both the Academic Building and the other supporting facilities, I propose a possible Campus Master Plan in this thesis for consideration. Each building will be located according to the First Nations culture. In this way, the natural environment and buildings will be blended to form a learning environment. The design of the buildings will be simple, functional, cultural, traditional and spiritual.

Elder Mike Steinhauer recommends that "wihsa-kacak" (a teacher of animals, people and medicine) is the best term applied to each building (Elder Mike Steinhauer 2000). Therefore, bear, eagle, buffalo, turtle, bull, beaver and wolf can be used for the names of buildings.

A2.9.1 Concept 1 - Four Corners

The campus will be designed based on the concepts of four corners, tipi and communal life style. A new road will be constructed from the highway to the north of the existing main building which will be used for a museum or heritage building. Four new major buildings that connect at ground level will represent the four corners. The buildings will be named according to the four colours and four directions or four corner concept discussed in Chapter 3 and Appendix 5. An open courtyard of a centre place building or auditorium used for housing the "Iron Creek" meteorite — the sacred stone — will be at the centre surrounded by the four major buildings. (Figure 10 - Concept 1 - Four Corners)

A2.9.2 Concept 2 - First Nations Camps

In this concept, seven buildings will be built in a circle. Each building represents one of the seven First Nations. The seven teachings, described by Diane Steinhauer in Appendix 5, will determine the names of the buildings. As in the Four Corner Concept, the First Nations Camp Concept also will have an open courtyard of a centre place building used for housing the "Iron Creek" meteorite - the sacred stone. The buildings may or may not be connected. (Figure 11 - Concept 2 - First Nations Camps)

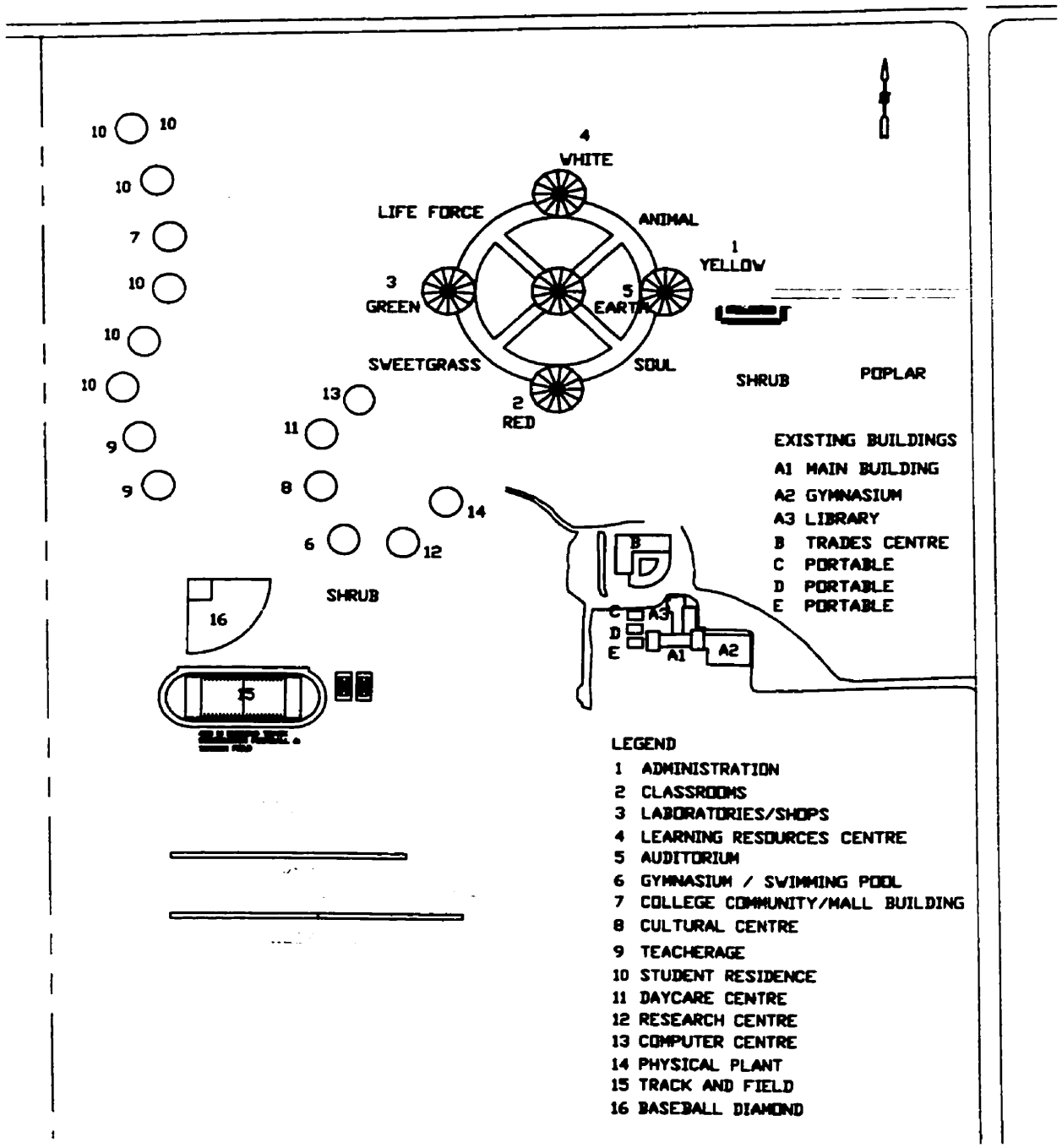


FIGURE 10 - CONCEPT 1 - FOUR CORNERS (Francis Ng)

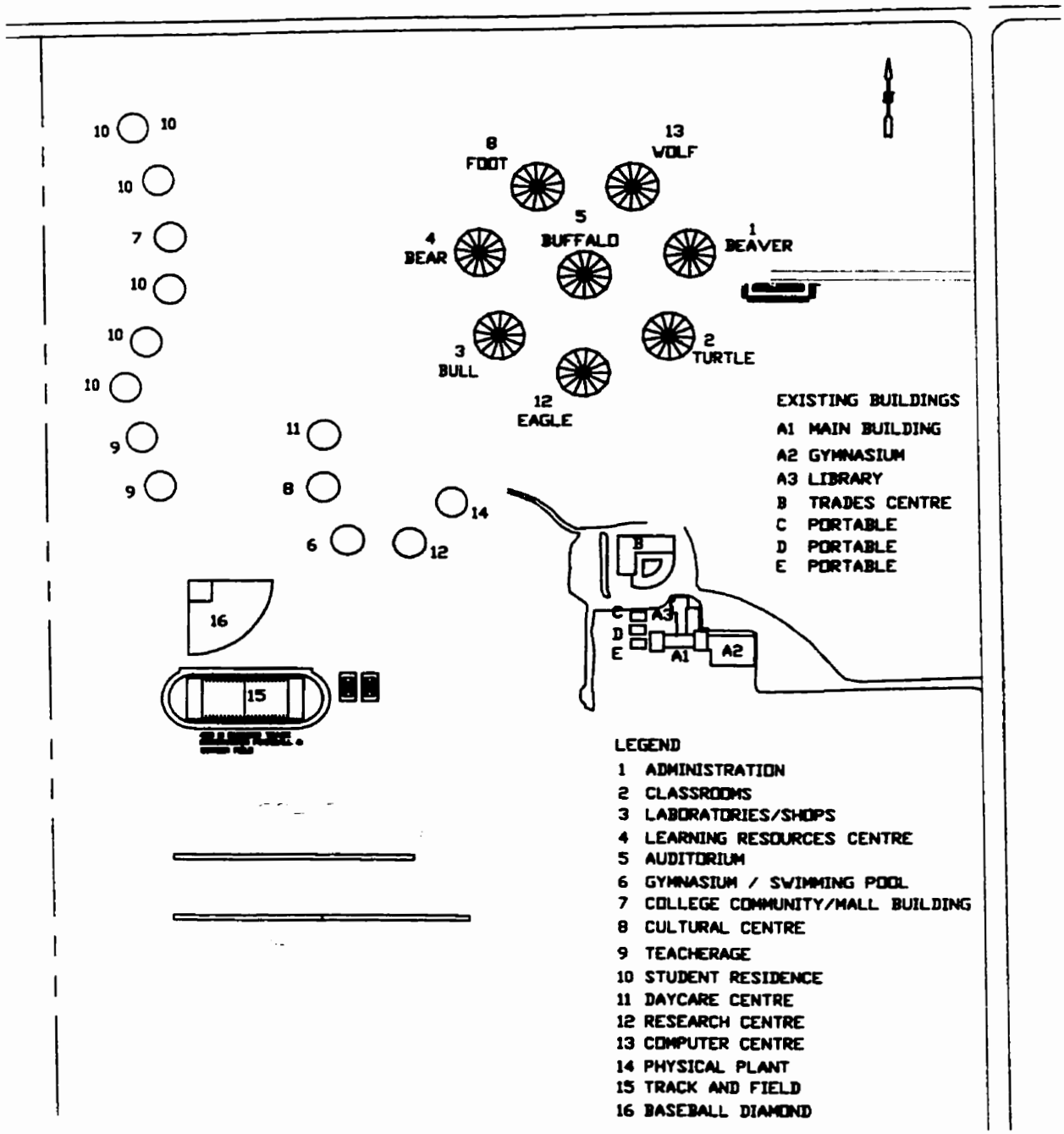


FIGURE 11 - CONCEPT 2 - FIRST NATIONS CAMPS (Francis Ng)

APPENDIX 3: SACRED CEREMONIES AND TIPI

A3.1 SACRED CEREMONIES

Sacred ceremonies include Sun Dance, Smoking Tipi, Masked Dance, Give Away Dance, Prairie-Chicken Dance, Horse Dance, Elk Dance, Bear Dance, Pipestem Bundle Dance, Round Dance and Mite-Wiwin (Mandelbaum 1979: 183 to 214). Secular dances include Pow-Wow Dance, Dakota Dance, Tail Wagging Dance and Tea Dance (Mandelbaum 1979: 214 to 219). Elder Alexis Seniantha of Assumption Reserve mentions that Tea Dances are community celebrations for thanksgiving and socializing (Meili 1991: 5). Other ceremonies include Bear, Eagle, First Event and Dog Feast (Mandelbaum 1979: 219 to 224). Elder Albert Lightning of Ermineskin Reserve also mentions the Horse Dance (Meili 1991: 85).

A3.2 TIPI

First Nations use the teachings of the tipi to help them understand their roles in the community today. Based on the fifteen poles of Tipi, each pole represents a value (Patricia Makokis 1999).

.1 OBEDIENCE: It is an act or instance of obeying. First Nations people learn by listening to traditional stories, to their parents or guardians, their fellow students and teachers. First Nations people learn what is right by watching the behaviour and listening to the reminders from their parents, guardians, teachers and fellow students.

.2 RESPECT: It is the act of giving particular attention and consideration. First Nations people give honour to their elders and fellow students and the strangers who come to visit their community. First Nations people honour other people's basic rights.

.3 HUMILITY: It is a state of being humble. First Nations people are not to place themselves above or below others in the circle of life; they ought to feel humble when they understand their relationship with the Creator. They as individuals are so small compared to the majestic expanse of creation and are only a strand in the web of life. Therefore, First Nations people must respect this.

.4 HAPPINESS: It is a state of well-being, contentment and joy. First Nations people show some enthusiasm to encourage others at social functions. Their action will make their ancestors happy in the next world.

.5 LOVE: It shows strong affection for another arising out of kinship or personal ties. If First Nations people are to live in harmony, they accept one another as they are and accept others who are not in their circle. Love means to be kind and good to another.

.6 FAITH: It means complete trust. First Nations people learn to believe and trust others, to believe in a power greater than themselves, a power who gives them strength to be worthy members of the human race.

.7 KINSHIP: First Nations Family relations are important to First Nations people. This includes their parents, their brothers and sisters who leave them and give them roots. The roots tie them to the life-blood of the earth. It also includes extended family, grandparents, aunts, uncles, cousins, in-laws and children. These are also their brothers and sisters who give them a sense of belongings to a community.

.8 CLEANLINESS: First Nations people learn not to inflict ills on others—by inflicting others they are also doing it to themselves (because of the interconnectedness of all living creatures). Clean thoughts come from a clean mind and this comes from spirituality. Good health habits also reflect a clean mind.

.9 THANKFULNESS: It means to express thanks and to be pleased with each other. First Nations people learn to give thanks for all the kind things that others do for them and to give thanks to their Creator that they are privileged to share with others in the spirit of love.

.10 SHARE: First Nations people participate with others and enjoy them. First Nations people learn to be part of a family by helping and providing food or other basic needs. This is sharing responsibilities in order to enjoy them.

.11 STRENGTH: It is a state of being strong and enduring. First Nations people learn to be patient in times of trouble and not to complain but to endure and show understanding. First Nations people accept difficulties and tragedies so that they may give others strength to accept their own difficulties.

.12 GOOD CHILD REARING: It tells people to be good parents and role models. Children are unique and blessed with the gift of life. First Nations people are responsible for their children's well being, spiritually, emotionally and physically and for their intellectual development. Children represent the continuity of our circle of life when First Nations people perceive to the Creator's will.

.13 HOPE: It means to cherish a desire with an expectation of fulfilment. First Nations people hope for better things to make life easier for themselves, their families and the community both materially and spiritually.

.14 ULTIMATE PROTECTION: The ultimate responsibility is balanced caring for body, mind, emotions and spirit of the individual, the family, the community and the nation.

.15 CONTROLS FLAPS FROM WINDS: First Nations people are connected by relationship and depend on each other.

APPENDIX 4: SACRED ROCKS AND SITES

A4.1 SACRED ROCKS AND SITES

Mr. Stewart Steinhauer, a renown rock sculptor from Saddle Lake First Nation accompanied me to two of eleven Sacred Rock sites in Alberta on April 17, 2000. These two are the Ribstone Historical Site near Viking and Wolf Ears Hill, which was the probable sacred site of the Iron Creek Meteorite. They are 26 km. apart.

After having visited these two sites, I met Professor Gordon R. Freeman at his office, in the Department of Chemistry, University of Alberta on April 17 and 19, 2000. Professor Freeman explained some of his personal opinions and observations. Later, he let me read a research document on Sacred Rocks of Alberta that he wrote along with his wife Mrs. Phyllis Freeman. The document describes eleven sites of glyphed boulders and a meteorite. The Freemans interviewed the owners of the sites.

Based on the NTS Maps of scale 1:50,000 produced by Department of Energy, Mines and Resources, Professor and Mrs. Freeman described the following Sacred Rock locations and gave their co-ordinates (Freeman and Freeman 1999):

The Viking site (111.613°W, 52.990°N) has two to three Sacred Rocks. They are light pinkish tan quartzite engraved with cups and long grooves forming a backbone and patterns of ribs. The larger one is triangular in shape and weighs about 140 kg. The Provincial Government named the site the Ribstone Historical Site.

The Iron Creek Meteorite site (probably Wolf Ears Hill, 111.409°W, 52.786°N) only has a small group of rocks running in a straight line to the north. Although there is a small hill called Round Hill that is about 2 km. away, according to record, Indians visited Wolf Ears Hill up to 1939 because the Indians who could survive smallpox in 1870 have since passed away. Freeman and Freeman believe Wolf Ears Hill is the site. The meteorite weighs 145 kg. and is nearly pure iron. It is triangular and resembles a human head. The original meteorite is now displayed at the Provincial Museum of Alberta.

The Endiang site (112.153°W, 52.025°N) had two Sacred Rocks on Leithead Hill. The rocks, which are completely covered with cups and grooves, are now on display at the Reynold's Museum, Wetaskiwin. The larger rock weighs about 500 kg and is light grey quartzite. It was orientated in an east-west direction. The smaller one was 2 metres east of the larger one. There were stones extending 100 m. and aligning on the north side of the larger Rock. A triangular flat white limestone marker was at the end of the stones. Between the marker stone and the sacred rocks, there were circular rock clusters.

The Byemoor site (112.413°W, 51.935°N) has one sacred rock on Wolf Hill. The Rock is pinkish, hard, metamorphosed sandstone, nearly quartzite and weighs about 800 kg. The small rock is 2 metres east of the large rock. Other than grooves, a deep cross, a circle and small cups can be seen on the rock.

The Scapa site (112.066°W, 51.923°N) had a sacred rock on Ribstone Hill. It was light sandy coloured quartzite or hard, metamorphosed sandstone and weighs about one half tonne. It was triangular with patterns of cups and grooves similar to the Viking sacred rocks. It was stolen from the site in 1974.

The Torchu site (113.060°W, 51.805°N) has a sacred rock with two faces—one human and one bison. It is in the possession of the landowner and is not on the site. The profile of the rock is similar to the skull of a Pacific Coast Flathead Indian, without the lower jaw. It is a pinkish quartzite, weighs about 230 kg. and is triangular. This rock may contain symbolic information about Alberta.

The Sunnynook site (111.607°W, 51.311°N) has a sacred rock on Ribstone Hill. This rock is engraved with cups and grooves on its entire surface. It is a sandy coloured, slightly pinkish quartzite and weighs about 260 kg. This sacred rock has a mudstone north-marker.

Kekip Sousouators (112.359°W, 50.819°N) had a sacred rock on Kekip Hill. It is a sandy coloured quartzite and has a hemispherical shape. It weighs about 80 kg. There are many symbols on its surface such as a star nested in a crescent moon and other clusters of grooves. It is now in the Canadian Museum of Civilization, Hull, PQ.

Millicent (111.864°W, 50.653°N) had a sacred rock on a knoll that is 5 km from the summit of Crow Buttes. It is pinkish quartzite and weighs about 800 kg. The cups carved in the rock are "polka dots" symbolizing morning stars. It is now located inside Dinosaur Provincial Park.

Foremost (111.469°W, 49.403°N) has a sacred rock on a knoll. It is purplish grey granite and weighs about 300 kg. It has engravings of a complex patterns of grooves and small cups, circles, and a right and a left human hand. Some stones nearby have been cracked by heat. They might have been used in a sweat lodge.

Other hills such as Badger Hill (112.154°W, 51.921°N), Gopher Head Hill (112.517°W, 51.872°N), Crow Buttes (111.831°W, 50.693°N) are discussed in the Freemans' research document.

Professor and Mrs. Freeman conclude that all sacred rocks, which vary from one-to-five thousand years of age, were probably moved to their sites. The rocks were orientated in a certain direction, mostly north, and they usually have a distant north-marker rock or rocks to their north. The sacred rocks were mostly located on the summits of hills from which rivers, valleys, and plains could be seen. And there was a visual connection among all sacred sites.

Different cups and grooves carved into the rocks may have represented different ritual purposes. The rocks related to the angles of sunlight and moonlight as the angles changed with the time of day and seasons of the year. In shape, the rocks are triangular, and from certain visual angles, some resemble human heads. Most of these rocks are no longer in their original positions and are not on any First Nations land. The sites have been seriously disturbed by farming, pipeline construction, gravel testing and vandalism.

Professor Freeman said that he prefers to provide his own opinions and record the information for future research by other people. He does not concern himself with what the First Nations think about the

Sacred Rocks and the sites. At one time, he was invited to meet an elderly woman in one of the reserves south of Calgary, in order to obtain more information about these rocks for analysis. Unfortunately, people did not keep their appointment (Professor Freeman 2000).

A4.2 ANALYSIS

The selecting of sacred sites reflects respect for the cultural landscape. The sites are located along a straight line from north to south, parallel to the present Highway 36. I feel that these sites had particular economic, religious and military purposes. The First Nations people hunting buffalo in this region needed an observation place to view the whole site. The orientation of and the engravings on the sacred rocks indicate the importance of cosmology. Based on the time cycles, the First Nations people could determine their seasonal economic activities such as hunting, travelling, and preparing themselves for a severe winter. According to their religion, First Nations people believed they could communicate with and worship their Creator better from the summits where the sacred rocks were located. Both sacred sites and sacred rocks brought First Nations people together at a central place. Perhaps, these sites were also used as for military defence because from them any invasion could easily be detected.

The Freemans' research shows that all the sacred sites are located between 111.000° W and 112.500° W. There may be more than eleven sacred sites for sacred rocks (Figure 12). "Writing-on-Stone" Provincial Park, Alberta, has many native etchings made by nomadic First Nations people who either carved or painted spiritual and life

events on stone about 3000 years ago (Elves 2000: F8). The park's location is about 111.500° W and 49.200° N.

The Alberta Government had aerial surveys for the whole province in 1949. From 1950 until this year, only parcels of land were photographed through aerial photography. Perhaps more sacred sites and rocks might be discovered from the original 1949 aerial photos.

Blue Quills First Nations College is located about 200 kilometres northeast of Edmonton, 5 kilometres west of St. Paul, and 800 metres north of Highway 28. It is located within part of the east half of Section 11, Township 58, Range 10, West of the 4th Meridian (Privy Council 1996); between 474 000 m E and 476 000 m E; and between 5 982 000 m N and 5 984 000 m N; and at the intersection of Longitude 111°22'30" (111.366°) W and Latitude 54°00'00" (54.000°) N (Alberta Environment 2000).

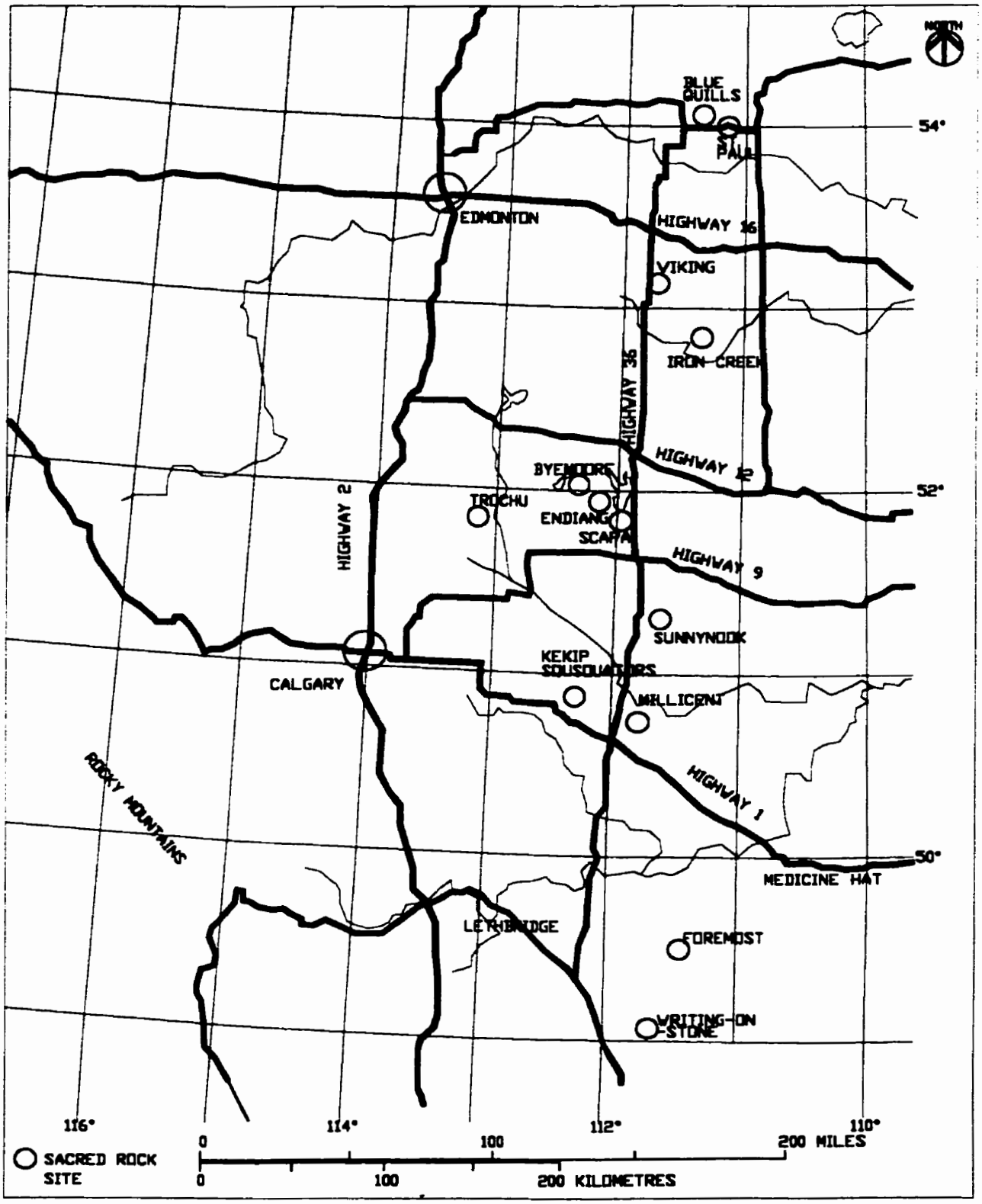


FIGURE 12 - LOCATIONS OF SCARED ROCKS AND SITES

(Francis Ng)

APPENDIX 5: FIRST NATIONS CULTURE AND LANDSCAPE

A5.1 CULTURE

In order to understand the character and behaviour of First Nations people, their traditional and cultural background are worth studying. This understanding is necessary so that educational and training programmes and courses can be designed properly.

A5.2 FIRST NATIONS LIFE AND KNOWLEDGE

According to the description of life values of First Nations culture, life has two parts, similar to two wedges. The left part is called Forced Life with the wide base of the wedge on top and represents the normal life of modern western society. The right part is called the Life Force and has the wide base of the wedge on the bottom and represents the First Nations life. Life Force is divided horizontally into seven levels:

Level 1 is called a time of happiness: e.g. a child goes to school.
Level 2 is a time of confusion and dependence.
Level 3 is a time of searching as one becomes older.
Level 4 is truth time.
Level 5 is decision time for man and woman.
Level 6 is a time of planning, for marrying and having children.
Level 7 is the time for Elders and teachers.
All seven levels represent life values.

Level 4 has the healing force of Life and is equivalent to High School Grade Twelve of a person's daily Forced Life. At the bottom of

Forced Life, one becomes an expert or master, similar to an Elder or a teacher of Life Force (Elder Mike Steinhauer 1999).

A5.3 NUMBER FOUR

First Nations principals are also organized into four corners: the lower left corner is Love represented by Sweetgrass; the upper left corner is Honesty represented by Life Force; the upper right corner is Sharing represented by Animal; and the lower right corner is Determination represented by Soul. Love and Sharing, and Honesty and Determination work in pairs. These forces make a pipe. Sweetgrass as incense can purify the body. All leadership and management skills are based on these four principles (Elder Mike Steinhauer 1999). Similarly, Bernie Makokis, member of Saddle Lake and Director of Tribal Chiefs Institute, uses pipe for honesty; sweetgrass for kindness; food animals for sharing; and rock for determination (Bernie Makokis 2000). The pipe is a symbol to the First Nations religion, as the cross is to Christianity. The person, such as Elder George Kehewin of Kehewin Reserve, who carries this pipe, leads people to God. "When he lights the tobacco in it, he sends prayers skyward to the Great Spirit with the smoke" (Meili 1991: 150). The straightness and strength of the wood pipe stem represents straight and true. The pipe bowl is made of rock (Meili 1991: 150).

According to Elder Mike Steinhauer, First Nations have four colours: yellow, red, green and white. Yellow represents the First Nations' grandfather—Sun. Sun gives them life and warmth, from the east. Red—red thunder from the south controls rains, physical health, and water for growth. Green is associated with the west and symbolizes learning. First Nations have green grass to lie on and use Sweetgrass

to make braids. Sweetgrass can purify them during ceremonies. White—Old man wind is from the north. He has white hair and blows winds that make trees lean together and make creatures mate. He is a mover of water.

If First Nations begin one fast, they are required to complete four fasts. If they perform the Sundance, they are required to do it four times to complete the cycle. If they begin one ceremony, they are required to complete four ceremonies (Elder Mike Steinhauer 1999).

Elder Russell Wright of Blackfoot Reserve mentions that four represents a whole, such as four seasons represent a whole year. Four directions represent the whole earth. Four human growth phases—child, youth, adult and elder, represent a whole life. And there are four decision-making steps based on the concept of continual learning and re-learning as part of the whole life cycle (Meili 1991: 49 & 50). The number *four* is used by Michael Rotondi, architect of Sinte Gleska University, to describe the landscape of Rosebud Reservation. He says the landscape of the reserve, which is natural without any man made elements, represents the four cardinal directions (Rotondi 1999: 85).

Black Elk, the Cree Chief Poundmaker who was released from prison after the Riel Rebellion in 1887, had a similar concept—the circle of four quarters. He said that "the East gave peace and light, the South gave warmth, the West gave rain and the North with the cold and mighty wind gave strength and endurance" (Richardson 1993: 5).

Bernie Makokis who has knowledge of the Eaglechild's Teachings, says the North wind represents knowledge and humility; the

East—Eagle Vision represents sharing; the South—Thunderbird represents water; and Bear represents West. Bear also represents learning, much in the same way the colour green does. "Canada is known as Turtle Island". Mother Earth is represented by the Sweat Lodge (Bernie Makokis 2000). During a healing session at Elder Mike Steinhauer's place in August 1999, Diane Steinhauer, Director of Education of Saddle Lake First Nation, indicated Eagle represents love; Bull represents respect; Bear represents courage; Foot represents honesty; Wolf represents humanity and humbleness; Beaver represents wisdom of life, and Turtle represents truth (Diane Steinhauer 1999). When Douglas Cardinal, one of Canadian most famous architects, designs First Nations projects, he applies the "number four concept" to arrange four buildings into Four Corners. One example from his work is the Kehewin Cree Nation core area with a school, a seniors lodge, a recreational building, and a Band administration building in northeast, southeast, southwest and northwest locations respectively.

I have encountered the "number four" concept several times in various articles on First Nations culture. For instance, the four winds concept is used by Mistassinis in Canada. Each wind blowing from one cardinal direction represents orientation with reference to the position of sun but also weather which affects Mistassini's travel planning (Tanner 1989:94-95).

A5.4 HEALING CIRCLE

Elder Mike Steinhauer mentions that there are certain people who are given the gift of healing and helping other people. Some healers are spiritual, others medical. People do not pay with money for their

services. Instead, people are expected to offer tobacco or a gift to the healer. There are many healing ceremonies such as dances or peace pipe ceremonies. Most ceremonies are begun with purification of the people, the sacred pipe and food. It is believed that through feasts First Nations people keep their circles strong. Flags of various colours are presented to the Elders presiding at the feast. These colours are presented to the Spirit World and the food to the ancestors for their help with lives on the earth. They pray for strength, good minds, kindness and love for their people so that there will be harmony in their family and communities (Elder Mike Steinhauer 1999).

A5.5 FIRST NATIONS GOVERNMENT

Prior to European influence, First Nations government was made up of different clans with different leaders such as hunters, medicine men, and teachers. They called their leaders headmen. These headmen, who acted as co-ordinators, met at a certain place. Then they brought what they discussed at the meeting back to their clans. Their clan members might or might not have agreed on everything initially but a consensus would usually be reached. Everybody was equal.

First Nations Government is based on the Four Corners Principles described previously (Elder Mike Steinhauer 1999). Mandelbaum also describes how the chieftainship is acquired. For instance, the chieftainship is not hereditary, but is based on the person's accomplishments in war and ability of social being such as hunting and farming (Mandelbaum 1979: 106 & 290).

A5.6 SPIRIT AND ELDERS

First Nations people believe in spirits and in a spirit world. Elder Mike Steinhauer has had an experience of a journey into this spirit world. Other Elders also have had similar spiritual experiences. First Nations people regard Elders as role models because of their wisdom and experience with the spiritual world (Elder Mike Steinhauer 1999). Mandelbaum describes the experience of a resurrected man in the spirit land and a man visiting the land of dead (Mandelbaum 1979: 180). Elder Joe Cardinal of Saddle Lake says that spiritual values are part of a Native person's heritage because spirit is the power of body and mind (Meili 1991: 256).

A5.7 TIPI

During my research, Dr. Patricia Makokis described the tipi to me (Patricia Makokis 1999). The tipi is not just a shelter but represents many values of traditional First Nations culture. It is a mnemonic device, like colours and wedges. The base of tipi represents the circle of Mother Earth. First Nations use the teachings of the tipi to help them understand their roles in the community today. Based on the fifteen poles of the tipi, each pole represents a value: obedience, respect, humility, happiness, love, faith, kinship, cleanliness, thankfulness, sharing, strength, good child rearing, hope, ultimate protection and relationships. The description of each value can be found in the Appendix 3.

A5.8 LANDSCAPE

Blue Quills First Nations College needs its education facilities to be based on the landscape, narratives and cosmological images in order to strengthen the relationship of First Nations students to their traditional culture.

Indigenous culture is in part created by the landscape, which provides settings for groups of people. People belonging to a particular group rely on settings to guide their behaviour. This communal behaviour becomes culture and this culture then reproduces geographical experience.

Communication about these geographical experiences– such as stories–connects a group of people to a particular place. Thus, the relationships to places are dependent upon communal activities (Basso 1996: 56-57; Cruikshank 1998: 2). For instance, when people travel to new landscapes and learn new stories, their behaviour gradually changes. After a period of time, their behaviour has noticeably changed (Basso 1996: 80). Ethnographic narration used by First Nations people reinforces memories and place to give their lives rootedness (Bierwert 1999: 41) and strengthens the virtues of wisdom by showing what can happen when conditions are unfavourable (Basso 1996: 76). In other words, Rapoport comments that human behaviour can either be directly affected by built environment in terms of "mood, satisfaction, performance and interaction"; or indirectly "modified in terms of social standing of occupants and behaviour" (Rapoport 1976: 11). For example, based on the stories connecting people and place told by the community members of Sinte Gleska University, the architect maps the relations

of earth and sky, people to earth, river to willows. This means that the transformation of cultural history into landscape has taken place through oral knowledge (Stevens 1998: 68; Duncan and Ley 1993: 4; Cruikshank 1998: 18).

Another example: at the meeting with the people of Rosebud Reservation, Rotondi heard a story from the President of the Sinte Gleska University, South Dakota, about how the people were betrayed by previous visitors. This president mentioned that when these visitors left the reserve, they took more gifts than they came with (Rotondi 1999: 85). This story indirectly underlines that "Mistrust" was the barrier between the architectural team and the Rosebud local members (Rotondi 1999: 85; Stevens 1998: 67).

During ritual performances, both temporary and permanent features of built environment act as critical symbolic elements and provide setting and markers for the participants who transform their collective ideals into reality and communities as a whole (Lawrence & Low 1990: 474). This transformation creates a particular culture in the community that becomes the focal point of the community. This focal point is called a centre place.

The landscape provides a good site for particular usage and symbols. According to the theory of "natural terrain or landscape" suggested by Doxiadis, man connects himself with the landscape and his own architectural space (Doxiadis 1976: 92). Places such as beaches, seashores and river sites are probably the original habitats of people. Also many cultures develop near oceans because of mild climates, food, transportation and security (Altman & Chemers 1984: 31). Similarly, according to research by the Freemans, a source of fresh

water such as a lake, a stream or spring, can be found within a few kilometres in an easterly direction from the Sacred Rock site (Freeman and Freeman 1999: 9).

The majority of First Nations lands are adjacent to either rivers or lakes which provide water and food. For this reason, many First Nations have names relating to lakes such as Whitefish Lake First Nation, Cold Lake First Nation, Frog Lake First Nation, Beaver Lake First Nation, and rivers such as Driftpile First Nation and Loon River First Nation.

Traditionally, First Nations selected their campground and established their communities close to a landscape that best accommodated their living and hunting. An example of this has been found near Head-Smashed-In-Buffalo Jump Centre in Fort MacLeod. When Elder Katie Bull Shield-Wells of Blood Reserve helped an archaeologist to conduct research on an early whiskey trading post, she identified numerous groups of rock rings used to anchor bottoms of tipis to the ground (Meili 1991: 194).

Cosmology and cosmological structures serve as orienting and determining devices for the organization of a built environment (Lawrence & Low 1990: 459). From the Lakota's stories, the people of Rosebud Reservation in South Central South Dakota applied cosmology to connect the earth and sky to an ecological system (Rotondi 1999: 85).

Mountains have always been special places, often associated with a culture's religious or cosmological beliefs (Altman & Chemers 1984: 31; Bierwert 1999: 41). For example, Sacred Rocks were on hilltops.

If the Sacred Hill is elongated, its usual long axis is towards the north. This north was significant to ceremonies. If Sacred Rock with its small rocks formed a line towards the southeast, this represented the Sunrise at the winter solstice (Freeman and Freeman 1999: 9). Description of sacred rocks and sites can be found in Appendix 4.

APPENDIX 6: STRAW BALE BUILDING AND LOG BUILDING

A6.1 STRAW BALE BUILDING

Magwood and Mack emphasize that "Straw is not Hay!" (Magwood and Mack 2000: 13). Straw is a by-product of cereal grain. After the seed head has been cut, the stalks are left to dry and then made into straw bales. The straw quality is affected by the harvesting process (Magwood and Mack 2000: 14). Hay, on the other hand, is baled grass that has been freshly cut. It is stored and will be consumed by livestock when fresh grass is not available.

Because of a shortage of suitable lumber and sod, settlers in Sand Hills, Nebraska used straw bales for building new homes since the late 1800's (Steen, Steen, Bainbridge and Eisenberg 1994: 3; Magwood and Mack 2000: 1). Today, people in the area still use straw bales in new house construction.

There are many advantages of using straw bales for buildings. Straw is a durable and flexible building material, suitable for different forms and shapes such as rounded or curved elements of building designs (Magwood and Mack 2000: 7 and 47).

Bales come in various sizes such as two-string bales with 355 mm (14 inches) high, 760-1015 mm (30-40 inches) long and 457-508 mm (18-20 inches) wide or three-string bales with 355-432 mm (14-17 inches) high, 813-1219 mm (32-48 inches) long and 584-610 mm (23-24 inches) wide (Steen, Steen, Bainbridge and Eisenberg 1994: 59; Magwood and Mack 2000: 16; Fibrehouse Limited with Scanada Consultants Limited 1995: 11). The straw bales vary from 16 to 19

kg. (35 to 42 lbs.) depending on their lengths (Fibrehouse Limited with Scanada Consultants Limited 1995: 11).

The insulation value of straw is between R35 to R50, depending on its width (Magwood and Mack 2000: 6; Gagné 1984a and Gagné 1986: 4). Straw bale insulation can reduce heat gain and heat loss through the walls. A straw wall can be built in less time than a wood frame wall, and building a straw wall does not require as much specific knowledge as building a wood frame wall does. Straw also provides an excellent sound barrier (Steen, Steen, Bainbridge and Eisenberg 1994: 25; Magwood and Mack 2000: 8). It is an environmentally sustainable material (Steen, Steen, Bainbridge and Eisenberg 1994: 27; Magwood and Mack 2000: 8). Normally, either stucco or plaster is applied to the surface of the straw-bale walls for rigidity and strength. Magwood and Mack refer to these plastered walls as "Stressed Skin Panels" (Steen, Steen, Bainbridge and Eisenberg 1994: 200; Magwood and Mack 2000: 50). Tests show that straw walls have superior fire resistance than do wood frame walls (Steen, Steen, Bainbridge and Eisenberg 1994: 41; Magwood and Mack 2000: 227; Gagné 1984a and Gagné 1986: 4). The bales need to be tied with polypropylene string or metal wire (Magwood and Mack 2000: 15).

However, there are some precautions that are required when straw bales are used. The bales need to be free of seed heads, which attract pests and contain chemical fertilizers and sprays. The stalks are to be long and unbroken. The moisture contents will not be more than twenty percents and dry density should be about 112 kg. per cubic metres (seven pounds per cubic foot) (Steen, Steen, Bainbridge and Eisenberg 1994: 58; Magwood and Mack 2000: 17).

There are two main methods of building straw-bale walls. The first type is the load bearing (or Nebraska) style. The roof load rests on the top plates installed on the top course of bales, and the baled walls carry the vertical load to the foundation (Steen, Steen, Bainbridge and Eisenberg 1994: 121; Magwood and Mack 2000: 50). The second type is the post and beam system in-filled with bales (Steen, Steen, Bainbridge and Eisenberg 1994: 128; Magwood and Mack 2000: 53). The roof load rests on beams supported by posts that are installed in the foundation. The baled walls will not carry the vertical load, but it will carry the lateral load generated by wind. In both cases, the straw bales should be installed in running bond (Magwood and Mack 2000: 147). The roof supports can be made of wood, bamboo or metal trusses. The roofing materials may be a thatched type, metal sheets, straw mixed with clay, cedar shakes, or asphalt shingles. The roof insulation may be fibreglass or straw bales (Steen, Steen, Bainbridge and Eisenberg 1994: 169 to 175). The floor may be elevated on wood posts or concrete piers. The floor assembly is made with wood joists and insulated with fibreglass (Steen, Steen, Bainbridge and Eisenberg 1994: 147; Magwood and Mack 2000: 70 and 71). Alternatively, the floor can be made as a concrete slab on rigid insulation or as straw bales under concrete slab (Steen, Steen, Bainbridge and Eisenberg 1994: 177 to 178).

Canada Mortgage and Housing Corporation (CMHC) has done several studies on construction using straw bales. The straw bales are available in Canada with bales made especially from barley and rye found in the Prairies. Also, the new farming technology does not require much straw and therefore straw is left in the fields (Gagné 1984a). Special tools were developed for straw bale walls and the patent was applied for in 1996 (Fibrehouse Limited with Scanada

Consultants Limited 1995: 17). CMHC also funded pilot projects and research to study the moisture in the straw bales and certain devices were developed for this purpose (Fibrehouse Limited 1997; Fugler). Four houses in Nova Scotia had been chosen for the study of moisture in straw bales (Henderson 1998).

Generally, four hectares (10 acres) of farmland can produce 300 straw bales of which can be used to build a 120 sq.m. (1,300 sq.ft) house. Straw bales can be used for both the walls and roof.

CMHC also funded Gagné to evaluate the performance of straw bales and a mortar wall system (Gagné 1984b). The joint mortar mixed with two parts of cement and one part of lime is used to fill the space between the sides of the bales. The mortar also can be applied on the surface of the walls (Gagné 1984b and 1986: 2).

The five key themes for healthy housing recommended by CMHC include: occupant health; energy efficiency; efficient use of natural resources; environmental responsibility and affordable cost to everyone. The advantages of using straw bales include the availability of these materials near the site; high fire resistance quality; high insulation values; no construction experience nor special skills required; and a relatively low construction cost. These advantages fulfil healthy housing conditions recommended by CMHC.

In March, 1998, CMHC published a report on "Self Build Aboriginal Housing using Balewall Construction" for Cumberland House, Saskatchewan. The balewall of this House was tested to have R-value 40 to 50. The construction costs about $43 per square foot (CMHC 1998: 9)

A6.1.1 Analysis

At present, straw bale buildings are not specified in the building code requirements and are subject to the preferences of the building officers. But the Arizona Straw Bale Building Code is available for reference (Steen, Steen, Bainbridge and Eisenberg 1994: 47; Magwood and Mack 2000: 216 and 219 to 226). Canadian Mortgage and Housing Corporation (CMHC) has studied the straw bale building (Magwood and Mack 2000: 216). CMHC's acceptance is a promising sign for the future of straw bale construction.

There are several case studies mentioned by Magwood and Mack such as Straw House Herbals in Ship Harbour, Nova Scotia (Magwood and Mack 2000: 199-200); the Richard Hughes and Claire Rhodes Residence with posts and bale in-fill in Sante Fe (Steen, Steen, Bainbridge and Eisenberg 1994).

The Blue Quills First Nations College site can produce barley, oats, rye and wheat which are good source for straw bales. First Nations can also supply these straw bales if required because there are many grain fields in the seven reserves. (See reference to Vegetation in Chapter 3.)

A6.2 LOG AND POLE CONSTRUCTION

The Colchi people living near Black Sea used logs for their buildings around 30 B.C. (Mann and Skinulis 1979: 1). Log buildings began appearing in Canada when the United Empire Loyalists migrated to this country after the American Revolution. These immigrants brought the methods of log buildings from the Thirteen Colonies. Their homes

were called "shanties" and the shanty became a Canadian log building tradition (Mann and Skinulis 1979: 16). This demonstrates that places have served as "symbolic anchors of community for dispersed people" because the immigrants used "memory of place to construct their new world imaginatively" (Gupta & Ferguson 1997: 39). Basically, "in a built environment, architecture can suggest new behaviour and act as a mnemonic device for reminding users of particular types of behaviour" (Kent 1990: 2).

A log building is aesthetic, durable and contemporary. Logs provide good acoustic quality (Mackie 1979: 1). Logs are a well-insulated building material. Moreover, If the bark is carefully removed and the surface is covered with boiled linseed oil, it provides the log with a smooth, waterproof quality (Mackie 1979: 2).

Mackie says that it takes three years to build a log house if work begins in early spring. Year one is for site preparation. Year two is for installing the logs and the roof. Year three is for finishing the interior (Mackie 1979: 18). The most suitable trees for logs are cedar, Douglas fir, pine, spruce, hemlock and balsam (Mackie 1979: 28). It is better to cut logs in winter or late fall. The bark is to be peeled when the logs are set in on the building. Logs have to be dried and seasoned for one year (Mackie 1979: 29). One of the advantages of a log house is that it "can be dismantled, moved and reassembled in a new location" (Mackie 1979: 21).

There are many configurations of log forms and cornerworks derived from different countries such as Sweden, Russia, Norway, France, Germany and Austria (Phleps 1982: 54-55; 60-67). The common types used in Canada are natural round logs, half logs and hewn logs.

The roof may be covered with sod, thatch, shingles, boards or stone (Phleps 1982: 85- 123). The roof frames can be made of full logs, wood rafters on purlins that will be in turn be supported by the log walls (Phleps 1982: 124- 155). The size of logs can be selected on Crown land, at commercial log producer or from one's private property. However, a permit or licence is required to cut trees even on one's own property.

A6.2.1 Analysis

First Nations did not traditionally use logs for building houses but they used a comparable form of construction. The construction of a tipi and sweat lodge are described in Chapter 3: small round logs are installed as slender poles with spaces instead of placed horizontally. The cornerwork of logs is replaced with knots for a tipi. The roofing materials for a tipi are made of hides or cloths.

APPENDIX 7: PROJECT MANAGEMENT COURSE REFERENCES

There are many scholars and authors on Project Management and Construction Management. I collected and summarized details of course topics for project and construction management, and apprenticeship and industry training for a quick reference.

A7.1 COURSE TOPICS FOR PROJECT MANAGEMENT

1. Definition of Project Management (Gray 1981: 1; Kerzner 1998: 2; Kezsbom, Schilling and Edward 1989: 3; Lewis 1995: 2; 1998: 5 & 61; TBC 2000a; Woodward 1997: 9 & 47).

2. Objectives of Project Management (Lewis 1998: 61).

3. Planning & Scheduling:

    - Standard approach (Lientz and Rea 1999: 69); Planning (Archibald 1976: 135).
    - Chart (Lientz and Rea 1999: 71).
    - WBS (work breakdown structure) (Lewis 1995: 55; 1998: 70; Kezsbom, Schilling and Edward 1989: 41 & 66).
    - CPM (Critical Path Method) between 1956 and 1958 developed by E.I. du-Pont de Nemours (Clough & Sears 1979: 22; Kerridge 1986a: 141 to 151; Kilem 1986: 37; Lewis 1995: 51; 1998: 70).
    - Bar Chart (Gantt Chart) developed in 1958 (Clough & Sears 1979: 43, 126 & 218; Kezsbom, Schilling and Edward 1989: 128; Lewis 1995: 50; 1998: 72; Kilem 1986: 28; Thomsett, 1990: 67; Stallworthy and Kharbanda 1983: 166).
    - Performance Evaluation & Review Technique (PERT) developed by the navy and the Booze, Allen and Hamilton consulting group in 1958 (Gray 1981: 4 to 12; Kilem 1986:

36; Lewis 1995: 51; 1998: 44; Taylor & Walting 1979: 156; Thomsett 1990: 83).

- Learning curve (Kerzner 1998: 929; Kezsbom, Schilling and Edward 1989: 98; Lientz and Rea 1999: 73).
- Scheduling offers guidance on how the project should be managed (Gray 1981: 67; INAC 1986a: 12; Kerridge 1986b: 153 to 171; Kilem 1986: 3 to 4; Lewis 1995: 53).
- Estimation of time (Thomsett 1990: 41).

4. Project Control System:

The project control system is to "compare progress to planned performance and correct the deviations" (Lewis 1995: 17); or "to prevent deviation in the quality and quantity of resources used through a project; to ensure that objectives, short-term and long-term, are being met" (Kilem 1986: 6). It also is used "to measure fiscal and technical performance" (Kezsbom, Schilling and Edward 1989: iv).

- Performance of work (Gray 198: 141 to 165; Lewis 1998: 278).
- Quality of work (INAC 1986a: 13; Lewis 1995: 84; 1998: 264); conformance to specifications (Kezsbom, Schilling and Edward 1989: 166).
- Daily time sheet (Lewis 1995: 77).
- Project evaluation and progress audit (Lewis 1995: 79) (Taylor & Walting 1979: 129).
- Report system (Lientz and Rea 1999: 11 & 15; INAC 1986a: 14); and feedback (Lientz and Rea 1999: 66; Kezsbom, Schilling and Edward 1989: 141; Clough & Sears 1979: 217).
- Earned value analysis (Lewis 1995: 83; 1998: 192).

5. Risk Analysis (Edwards 1995; Kerridge 1986c: 239 to 252; Kerzner 1998: 871; Lewis 1998: 66, 109 to 124; TBC 2000b;).

6. Cost Estimation:

   - Cost = f(P, T, S) (Lewis 1995: 3; 1998: 63)
     whereas f= function; P, T and S mean performance, time and scope of work respectively.
   - "Good budgets link the annual, near-term planning of technical organizations to that of the business's overall, long-range strategic plans" (Kezsbom, Schilling and Edward 1989: 151).
   - Improvement.

7. Life Cycle of Project (Archibald 1976: 19; Kerzner 1998: 73; Kezsbom, Schilling and Edward 1989: 8; Woodward 1997: 5).

8. People in Project Management:

   Project Manager (Archibald 1976: 35; Clough & Sears 1979: 15; Hellard 1993: 7; INAC 1986a: 7; Kerzner 1998: 10; Kezsbom, Schilling and Edward 1989: 182; Kilem 1986: 3; Lewis 1998: 21; Taylor & Walting 1979: 7, 33; Woodward 1997: 164); and Project Team (Lewis, 1995: 105; 1998: 63; Thomsett 1990: 24-25, 34; Woodward 1997: 165).

   It is worth studying the concept of the evolutionary project manager under global conditions. (Laszlo 1994: 3-1 to 3-7).

A7.2 COURSE TOPICS FOR CONSTRUCTION MANAGEMENT

1. Definition of Construction Management (Heery 1975: 39; INAC 1981: 5).

2. Objectives of Construction Management:

   - economic measures of work study (Pilcher 1976: 102 and 114).
   - has a finite life with beginning, middle and end (Hellard 1993: 38).

3. Planning for Construction:

   - Pre-tender (Pilcher 1976: 131).
   - Pre-Contract (Pilcher 1976: 135).

4. Contract and Tender.

5. Allocation of Resources.

6. Control and Network:

   - PERT (Pilcher 1976: 144 and 178).
   - Cost control (INAC 1981: 20; Stallworthy and Kharbanda 1983: 172).
   - Purpose of cost control (Pilcher 1976: 245; Stallworthy and Kharbanda 1983: 173).

7. The concepts of total quality management for construction (Hellard 1993: 87); quality assurance and the construction

contractor (Taylor & Walting 1979: 84; Thrope, Summer and Duncan 1996: 120)

8. Management audit in construction (Hellard 1993: 62)

9. Construction Manager (INAC 1981: 5, 7 and 18); and Superintendent (Begley 1970: 27-38; 48-59)

A7.3 APPRENTICESHIP AND INDUSTRY TRAINING

Local First Nations members can be sponsored by their own First Nations to attend technical training courses at Blue Quills First Nations College in order to gain skills and experience. They can also obtain their journeyman certificates from the following programmes (Alberta Apprenticeship and Industry Training 2000).

1. Apprenticeship Training Program
2. Interprovincial Standards (Red Seal) Program (R)
3. Qualification Certificate Program (C)
4. Registered Apprenticeship Program.

These local members can be trained to construct the proposed facilities at Blue Quills First Nations College. Once the local members become qualified Journeymen, they can work for their own reserves, local communities and industries. I recommend that the following trade courses be offered at Blue Quills First Nations College thus enabling students to work on construction of new College facilities:

1. Bricklayer (R)
2. Cabinetmaker (R)
3. Carpenter (R)
4. Communication Electrician

5. Concrete Finisher (R)
6. Electrician (C)(R)
7. Electronic Technician (C)(R)
8. Floorcovering Installer (R)
9. Gasfitter (C)
10. Glazier (R)
11. Heavy Equipment Technician (C)(R)
12. Insulator (R)
13. Ironworker (C)(R)
14. Metal Building Systems Erector
15. Landscape Gardener
16. Lather-Interior Systems Mechanic (R)
17. Locksmith
18. Machinist (R)
19. Painter and Decorator (R)
20. Plumber (C)(R)
21. Power Lineman (R)
22. Power System Electrician
23. Roofer (R)
24. Sheet Metal Worker (C)(R)
25. Sprinkler Systems Installer(R)
26. Steamfitter - Pipefitter (C)(R)
27. Structural Steel and Plate Fitter (R)
28. Tilesetter
29. Water well driller
30. Welder (C)(R)

Northern Alberta Institute of Technology (NAIT) also offers 35 apprenticeship technical training programmes including boilermaker, cabinetmaker, carpenter, mobile crane operator, boom truck operator, electrician, floorcovering installer, gasfitter, insulator, ironworker, lather ISM, machinist, millwright, painter and decorator, plumber, roofer, sheet metal worker, steamfitter/pipefitter, structural steel/platefitter, welder (NAIT 2000).

APPENDIX 8: MANDANS, EARTH LODGE AND RAMMED-EARTH

A8.1 EARTH LODGES IN SIKSIKA FIRST NATION

I met Ms. Jeanette Many Guns, Project Coordinator, and Elder Ivan McMaster at the Tourism office of the Siksika First Nation, Alberta on July 6, 2000. Siksika First Nation is about 110 kilometres east of Calgary and south of the intersection of Highway 1 and Highway 547. It consists of 664 square kilometres (300 square miles) and is the second largest First Nation in Canada. Ms. Many Guns and Elder McMaster led me to the earth/mud lodge village site called Okān on the reserve. The site has many circular pits of various sizes and depths. Some pits are connected and some are independent. Around the village, a dry sunken trail or moat can be seen. Nowadays, the complete site including pits and dry moat is covered with grass. The historical site cannot be identified easily but is well preserved. It is not open to the public.

According to descriptions of the earth/mud lodge village by Ms. Many Guns, the lodges were originally built by Mandan Indians in the 1600s. After much warfare with other tribes, these Mandans were either killed or forced to leave this village. The actual method of construction of these lodges is unknown. Based on the present method of sweat lodge construction in Siksika, a possible method of construction might be inferred. The lodges were possibly made with willows stretched across the pits, then mud applied onto the willows to form dome-shape structures. The pit floors were covered with hides.

A large lodge could be up to 6 m (20 feet) in diameter and accommodate a family of fifteen. The connected lodges could be occupied by a family too. The parents lived in the larger lodge, the children in the second smaller lodge.

A8.2 RAMMED-EARTH HOUSE IN CALGARY

I visited Mr. Jorg Ostrowski's rammed-earth greenhouse at 9211 Scurfield Drive, Calgary, Alberta on July 15, 2000. The rammed-earth wall was 450 mm (18-inch) thick. During construction, the formwork was made with exterior plywood panels on both sides. A 350 mm (14-inch) wide and 200 mm (8-inch) high steel mould was placed inside the formwork. This created a 50 mm (2-inch) space between the plywood and the mould. Virgin earth containing gravel, clay and sand was shovelled into the steel mould. The mix of sand, clay and cement was poured into the 50 mm space on both sides of the mould. Both the virgin earth and the mix were tamped at the same rate to a thickness of 100 mm (4 inches). The wall was built up with increments of 100 mm (4 inches). Then a second pour of earth was tamped to the brim of the mould. The rammed-earth can produce 5,500 kPa (800 psi) when green and 6,900 kPa (1000 psi) when cured. Normal thickness of rammed-earth walls is between 450 to 600 mm (18 or 24 inches) (Jorg Ostrowski 2000).

A8.3 HISTORY OF THE MANDANS AND THEIR EARTH LODGES

Wood commented that the Mandans were a Siouan-speaking, horticultural group (Wood 1967: 3; Bowers 1991: 1). Based on his research at Huff Site in the upper Middle Missouri area in the United States, Wood assumed that "Mandan Indian culture emerged about

1500 A.D. under the impact of trade and contact with semi-sedentary village people from the Central Plains and with adjacent pedestrian nomads (Wood 1967: 1, 3 & 9; Bowers 1991: 8)." The site was enclosed by a rectangular fortification which included a ditch, earthwork, and a bastioned palisade. The village had 103 long-rectangular, four-post houses aligned in rows parallel to the river with the entrances facing away from the river. In the village centre, a large long-rectangular structure facing an open plaza has been identified as the village ceremonial lodge. The four-post house at Huff might represent one of the first stages in the transformation of the older long-rectangular houses to the circular, four-post earth lodge during 1500s A.D. (Wood 1967: 1).

Bowers mentioned that the Mandans' first contacts with French coming overland from the Lake Winnipeg region to trade, occurred shortly after 1700 A.D. The location of Mandans was shown near the mouth of Heart River on the La Harpe map in 1719 A.D. La Verendrye, was the first known explorer to leave a written account of his observations on his visit to the earth-lodge villages on the Upper Missouri River in 1738 (Bowers 1991: 8 and 9). M. Belle's map of 1755 was the first to show the location of the Mandan villages along the Mantons River (Bowers 1991: 9). In 1773, Mackintosh reported the Mandans including many thousands of warriors, were living in the Heart River region with from nine to thirteen villages on both banks of the Missouri River (Bowers 1991: 10). In 1797, David Thompson recognized that the Hidarsa, although living in earth-lodge villages adjacent to the Mandans, were a separate tribal group (Bowers 1991: 10). In the winter of 1804/1805 at Fort Mandan, both Lewis and Clark wrote that the Mandans settled in nine villages ninety years ago but later the number of villages was reduced to five. Eventually, the

Mandans emigrated to the two villages that were formed by Mandan predecessors.

The Mandans continued to emigrate and settled to the southeast of the Missouri found in 1796 (Bowers 1991: 11). In 1806, Alexander Henry found the Mandans had moved from the mouth of the Heart River to Painted Woods after the small pox epidemic of 1782 (Bowers 1991: 12). In 1811, Bradbury and Brackenridge confirmed the location of the Mandans as specified by Henry. In 1820, Bowers noted that the Mandan survivors of the west-side Heart River villages moved to Eagle Nose Butte (Bowers 1991: 13). Since that time, the Mandans did not migrate significantly.

The evidence shows that when the southern Mandan group moved northward to the vicinity of Heart River, they found other Mandans already living there. The southern group were first to adopt the circular earth lodge and the northern group adopted it between 1550 and 1600, retaining a modified rectangular lodge for ceremonial purposes thereafter until the natives population moved onto the reservations (Bowers 1991: 16 & 17).

Wood mentions that the Mandan women were responsible for building the earth lodges. Men were only required to raise the heavy beams. Although there were different forms for dwellings, the main ones were three-pole tipis and circular earth lodges. The circular earth lodges were built over shallow pits. Typically, a rock fireplace was built in the centre of the pit. Four large centre posts connected by crossbeams were installed around the fireplace. Eleven to fifteen posts were erected along the walls and were connected by stringers. The only covered entrance faced the village centre. The entire

structure was reinforced with rafters and willows and a layer of earth and clay was applied on top. In winter, a fire screen of reeds and willow twigs woven together were added. Such houses were commonly occupied from 7 to 12 years, contained 4 to 8 beds, and accommodated 5 to 16 individuals (Wood 1967: 16).

A8.4 HISTORY OF RAMMED-EARTH HOUSE

From archaeological evidence, many cities over 10,000 year old were built with raw earth such as Jericho; Catal Huyuk in Turkey; Akhlet-Aton in Egypt; Babylon in Iraq; Duheros near Cordoba in Spain (Easton 1996: 3). Earth building is not restricted to arid climates. The Romans and Phoenicians applied rammed-earth construction to the temperate regions of Europe (Easton 1996: 4). When the Moors invaded Spain, they brought with them the technique of mud brick construction called adobe which is better suited to heavy clay (Easton 1996: 5; Ellington 1924: 83, 84, 98). When the Spaniards began to conquer the New World, they carried with them the knowledge of the adobe method (Easton 1996: 5). From South America, application of the adobe method expanded northward through Mexico and eventually into the southwestern United States and replaced the earlier earth-building techniques that had been utilized and developed by native cultures since 700 A.D. When the Jesuit priests arrived in California to convert natives to Christianity, they taught the natives to make adobe bricks (Easton 1996: 7). In Australia, the first use of pisé was introduced by the European gold prospectors during the goldrush period of the 1850s (Easton 1996: 7; Ellington 1924: 95).

Rammed-earth is called "pisé de terre" by the French (Merrill 1947: 2; Easton 1996: 5; Ellington 1924: 13). In 1772, Francois Cointeraux,

a French author "noted that outside of the Province of Lyons, the material was practically unknown though it had been available to the French before the time of Christ when the Romans built with it (Merrill 1947: 7)." Cointeraux wrote four separate short texts on building with pisé de terre in 1790 and 1791 (Easton 1996: 10 & 11). During that period, Henry Holland and Robert Salmon in Great Britain followed the technique of Cointeraux but proposed some variations to formwork and construction details (Easton 1996: 11).

In 1800, Stephen W. Johnson in New Brunswick, New Jersey studied pisé de terre to do a detailed experiment and wrote a book about it. He addressed it to Thomas Jefferson, president of the United States (Merrill 1947: 10). Johnson built a pisé building near Trenton (Easton 1996: 12). Tom Hibben wrote a book in 1936 virtually identical to that written by Johnson in 1806 (Merrill 1947: 11). Between 1843 and 1855, John Stephen Wright, editor of Chicago's Prairie Farmer, published over forty separate articles and references to rammed-earth (Easton 1996: 13).

In 1920, J. St. Loe Starchey, editor of the London Spectator, published articles on rammed-earth housing and his son-in-law, Clough William-Ellis wrote and published a survey of English earth housing - *Cottage Building in Cob, Pisé, Chalk and Clay* (Easton 1996: 13; Ellington 1924: 81). At this time, T.A.H. Miller investigated the rammed-earth church built by William Anderson in Statesboro, South Caroline (Easton 1996: 13). In 1926, based on the house as a pilot project and theory of Dr. Harry Baker Humphrey, chief plant pathologist of the United States Department of Agriculture, Department of Agriculture published its famous Farmer's Bulletin No. 1500 on Rammed Earth Walls for Buildings (Merrill 1947: 15; Easton

1996: 15). Although the public was interested in this construction, due to personal prejudice, the staff of the Department of Agriculture discouraged the public from using this type of house construction (Merrill 1947: 15 & 16).

A8.5 RAMMED-EARTH CONSTRUCTION

Rammed-earth construction was popular when the world was in an economic depression and energy crisis because a lot of unemployed labour was available and people wanted low cost housing. On the other hand, this rammed-earth construction was not widely used because the logging companies and lumber industry wanted the builders to use lumber for construction.

Pisé is widely used where soils are sandy and adobe where they are clayey (Easton 1996: 8). Cob or clay lump is a technique in which clay soils are mixed into sticky mud, then laid directly into a free standing wall (Easton 1996: 9). In Cob, mud can be mixed with straw or other binding materials such as gravel and stone (Ellington 1924: 14). The oldest of earth-building technique is "wattle and daub". Wattle is a woven framework of twigs. Daub is a mud covering applied over the framework (Easton 1996: 9).

Any soil which contains from 30 to 70 per cent sand may be satisfactory for ramming. The more sand is in the wall, the better the wall—sand ranging of aggregate from ordinary sand to pieces of gravel as big as a man's fist (Merrill 1947: 107). Easton suggests that the soil composition is 70 percent sand and 30 percent clay for rammed-earth (Easton 1996: 91).

One advantage is that once the earth dries there is no sticky mud; another, there is no waiting for the bricks to dry; and another advantage is no mortar is required for joints and no bricks are laid (Easton 1996: xiii). A disadvantage is that the rammed-earth walls are susceptible to a certain type of weather erosion.

The average wind velocity during storms is a major factor and more important than the total rain in eroding the rammed-earth wall (Merrill 1947: 34) because the striking force of wind converts rain drops into numerous bullet-like shots against the rammed-earth walls. The problem can be solved by means of the overhangs which are wide enough to shade the walls from the beating rain or adding stucco on the exterior walls (Merrill 1947: 35).

The control of moisture is a little more important with soil-cement than it is with plain rammed-earth (Merrill 1947: 55). Oil paints are not satisfactory on exterior earth walls because of the chemical reaction of oil with soil (Merrill 1947: 55). Surface soil or soil containing plant and bush roots are never to be used for either sampling or ramming because the foreign and vegetation can weaken the bonding of soil particles (Merrill 1947: 118). Low sand content indicates a possibility of cracking and potential weathering hazards (Merrill 1947: 120).

The foundation can be made of reinforced poured-in-place concrete (Easton 1996: 79). Rammed-earth walls can be a cast-in-place wall or a block wall construction (Merrill 1947: 52).

Merrill suggests that the floor is about 225 mm (9 inches) thick. The same type of rammed-earth for wall is used and tamped for the

bottom layer. Then a thicker layer of earth with used crankcase oil is laid. Finally a thin layer of sand over which is laid a 38 mm (1.5-inch) soil-cement slab covered by a wearing surface of cement mortar. (Merrill 1947: 178). Easton suggests either the suspended wooden floor or slab-on-grade can be used (Easton 1996: 194). The former allows ventilation between the wooden floor and soil and prevents destruction of the wooden floor from the termites. The latter can be applied on the rammed-earth substrate under which waterproof membrane is installed.

A flat roof is only recommended for extreme dry climate (Easton 1996: 193). Conventional roof-truss construction is better for rammed-earth houses (Easton 1996: 194).

A Davis Terracrete Block machine was used to mass-produce earth bricks (Merrill 1947: 56). A utility power block machine may also be used in making pisé blocks (Ellington 1924: 42).

A8.6 CASE STUDIES

William Anderson constructed the Holy Cross Church in South Carolina in 1850. It is 32 x 8 m (105 feet by 27 feet) and its earth walls are 4.5 m (15 feet) high at the eaves and the peak of the roof is 13 m (43 feet). The end walls meeting the roof have openings for 4.87 m (16 foot) Gothic windows. A 6 m (20 foot) spire was built on top of a square 12 m (40 feet) high rammed-earth tower. The tower withstood the severe earthquake of 1886 and a three-day hurricane in 1895. In 1903, only the tower was destroyed by a cyclone (Merrill 1947: 12 and 13; Easton 1996: 12). As of 1996, this church still exists (Easton 1996: 12).

The rammed-earth Chew Kee Store near Sacramento, California was built by Chinese immigrants in 1850 during gold rush. The foundation is made of rammed-earth and is in good condition. Only the lower section of the exterior rammed-earth walls has been weathered. The walls vary from 4 to 5 metres (12 to 16 feet) front to back. The ceiling is 3 metres (9 feet) high and is covered with loose soil on silk fabric on ceiling boards. In 1986, California Department of Historic Preservation did extensive restoration work on this building (Easton 1996: 248 to 251).

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