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A Gathering Place for Learning, Play and Remembrance

existing flagpoles
plaza paving extends to town hall, with elevated pedestrian crossing
...ramp
...seating ledge
'Moricetown' rock outcrop
a bold stone feature animates the civic plaza and creates a transition between the linear plaza, the peace monument and the park
existing trees to remain
'Dip Netting' Poles
clusters of poles at the park entrances create a playful landscape in all seasons
existing trees to remain
new trees provide added screening
Peace Monument
water encircles the monument and then integrates with the surrounding park and plaza
Courthouse
Peacener
an expansive lawm for summer games, concerts, and winter play
Peace Park
an informal gathering space for children to explore, where rainwater and snow melt falls from extended gutters
Contemplation Garden
a place to look out from the library onto drift of grasses casting shadows...
EXECUTIVE SUMMARY

INTRODUCTION

The Smithers Public Library Board engaged Urban Arts Architecture to prepare a study to determine the appropriate size of a Library expansion and to provide a design and cost for the revised facility.

The design of the Library has been developed in close collaboration with the community. The new facility will be approximately 12,000 sq ft, and has been designed to be an energy efficient, low carbon footprint facility.

This Design Report summarizes the design of a new Public Library for Smithers. It is intended to be read in conjunction with the Design Brief issued in March 2009, which summarizes: the assessment of the existing Library facility, the community vision for Library service, a building program, sustainable guidelines, design concepts, siting strategies, and a preferred design concept.

SITE DESIGN

The Library has been designed in conjunction with a revitalization of Veteran Peace Park in which the Library sits. The primary goals have been to make the Park more useful to Smithers residents, create a larger presence for the Library, to connect the Library to the Park, and to create greater presence and relevance for the cenotaph.

The site design envisions:

- A new Civic Plaza between the Library and the Town Hall, fronting on Alfred Avenue
- A Town Green that can be used for play, gathering, and outdoor events, throughout the year.
- A revitalized Cenotaph memorial - relocated to be more visible and anchor the end of Main Street
- Parking removed from the Park to be angle parking around its perimeter in conjunction with a small parking lot in part of the Civic Plaza that can be closed off for events.
- A Readers Terrace that connects the Library to the Park
The new Smithers Public Library could attain a LEED TM Gold Certification. The diagram opposite illustrates the Sustainable features to be included in this project:

Maximize Passive Systems:
- Roof design brings in daylight and solar heat gain in winter, provides shade from hot summer sun and allows views of Hudson Bay Mountain.
- Triple glazed curtain wall filters summer sun and lets in winter sun to use as a heat source.
- Natural ventilation of all indoor environments.
- Increase thermal insulation particularly on roof and north facades to reduce heat loss.
- Use berm to create microclimate for Park, eliminating need to remove excavated material from the site.
- Utilize daylighting wherever possible to provide lighting, combined with automated lighting controls to minimize energy use.

Materials Locally Sourced:
- Wood will be used extensively as a sustainable, local product to maximize community participation for local industries and businesses.
  - Wood trusses locally fabricated are cost effective and efficient use of material.
  - Heavy timber showcased in expressive design of Entry Porch and Readers Terrace canopy to be locally sourced.

Create Energy:
A number of energy strategies were identified and could be included in the project. Options being explored are:
- Geo-thermal Heat Exchange System.
- Solar Hot water Panels to supply building's hot water needs and contribute to radiant heat system.

Conceptual Building Section
Illustrating Sustainable Features

- Wood truss structure: - supporting local industry - provides clear span for maximum flexibility
- High Summer sun screened to prevent heat gain
- Low Winter sun to penetrate deep into Library for daylighting and passive heat gain
- Clerestory window to provide panoramic view of Hudson Bay Mountain
- Use snow build up for added insulation
- Natural ventilation - hot air out
- Geothermal Heat Exchange
- Sunny spot to read and enjoy Park
- Support Space
- Radiant Slab - cooling in summer - heating in winter
EXECUTIVE SUMMARY

BUILDING DESIGN

The Library design seeks to invite the community in and provide a comfortable environment in which to access a wide variety of Library services.

The building design has been developed from: sustainable design principles, providing connectivity to site and views, efficiency of function, and the creation of uninterrupted Collections floor area to enable maximum flexibility.

COST ESTIMATE SUMMARY

The cost Estimate can be summarized as follows:

<table>
<thead>
<tr>
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<th>Cost</th>
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<tbody>
<tr>
<td><strong>LIBRARY PROJECT COSTS</strong></td>
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<tr>
<td>Building Cost</td>
<td>$4,359,128</td>
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<tr>
<td>Site Development Cost</td>
<td>$47,168</td>
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<tr>
<td>Site Services</td>
<td>$73,500</td>
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<tr>
<td><strong>Total</strong></td>
<td>$4,479,796</td>
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<td><strong>PARK IMPROVEMENT COSTS</strong></td>
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<tr>
<td>Demolition of Existing Library</td>
<td>$36,000</td>
</tr>
<tr>
<td>Park development estimate</td>
<td>$250,000</td>
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RECOMMENDATIONS

The following steps are recommended for the Smithers Public Library Board to get the Library built:

1. Have a “Shovel Ready” project package assembled in order to capitalize on any applicable funding that may come available. This will include all documentation to permit tendering of the project.

2. Identify sources for fundraising and make application using this report and other visual tools provided.

3. Identify partners in the community who may assist with fundraising or who may donate materials or labour in kind.

4. Confirm necessary implementation requirements for the Town to confirm funding and community support for the project.
“The public library, the local gateway to knowledge, provides a basic condition for lifelong learning, independent decision-making and cultural development of the individual and social groups.

High quality and relevance to local needs and conditions are fundamental. Material must reflect current trends and the evolution of society, as well as the memory of human endeavour and imagination.”

UNESCO Public Library Manifesto
November 1994
INTRODUCTION

“Our libraries are a great investment in community, learning, and literacy. They open doors of opportunity for minds hungry for knowledge and adventure. They are the front lines of the effort to make British Columbia the most literate place in the world.”

Premier Gordon Campbell

The Smithers Public Library serves a population of approximately 12,200 within the core city and surrounding area. The existing 3,600 sq ft facility is overcrowded and cramped with inadequate space for books, computers, seating areas and administration spaces.

The Library Board engaged Urban Arts Architecture to undertake a study to determine the appropriate size of an expansion and to provide a design and cost for the revised facility.

The new Library will be approximately 12,000 sq ft, a size determined based on population projections to 2030. The new Library has been developed in close collaboration with the community and is designed to be an energy efficient, low carbon footprint facility.

The expanded library will:
1. Provide a quality setting which encourages library patrons to utilize the library for their maximum benefit.
2. Relieve overcrowding and provide sufficient space for a broad range of library activities.
3. Enable the housing of, and accessibility to a larger collection to better serve the community.
4. Provide meeting space for a broad range of children, youth and adult programs, including a meeting/teleconference capability.

“The Town of Smithers and the Smithers Public Library Board will expand the Smithers Public Library to an appropriate size to be a full service community library.”

Smithers Public Library Board
Mission Statement for expansion
PROJECT TEAM

The following consultants have contributed to this Design Brief.

ARCHITECT & TEAM LEADER:
**Urban Arts Architecture**  
Jennifer Marshall, MAIBC, Partner in charge.

LIBRARY CONSULTANT:
**Greg Buss**  
Chief Librarian, Richmond Public Library

LANDSCAPE ARCHITECTS
**Space2place**  
Jeffrey Cutler BCSLA, CSLA, Principal-in-Charge

STRUCTURAL ENGINEERS
**Fast + Epp Structural Engineers**  
Paul Fast, P.Eng., LEED A.P., Partner

MECHANICAL + ELECTRICAL ENGINEERS
**Cobalt Engineering Ltd.**  
Lane Logan, - Prince George Office  
Vladimir Mikler, P.Eng., LEED A.P., Partner

CIVIL ENGINEERS
**Dayton + Knight**  
Paul Wellington - Smithers Office

COST CONSULTANT
**Newhaven Projects Ltd.**  
Terry Ward
DESIGN REPORT SCOPE

This Design Report for an expanded Smithers Public Library is intended to be utilized to secure funding to realize the envisioned facility.

It describes the developed design for the Library and associated construction costs to enable the Town to budget and pursue funding. The developed design evolved out of the Design Brief and the two documents should be read together.

This Design Report includes the following:

Site Design:
A detailed description of the site design, urban design issues, key exterior spaces, and integration into the Park.

Building Design:
A detailed description of the building design including a program summary, sustainable design strategies, architectural design, and structural, mechanical, and electrical design strategies.

Cost Estimate:
A Class C cost estimate based on the above information.

Recommendations For Moving Forward:
Recommendations to facilitate the realization of the envisioned Library.
SUMMARY OF WORK TO DATE

The design of the Library has grown out a rigorous process of community consultation, building assessment, and exploration of site development and concept options. This process is described in detail in the Design Brief dated March 2009. This document includes:

Consultation:
The project commenced with a series of workshops in December 2008 to establish a vision for the Library and Park. The consultant team met with the Library Board, Town and Library Staff, Key Community Players, First Nations’ representatives, and Volunteers. Working together we explored community issues, options for Library service delivery, space requirements, and building experience and image.

Building Assessment:
This stage of the work assessed the suitability of the existing Library building for expansion and the cost comparison of retention versus building an entirely new facility. The Assessment consists of:
• an evaluation of the condition of the existing Library,
• exploration of facility location options within the Park
• a cost benefit analysis of retaining the existing structure and adding onto it, versus the cost of building a new stand-alone facility, and
• a recommendation against retention.

Council has supported the consultant team’s recommendation not to reuse the existing Library facility and to build a new facility in the westerly corner of the Park.

Community Vision:
Library staff and board, Community group stakeholders (school board etc), the Wet’suwet’en First Nations, and Library customers were consulted in a workshop format to determine the vision for the expanded Library service and facility.

Library Tours:
To gain a deeper understanding of current customer service and materials handling trends, the Library Director, a Library Board representative, and the Architect toured recently built Libraries in the Greater Vancouver area.
Library Space Needs:
An analysis of Library Space needs was undertaken to determine the optimal size of the expanded Library, based on population projections to 2030, considering overall users. Three methodologies were employed to ascertain the optimum space size for the Expanded Library: Library Space Standards, Comparable Library Space, and Detailed Space Requirements. These methodologies support a Library size in the range of 12,000 ft².

Program:
This Program describes in detail the environment required to accommodate the envisioned Library Services. The Detailed Space Program outlines the design considerations, the program spaces and their function, specific characteristics, requirements, and adjacencies.

The Library Program has been developed from the Library Space Standards and the Community Vision. A detailed program has been compiled outlining the individual spaces of the Library, their adjacencies, and special requirements. Refer to Design Brief for details.

Sustainable Design Guidelines:
Working as a team with our consultants and the client, we have set priorities and developed practical strategies for sustainability. By working together, principles of sustainability are being fully integrated into the design of the project, to create as cost effective, efficient, and ultimately ‘green’ a development as possible.

The conclusions from the workshops are as follows:
• The Library could attain a LEED Gold Certification at the current standing of the project.
• A number of passive energy strategies were identified and will be explored for inclusion in the project.
• Wood will be used extensively as a sustainable, local product and to maximize community participation for local industries and businesses. Built by the Community for the Community!

Site Strategies:
Site development goals and key siting strategies for the Park and the Library were established. The Park site was evaluated to determine issues and opportunities. Key site strategies evolved from this analysis. An optimal Library location and orientation were determined based on these strategies as well as sustainable design considerations.

Concept Design:
Based on the site strategies, preferred building location, and the sustainable guidelines, several concept options have been explored. They have focused primarily on Library functionality and urban design responsiveness. The concepts were refined to two options and a preferred design approach selected.
“the revitalized Library will play a significant role in anchoring the development of civic space.”

COMMUNITY CONTEXT

“Smithers Public Library supports community needs for information, encourages life long learning and satisfies a love of learning.”

Smithers Public Library Mission Statement

Smithers is a town of approximately 5,000 people, located in the Bulkley Valley along The Trans Canada Yellowhead Highway (Route 16) between Prince George and Prince Rupert.

The Town is a regional service centre for the approximately 20,000 inhabitants of the Bulkley Valley. The Smithers Public Library, while funded by the Town and a portion of Electoral Area “A”, serves the population of the entire Valley.

**Literacy is a major issue in the Bulkley Valley.** The Library will address this issue by providing support for literacy programs and an environment that is non-threatening and welcoming to those who are literacy challenged.

The Wet’suwet’en First Nation is an integral part of the Bulkley Valley. The Library will incorporate this key community in the both the provision of Library Services and the architectural expression to encourage greater cross-cultural understanding.
SITE DESIGN

SITE INTRODUCTION

Located in Veteran’s Peace Park, the revitalized Library is in a pivotal location in the Town and can play a significant role in anchoring the development of civic space. Sited across from the Town Hall, the Library and the Park together terminate Main Street, the spine of the downtown, and is the gateway leading from the railway station into Smithers.

The Town of Smithers completed a Charette on creating a vibrant Downtown. The Downtown Charette identified that **the revitalized Library will play a significant role in anchoring the development of civic space.**

This key existing location in Veteran’s Peace Park can be **enhanced to support and define a major civic gathering place, strengthen the heart of the town, and compliment the use of the Park.**

*Aerial view of downtown Smithers - showing the existing Library's central location in Veteran's Peace Park, bounded by the Railway Station, the Town Hall, and the Government Building.*
SITE DESIGN STRATEGIES

Siting

The Library and Park have been designed to:

- **Integrate the Library with the Park.** The built form of the Library is utilized to help shape a positive park experience, and the Park provides program space and visual beauty to the Library, together rejuvenating Veterans Peace Park.

- **Maximise Park space.**

- **Capitalise on solar energy** for daylighting and passive heating.

- Allow users of both the Library and Park to have good views of Hudson Bay Mountain.

- Create “Civic synergy” with the Town Hall in a new Civic Plaza.

- Create strong connections to the Park for Town and Library.

- Support visual access from the end of Main Street to the Plaza and the Library and Town Hall front doors.

- The Library and Park together provide a meaningful end/anchor to Main Street.

- Create a positive street presence and high visibility from Main Street and Alfred Street.

- Site and orient to reduce building’s energy load, by maximizing thermal and solar access and making the most of the site’s micro-climate.

- **Maximize positive attributes of the site** - capture views of mountains and park to create a happy and healthy public environment
**Access**

The Library is **easy to get to** from main vehicular and pedestrian routes. The Main Entry is **easy to find** and makes strong connections to both Main Street and Town Hall.

The Library is **accessible to all users** including children, elderly, persons with strollers, persons in scooters and wheelchairs, visually impaired etc. and takes into account winter conditions with covered stairs and ramps.

**Parking**

**Parking is conveniently located** adjacent to the Main Entry and takes into account winter conditions with a seasonal lot directly in front of the Library. A drop off area for book returns and passenger pick-up has been designated near the main entry.

Library parking has been largely removed from the Park to and located along Alfred, and Railway as angle parking and Aldous Street as right angle parking, **to preserve as much Park as possible.**
“If a city is designed for children it will be successful for everyone”

PARK DESIGN STRATEGIES

Create a reinvigorated Park that:

• **Is a place to share** - a space that hold meaning for all people in the community has been a key value in the design of the Park.

• Creates **places for kids to play** that are not explicitly a playground and can be used for other purposes.

• **Uses water and snow as landscape features.** Water is an important element to Wet’suwet’en culture.

• Supports **multi-seasonal use and a variety of activities** such as grassy slopes for active play and outdoor performance viewing, a walking labyrinth, snow sliding, sitting in the sun, story telling.

• **Reinvigorates and re-imagines the Cenotaph to be more relevant to people today** as a result of a consultative process.

• Incorporates native and First Nations medicinal **plants in a didactic display.**

• Incorporates **existing features in the Park** as appropriate such as lawn bowling and horseshoes.

The **landscape design must be sustainable**; using indigenous plant material where possible, minimizing the need for water consumption, with impervious paving surfaces kept to a minimum.
KEY EXTERIOR SPACES

The Park has been designed with 3 focii to its development:

1. Civic Plaza
2. Peace Park + Monument
3. Readers Terrace

The Civic Plaza is envisioned as a fairly formal, hard surfaced space that gives presence to and elevates the Town Hall and Library. The space could have a focal water feature, and bench seating. Some landscaped elements will included; suitable indigenous planting, seating, paved areas and a water channel.

The Peace Park is envisioned as a more free flowing casual space that can accommodate large gatherings of people. At its centre the Peace Monument will be a re-imagined cenotaph brought into relevance for all Smithers’ residents today. Gathering activities are seen as ranging from Remembrance Day ceremonies, musical performances, movies in the park to company picnic type events.

The Readers Terrace is a focal point of both the Library and the Park. It will be a space for Library patrons to utilize for casual or programmed activities for all ages. It will also be a terrace to the Park providing for and supporting interaction. Pleasant opportunities for people to sit outside and read should be provided as well as an area for children to use their large motor skills.
LANDSCAPE PLAN

The Landscape for the Library and Park and Peace Monument will be implemented in separate initiatives. The Park will be built by the Town of Smithers. The Peace Monument relocation and revitalization will be done under the auspices of the Legion. The Civic Plaza, the Parking/Event Plaza, and Readers Terrace will be built as part of the Library development.

Listed below are some of the suggested features that would contribute to a cohesive Park and Library Design:

1. **Seating Pockets**
   Social clusters of benches line the Civic Plaza.

2. **Front Entry Stairs**
   The stairs and entry ramp have been designed to support and encourage public gathering and relaxation.

3. **Boulder Garden**
   An informal gathering space for children to explore, where rainwater and snow melt falls from extended gutters.

4. **‘Moricetown’ Rock Outcrop**
   A bold stone feature animates the civic plaza and creates a transition between the linear Plaza, the Peace Monument and the Park.

5. **Water Feature**
   Water encircles the monument and then integrates with the surrounding Park and Plaza.

6. **Contemplation Garden**
   A place to look out from the Library onto drift of grasses casting shadows on the screen behind. This space screens Railway Avenue from the Library users view.

7. **Civic Plaza Paving**
   Plaza paving extends to Town Hall, with elevated pedestrian crossing.

8. **Parking/Event Plaza**
   Functions as an extension of the Plaza when needed for events.

9. **‘Dip Netting’ Poles**
   Clusters of poles at the park entrances and around the Great Lawn of the Peace Park create a playful landscape in all seasons.

10. **Park Entry**
    Connecting Main Street to the library, the Civic Plaza and the Peace Park.
BUILDING DESIGN

LIBRARY PROGRAM

The major components of the Library and their areas are:

- Entry + Orientation
- Welcome Desk + Checkout
- Living Room
- Community Meeting
- Children’s Services
- Adult Services
- Teen Services
- Technical Services + Staff Support

The Program Summary Chart in Appendix B summarizes all spaces and their respective areas, computers, and seating.

A Detailed Program is in the Design Brief issued March 2009. It outlines all spaces and their respective sizes, adjacencies, and requirements.

The total area proposed by the Program is approximately 12,000 ft².

Program Diagram

The Program Diagram illustrates the optimal arrangement of the major components of the Library on the site. These relationships are developed in the design of the Library.
Conceptual Building Section
Illustrating Sustainable Features

Maximize Passive Systems:
- Roof design brings in daylight and solar heat gain in winter, provides shade from hot summer sun and allows views of Hudson Bay Mountain.
- Triple glazed curtain wall filters summer sun and lets in winter sun to use as a heat source.
- Natural ventilation of all indoor environments.
- Increase thermal insulation particularly on roof and north facades to reduce heat loss.
- Use berm to create microclimate for Park, eliminating need to remove excavated material from the site.
- Utilize daylighting wherever possible to provide lighting, combined with automated lighting controls to minimize energy use.

Materials Locally Sourced:
- Wood will be used extensively as a sustainable, local product to maximize community participation for local industries and businesses.
- Wood trusses locally fabricated are cost effective and efficient use of material.
- Heavy timber showcased in expressive design of Entry Porch and Readers Terrace canopy to be locally sourced.

Create Energy:
A number of energy strategies were identified and could be included in the project.
- Geo-thermal Heat Exchange System.
- Solar Hot water Panels to supply building's hot water needs and contribute to radiant heat system.

Create Civic Synergy:
SUMMER CIVIC PLAZA
WINTER PARKING

Connect Civic Spaces

Improve Park Access

Maximise Park Space

Capture Mountain View

Capitalise on Solar Energy

GOVERNMENT BUILDING

SUSTAINABLE FEATURES:
The new Smithers Public Library could attain a LEED™ Gold Certification. The diagram opposite illustrates the Sustainable features to be included in this project:
- Wood truss structure - supporting local industry - provides clear span for maximum flexibility
- Clerestory window to provide panoramic view of Hudson Bay Mountain
- Low Winter sun to penetrate deep into Library for day lighting and passive heat gain
- Use snow build up for added insulation
- Natural ventilation - hot air out
- Radiant Slab - cooling in summer - heating in winter
- Natural ventilation - cool air in
- High Summer sun screened to prevent heat gain
- Sunny spot to read and enjoy Park
- Natural ventilation - cool air in

SUPPORT SPACE
LIBRARY
READERS TERRACE
PARK

SUMMER EMERGENCY ACCESS
WINTER PARKING

Entry + Orientation
Back of House & Service
Meeting
Meeting
Living Room

SUMMER CIVIC PLAZA

Adult's Library
Childen's Library
Community Meeting
Future Expansion Opportunity

Smithers Public Library

T'IT'Q'ET COMMUNITY HALL - OPTION C

Smithers, BC

URBAN ARTS ARCHITECTURE
ARCHITECTURAL DESIGN

The design of the building is elaborated here in terms of the many facets key to the success of a Public Library facility: Sustainable Strategies, Ambience, Organization + Layout, Materials Access + Display, Seating + Workspace. In addition a Description of the Architectural Design follows these design principles. Full Architectural Drawings are to be found in Appendix A.

Sustainable Strategies
Sustainable design practices have heavily influenced and informed the design of the Library. Refer to Conceptual Building Section and Site Plan on the left for illustration of this. Principles incorporated in the Architectural Design are:

• The building is designed to promote community interaction.

• The interior environment is designed to promote health and well-being, providing access to daylight and fresh air to all inhabited spaces.

• Spaces are designed to do “double duty” and to be highly flexible to allow for future change.

• The building has been designed to capitalize on natural ventilation, thermal mass and day-lighting strategies. Facades facing to the south are designed to capture as much daylight and thermal heat gain as possible with roof sloped towards to north to facilitate passive natural ventilation.

• The building envelope has been designed for northern conditions to minimize heat loss, with R-30 in walls and R-50 in roof and detailing to minimize thermal bridging etc.

• The building heating and cooling will be a Geothermal -exchange radiant system.

• A green roof system could be highly beneficial, extending the life of the roof, increasing insulation, and providing habitat for flora and fauna. Indigenous plant material can be sourced locally. At this time the green roof option has not been included, but the design can accommodate a green roof on all the flat roof areas in future.

• Green certified and non toxic materials, and locally available materials will be utilized. Wood will be the best source of local low embodied energy material. Source local heavy timber – directly out of forest, minimizing processing and transportation.

• Utilize local expertise and labour – the community has many skilled wood workers including a heavy timber fabricator.

• Construction waste to be minimized and recycled.
ARCHITECTURAL DESIGN

Ambience
The Library has been designed to be:
• Welcoming
• Empowering of users
• Warm
• Exciting and relaxed
• Dignified
• Enriching of customer experience

Organization + Layout
The Library has been laid out with the following considerations:
• Orientation - clearly legible and logical layout – easy to navigate
• Flow of all users to be efficient and intuitive
• Definition and animation of distinct areas or departments through color, floor and ceiling treatments
• Flow of materials to be efficient and ergonomic
• Ease of supervision of all public areas by library staff
• Use of space and architecture to clearly orient and define layout.
• Provide a range of activity areas from noisy to quiet - isolate noisy areas, activities, and circulation routes from quiet zones.
• Integration of technology to assist in tasks and process material as quickly as possible
• Layout based on smooth flow of materials
• Integrate ergonomics wherever possible
• Storage space important.
ARCHITECTURAL DESIGN

Materials Access and Display:
The Library collection has been laid out to be accessed and displayed as follows:

• Convenient traffic lanes and ease of movement for all users including wheelchairs and strollers, as well as staff with book trolleys and other equipment.
• Layout of collection to be open, logical, and intuitive to use.
• Browsable materials in each collection area are to be immediately visible.
• Computerized catalogue and Reader’s advisory tools are integrated into collection areas.
• Shelf height to be appropriately scaled for users, with integrated display opportunities—no materials above 5’ high shelf and lowest shelf to have books displayed face out.
• Lighting to illuminate stacks well.
• Display tailored to the material: books, magazines, newspapers, CDs, videos, popular paperbacks.
• Display opportunities to actively market materials which encourages use and ultimately increase circulation.

Seating and Work Space
The Library has been designed to accommodate a variety of seating and workspace options such as comfortable seating for casually conversing and perusing material, computer workstations, reading tables, places for individual work, and areas for group work.

Some considerations in these seating options are:
• Furnishings and environment to be comfortable and conducive/supportive of activity as well as scaled and appropriate to user age, and size (0 to 100+ years)
• Durability - all furnishings to be well made and long lasting
• Visual security - all seating areas to be easily visible from a central monitoring area.
• Fully wire the entire library so that each workstation can plug-in
• Computer work stations to be dispersed throughout the library supporting each interest area with appropriate resources.
• Individualized work areas for solitary work spread throughout the collection areas and to have network plug-ins.
• Integration of ergonomic considerations into all seating and workstations.
Aerial view of Peace Park and Library from the end of Main Street, showing the “gullwing” roof over the collection areas and the Entry Porch on the Civic Plaza.

Aerial view of Library from the corner of Aldous Street and Railway Avenue, showing the flat roof over support spaces, the folded roof over the mechanical attic and Technical services, and windows of Adult Collection area accessing views of mountains.
ARCHITECTURAL DESIGN

Project Description:

ORGANIZATION:
The new library is an "L shaped" facility, entered from a new Civic Plaza. The two wings contain the Children's Library and the Adults Library, with support spaces located along the length of the Adult wing. All major spaces open onto the revitalized park.

MASSING:
The Library massing is as follows:
• The main roof of the Library is a "gullwing" form over the Collection areas, generated in response to bringing light in and accessing views to the mountains. This form is uplifting and welcomes the community into the Library.
• Stone walls anchor the ends of each wing and flank the Entry, grounding the Library.
• The Entry Porch and Community Meeting Room are massed under a flat roof that has a ceiling height of 11 feet.
• The Support spaces are massed in bar alongside the Adult Collection with a ceiling height of 8 feet.
• The "gullwing" roof folds over the Support spaces to create a Mechanical and Storage attic above the Technical Services area.

ENTRY PORCH:
A generous, covered entry porch faces the new civic plaza. The porch is supported by heavy timber columns and beams, and will provide a sheltered area at the entry. It is designed as a community "front porch", open and accessible to all.

READERS TERRACE:
A covered Terrace area faces the Great Lawn which can become a Skating Pond in the winter. This Terrace is intended to act as a staging area for the park as well as provided sheltered exterior program space for the Library.

The design intent of both these covered porches is to evoke the Alpine theme - a rugged expression of Smithers natural context - with heavy timber construction, stone walls, and alpine plant materials. This expression is a part of the building’s design, not a pasted on facade.
Main Floor Plan

- Community Meeting
- Digital Kids
- Story Telling Circle
- Childrens Collection
- Welcome Desk
- Digital Youth
- Community Living Room
- Fiction Collection
- Computers
- Non-Fiction Collection
- Group Study
- Teen Zone
ARCHITECTURAL DESIGN

Project Description (continued):

EXTERIOR:
The library is constructed primarily of locally sourced materials featuring wood in particular.

The exterior features heavy timber columns, wood siding, stained wood soffit, metal siding in the service areas, and stone facing in key locations. The windows and doors are natural anodized aluminum for ease of maintenance, and a contrast to the rich wood siding.
ARCHITECTURAL DESIGN

Project Description (continued):

INTERIOR
The interior will be a light filled space, defined by the sweeping wood ceilings. The roof structure is comprised of wood trusses 24” on centre. This strategy creates both a clear span, for maximum flexibility and area between the trusses to contain and conceal mechanical ducts, lighting, sprinklers and wiring, resulting in a beautiful space in the collections areas - uninterrupted by columns - that open up to the exterior mountain views and the Park.

Mechanical spaces are located in a second floor mezzanine.
Project Description (continued):

INTERIOR
The ceiling of the main Library volume will be Pine slats spaced apart to create an acoustically absorbant feature that brings warmth to the Library interior. Ceilings in the Support spaces will be acoustic ceiling tiles. The Cedar soffit at the Entry will flow into the Vestibule.

The Story Telling Pithouse is a central feature of the Library located between the Welcome Desk and the Children’s area. It is intended to evoke Wet’suwet’en building culture in a structure that will create a special enclosed space within the volume of the Library.

Section D•D - Thru Adult Collection, Tech Services, and Entry

Section E•E - Thru Children’s Collection and Readers Terrace

Section F•F - Thru Living Room + Story Telling Pithouse

3. BUILDING DESIGN
Project Description (continued):

ENTRY:
The entry lobby opens directly to both the library and the multi-purpose room, allowing the multi-purpose Community Meeting room to function independently after hours. The Centennial Library heritage doors are to be mounted as side panels to the Community Meeting Room entry doors.

The entry lobby is large enough to accommodate bench seating with boot storage, and a hanging area for coats.

Returns are self sorted into 3 categories to reduce mundane tasks for staff.

WELCOME DESK / ORIENTATION AREA:
The two wings of the library are clearly visible from the entry area. The welcome desk is located in a central, key location, and is highly visible upon entering the library space.

LIVING ROOM
The Living Room is located in the heart of the library, in a pivotal location between the Children’s and the Adult Areas.

The space overlooks the park, and is defined by a stone fireplace to the north, and the large newspaper reading table to the south.

An outdoor Reading Terrace is accessible from the Living Room.
**Project Description (continued):**

**ADULTS COLLECTIONS:**
The adults Collections flow south from the Living Room area. This is a wide, clear span space with clerestorey light to the mountains to the west, and the park to the east, for maximum flexibility. As in the Children’s Library, the stacks are located in the centre of the space. Independent study areas line the windows. Reference and A/V areas are located adjacent to the Welcome Desk, for ease of assistance by the staff.

**COMPUTER LAB:**
A separate computer lab with 10 stations may be used as a classroom teaching environment or may be opened up to the Collections Area for daily use. 10 additional computer stations are located at the south end of the library, adjacent to the group study area. Wireless internet service will be provided throughout the Library.

**GROUP STUDY:**
A group study area is located at the south end of the library overlooking the enclosed garden. This space may be used for individual or group study, and is connected to the collections area by a large, glazed, sliding screen.

**TECHNICAL SERVICES:**
The staff areas are consolidated in an efficient area directly adjacent to the Welcome Desk. This area is comprised of 3 work stations, programming office, an open work area, Director’s office, and Staff and Volunteer’s Lounge. There is a separate staff and service entry to Aldous Street.
ARCHITECTURAL DESIGN

Project Description (continued):

CHILDREN’S LIBRARY:
A “What’s Hot” curved area shields the Children’s Library from the Welcome Desk. Special Collections and themed display kiosks are also located in this space.

The Children’s Library will be a vibrant, animated space with three zones:

Story Telling Pithouse:
This space references the Wet’suwet’en First Nation’s traditional pithouse dwellings. A space within a space, this area will be an intimate, culturally meaningful space for children and adults. It will be a gathering place for story telling.

Children’s Collections:
The collections are located in the centre of the space, with all occupied areas located adjacent to the windows. All shelving will be a maximum of 36” high, accessible to the children. Adjacent lounge areas with large armchairs and small reader tables are located overlooking the park.

Digi-Kids
The Children’s computers are located in two areas: the north corner, facing the Plaza with 4 computer stations for small children with adjacent chairs for supervising parents and a separate area for youth overlooking the Park.
CIVIL DESIGN

Based on a review of the Site Plan below, the Civil Engineer has the following comments with respect to building servicing and parking layout:

1. A new sanitary service for the new building can come off the existing mains on Aldous Street.

2. A new storm service for the new building could come off the existing mains on Aldous Street. However, site drainage in the car parking area and possibly also the grassed areas south of the new building is also required. The Town will likely not want two services to the site so a single storm service from the Aldous St main into the car park with leads to the building and the other site areas would be the best solution.

3. With the water entry room being on the northeast end of the building it probably makes most sense to bring the water service from the existing main on Alfred Ave. This main is along the east side of Alfred but there is an existing 200mm crossing to the site just between the existing library and the parking lot. This could be extended to the new building.
CIVIL DESIGN

4. As the building is required to be sprinklered, a new hydrant would need to be installed on the existing 200mm pipe across Alfred, with the siamese connection near the water entry room. The hydrant at the corner of Railway and Aldous may need to be relocated depending on the final parking configuration.

5. The parking along Railway Ave looks workable. It would likely require one or two catch basins be installed to make the drainage work. These would be connected to the existing storm sewer along Railway.

6. The 90 degree parking along Aldous St needs to be reviewed in combination with cars parallel parked along the other side of Aldous St as there is insufficient room to maneuver into the parking spaces. The gas main along Aldous St is on the south side of the road and will be under the parking area. The gas main may need to be relocated from under the parking area. This will need to be reviewed with Pacific Northern Gas during design. Adequate cover over the gas main may be able to be achieved if the parking area is sloped back toward the road.

7. The parking along Alfred Ave has a gas main under it too. This would need to be dealt with in a similar manner to the main along Aldous. There is no storm sewer along the Alfred St frontage. Drainage from the parking area will need to be directed to the storm sewers at Aldous or Main St via new catch basins and leads.

8. The curb radius at the Railway/Aldous and Aldous/Alfred intersections needs to be a minimum of 8m. This will eliminate 1 or 2 of the spaces on the Alfred parking. The existing catch basins at these intersections will need to be relocated to suit the new curb location and drainage patterns.

9. A concrete driveway crossing (similar to that into the Town Hall parking area) will be required at the entrance to the onsite parking area.

10. The Library dumpster will need to be changed to a conventional front load one and the parking in front of the dumpster would have to be deleted to ensure the truck has access when required.

These comments will be integrated into the design of the Parking and Site Services in the next stage of the project.
"Incorporate local wood building products to create a highly expressive structural form that will be aesthetically striking and provide a warm ambience for library users."

**STRUCTURAL DESIGN**

**Structure**

The structure has been designed to allow for uninterrupted areas of the Library floor for maximum flexibility in layout of departments and collection shelving. Another important objective in determining a structural concept and selecting structural materials has been to maximize the use of locally supplied, cost efficient products.

1. The structural concept revolves around a main central gull wing roof, with a light support structure below. The gull wing will be constructed using locally prefabricated gang nailed wood trusses at 24” o.c that will span perpendicular to the long axis of the building. The shape of the gull wing will create a central valley along the length of the building.

2. The trusses will sit on perimeter 8” glue laminated beams spanning between exposed built wood columns existing of 2x6’s. The individual members of the columns will be spaced apart with structural blocking between in order to provide aesthetic interest. Some steel elements will be required in the region where the building is cranked in plan.

3. The lower roof will be constructed of locally prefabricated gang nailed wood trusses at 24” o.c, supported by load bearing 2x6 walls.

4. The structure has been expressed in conventional sawn timber framing at the Front Entry Porch and on the Reader’s Terrace structures to add excitement and interest and reflect the wood building traditions of Smithers.

The repetitive nature of the locally sourced wood framing system will yield both cost effectiveness as well as flexibility for placement of mechanical/electrical services, and will also result in an attractive ceiling structure with a warm ambience provided by the exposed wood finish.

![Whistler Public Library](image-url)
ELECTRICAL DESIGN

Lighting Strategies

Lighting is critical to the success of the Library. The Lighting has been designed to:
• Utilize day lighting wherever possible
• Help users understand the space by defining different areas
• Be warm and exciting, not gloomy or over lit
• Be energy efficient.
• Highlight architecture and space.
• Vary in type specific to task.
• Stacks to be evenly and well lit.
• Reading areas to be lit with individual table lamps – intimate and warm.
• Lighting for computer stations designed to minimize screen glare.

Lighting for the facility designed to create a comfortable atmosphere for the public to enjoy their experience while in the library.

In the Main Collection area light fixtures will be incorporated on the top of the book stacks to provide lighting for the shelves and for the general area lighting.

The Children’s section will utilize pendant mounted area lights for the book racks and for the general reading area.

The Welcome Desk will re-use existing pendant light fixtures from the existing facility. Support spaces and offices will use recessed or surface fixtures to suit the space being illuminated.

Recessed downlights will be used in certain areas to enhance light levels, such as the Independent Study, Multi-purpose Room, and soffits lighting the building exterior.

Lighting systems proposed for the facility will be with energy efficient lamp sources and will provide light levels to meet, or exceed, recommended criteria. The lighting control system will utilize occupancy sensing, daylight harvesting and timeclock control to enhance energy savings for the facility.

Power and Communications

Power will be distributed on a central spine in the floor slab to facilitate future changes.

The entire Library will be equipped with WiFi and have a generous distribution of power, including outlets for every workstation to facilitate patrons bringing their own laptops.
MECHANICAL DESIGN

Heating + Cooling Strategies

Strategies incorporated are:

- Any mechanical system employed needs to be simple to operate and be able to be serviced locally.
- **Passive thermal and indoor air quality control** are integrated whenever possible by utilizing shading and natural ventilation to reduce load on the mechanical cooling/ventilation systems.
- Using shading strategies and highly insulated building envelope **no need for a cooling air-conditioning system** due to the local climatic conditions of relatively cool summer. During the warmer months a mechanical mixed-mode ventilation system will aid the passive ventilation to cool the building.
- Utilize **Geo-exchange** system as the main source for heat during winter and Domestic Water pre-heat.
- Utilize High Efficiency Gas-fired Condensing Boiler as auxiliary source for heat during winter and Gas-fired Water Heater for production of domestic hot water throughout the year.
- A **radiant surface heating system** in a concrete floor is the most efficient to run. This would be powered by a boiler that circulates liquid through piping set into the slab.

The Heating and cooling strategy for the Library is a combination of Displacement Ventilation, Forced Air Ventilation with Heat Recovery, Geo Exchange System, and Low-Intensity Hydronic Radiant Slab Heating and Cooling. This strategy de-couples the ventilation function from the space temperature control function allowing for high indoor air quality yet requiring additional space heating control. Low-intensity hydronic radiant heating and cooling is well suited to function with displacement ventilation.
MECHANICAL DESIGN

System Description

**Displacement Ventilation**
Displacement ventilation systems supply a relatively small volume of 100% outdoor air and operate effectively in combination with natural ventilation strategies. The ventilation air disperses across the floor without causing any perception of discomfort, and stratifies as it is warmed by people and other internal heat gains. The warm, contaminated air forms a stratified layer below the ceiling, and it is exhausted from the space at high level. The one-directional displacement air flow pattern assures effective removal of pollutants from the space without re-introducing them to the occupant breathing zone, providing ventilation effectiveness and indoor air quality unmatched by other types of “allair” HVAC systems.

**Forced Ventilation with Heat recovery system**
All occupied areas shall be mechanically ventilated, generally using displacement type air terminals strategically positioned at or near floor level providing an even distribution of low velocity fresh air throughout the building. It is important to note that the mechanical element of the ventilation system to the library is primarily there to provide consistent and controlled ventilation, particularly during winter conditions when natural ventilation is likely to cause severe discomfort to occupants.

The central source for the forced ventilation system will be an air handling unit which will be located in the upper floor Mechanical room.

A heat recovery element inside the air handling unit which is located in fresh and exhaust air streams, will recover heat from the exhaust air and transfer it to the cold fresh air intake. DDC control system will modulate fresh air intake and exhaust dampers upon demanded ventilation (controlled by CO2 sensor).

Also in summer time and in peak summer days when natural ventilation can not provide satisfactory indoor conditions, the operation of the air handling unit in a free cooling mode thru displacement diffusers will meet acceptable comfort conditions inside the building.
MECHANICAL DESIGN

Geo Exchange System (GHX)
Geo exchange system typically consists of open or closed loop geothermal field, ground source heat pumps and circulation system. The ground acts as a heat source or heat sink for the (ground source) heat pumps to generate low temperature hot water in winter time or chilled water in summer time for use in low grade heating and cooling.

Due to mild summer temperatures in Smithers and because of limited mechanical budget, this project will not have summer air conditioning system. Geo-exchange systems are generally cost effective when used for both heating and cooling and since there’s been an offer from a local mining company to donate the drilling of the field; this system can be utilized for this project at the minimum cost.

The GHX system shall be a vertical geothermal arrangement and water shall be circulated between the geothermal field and heat pumps installed in the mechanical room at upper floor level.

Low-Intensity Hydronic Radiant Slab Heating and Cooling
The radiant slab heating system will consist of a closed loop hydronic system embedded in the concrete floor slab. Heated water at fairly moderate temperatures circulates through the embedded piping to maintain the exposed floor surfaces at a set temperature. Typically, with a properly designed high-performance building envelope, the floor surface temperatures are kept within a relatively narrow range over the course of the year i.e. 22 °C (72 °F) during winter.

It’s noteworthy that although this project is not intended to have any cooling system but in case of selecting the GHX system, the whole infrastructure will have the potential to provide cooling for the radiant slab at a minimum additional cost.

Radiant heat transfer is the main factor assuring superior thermal comfort, as radiant temperature dominates comfort levels perceived by people. Radiant space heating can operate effectively with windows open. Unlike conventional all-air heating, the space tempering function is independent of the air in the space, allowing windows to be opened during a wide range of outdoor temperatures.

The radiant floor system shall be divided into zones to provide individual temperature control inside each room. Larger spaces shall be separated into external and internal zones in order to enhance temperature control and comfort levels.

This system in combination with displacement ventilation at floor level will ensure practically constant space temperature and comfort conditions with only minor and gradual fluctuations on a seasonal basis.
COST ESTIMATE

Terry Ward of Newhaven Projects Ltd has provided the following Class C cost estimate of the detailed design described in this report. Refer to Appendix C: Detailed Cost Estimate Breakdown for more detail.

The cost Estimate can be summarized as follows:

<table>
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<th>LIBRARY PROJECT COSTS</th>
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<tr>
<td>Building Cost</td>
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<td>Site Development Cost</td>
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<td>Site Services</td>
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<table>
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<tr>
<th>PARK IMPROVEMENT COSTS</th>
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<tr>
<td>Demolition of Existing Library</td>
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<tr>
<td>Park development estimate</td>
<td>$250,000</td>
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</table>

INCLUSIONS + ASSUMPTIONS:
1. Geotechnical unavailable - Assume bulk excavate and structural fill to 6’ depth.
2. Allowance for dewatering based on over excavation and structural fill requirement.
3. Preloading site for 3 to 5 months.
4. Concrete foundation with 4’ depth with perimeter insulation and frost protection insulation.
5. Concrete foundation with 8’ frost depth on isolated pads and footings.
6. Slab on grade 6”, raft slab detail with rigid insulation under slab.
7. Steel posts and large steel shaped beam support to roof at intersection of roof valleys. Design team are re-looking at this detail, due to cost.
8. Wood frame construction with dimension lumber roof framing and local wood trusses.
9. High insulation value with thermal mass in floor heating will result in low operating costs.
10. Library stacks allowance for 80% new.
11. Landscape limited to planters.
12. Hard surfaces to winter parking lot and entry only. Remainder in Park development.

EXCLUSIONS
- GST
- Professional fees
- Legal and accounting fees
- Administration fees
- Permits
- Escalation
- Furniture and fittings (except shelving)
- BC Hydro service connection
- Road reconstruction
**CLASS C - ELEMENTAL ANALYSIS**

**Project #: 5450**

**Smithers Library**

**Newhaven Construction Management Ltd**

**Gross SF:** 11,550

**excluding parking**

<table>
<thead>
<tr>
<th>Major Group / Group Element</th>
<th>Element &amp; Sub-Element</th>
<th>Unit Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Item Cost</th>
<th>Sub-element/ Element Total</th>
<th>Cost/ Gross SF</th>
<th>% 1-12</th>
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<tbody>
<tr>
<td><strong>A.1 Substructure</strong></td>
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**BUILDING TOTAL**

$ 4,359,128

**NCML COST OF PROJECT ADJUSTED TO 2009**

$ 4,515,796

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<tr>
<th>D.1 Site Development</th>
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<th>D.1.2 Hard Surfaces</th>
<th>D.1.3 Site Improvements</th>
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RECOMMENDATIONS FOR MOVING FORWARD

The following steps are recommended for the Smithers Public Library Board to get the Library built:

1. Have a “Shovel Ready” project package assembled in order to capitalize on any applicable funding that may come available. This will include all documentation to permit tendering of the project.

2. Identify sources for fundraising and make application using this report and other visual tools provided.

3. Identify partners in the community who may assist with fundraising or who may donate materials or labour in kind.

4. Confirm necessary implementation requirements for the Town to confirm funding and community support for the project.

Urban Arts Architecture and our consultant team would be happy to prepare construction documents for the Library design to permit Tendering when required. A full fee proposal can be prepared should the Town be interested in pursuing this option.

This work would take approximately six months to complete to the end of Construction Documents.
APPENDICES

Appendix A: Consultant Design Reports
Appendix B: Program Summary Chart
Appendix C: Cost Estimate Breakdown
APPENDIX A:
CONSULTANT REPORTS

- Architectural Outline Specification
- Structural Report
- Mechanical Report
- Electrical Report
- Civil Report
PROJECT DESCRIPTION

The project is to construct a new approximately 12,000 sqft Library facility in Veterans Peace Park in Smithers, BC. Floor areas are as follows:

<table>
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<th>Area Description</th>
<th>Area in sqft</th>
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<td>Main Floor Area</td>
<td>11,460 sqft</td>
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<td>Mechanical + Storage Loft</td>
<td>945 sqft</td>
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<tr>
<td>Building Total</td>
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| Main Floor Subareas:
  Open floor space w/ gull wing roof                   | 7,666 sqft   |
  Support spaces with flat 9' high roof                 | 2,690 sqft   |
  Support spaces with flat 11' high roof                | 1,104 sqft   |

BUILDING ASSEMBLIES

The building Assemblies are as follows:

**ROOF:** R:50
- 3 ply SBS roofing membrane on
- R:48 Rigid insulation (Poly iso) on
- Vapour barrier on
- ¾” T+G plywood decking on
- Wood trusses – Refer to Structural Report on
- Cross purlins (painted black) on
- 2x6 Pine ceiling slats @ 8” oc.

**EXTERIOR WALLS (Generally)** R:30
- Wood siding on
- 2x3 vertical furring with
- R:10 2” rigid insulation on
- 2 layers building paper on
- ½” plywood sheathing on
- 2x6 wood studs @ 16” oc with
- R:20 Batt insulation on
- 5/8” GWB – painted.

**INTERIOR WALLS (Generally)**
- GWB both sides on
- 2x6 wood framing

**FLOOR + FOUNDATION**
- Finish Floor on
- 2” lightweight Concrete topping w/
- Radiant in-floor system on
- 6” reinforced concrete slab on
- Compacted fill
OUTLINE SPECIFICATIONS

This outline specification describes Architectural finishes and assemblies. Structural, Mechanical, and Electrical systems are described in appended Reports.

The following outline specification is intended to identify parameters for costing with respect to materials and products, and is to be read in conjunction with the accompanying drawings. This outline specification is the minimum standard of the materials and finished to be provided.

1 GENERAL REQUIREMENTS

1.1 Building Code:
Renovation, systems and services shall comply with the requirements of the BC Building Code, current edition, as well as the requirements of all authorities having jurisdiction.

2 SITE WORK

2.1 EXCAVATION

2.1.1 Excavation for all footings and foundations. Structural drawings to be provided. Protect existing landscape elements to be retained.

2.3 FOUNDATION DRAINAGE & BACKFILL

2.3.1 The work of this Section includes supply and installation of:
- Dampproofing and drain mat
- Foundation drainage, including drain mat
- Storm water drainage and all rainwater leader connections
- Backfilling and grading of site to elevations specified by Architect.

2.4 LANDSCAPING

2.4.1 The work of this Section includes supply and installation of:
- Front Porch, ramp, and stairs
- Retaining Walls adjacent to the building
- Readers Terrace
3 CONCRETE

3.1 REINFORCED CONCRETE

3.1 Supply all labour, materials and equipment to form and pour all new concrete foundations, slabs, walls, topping for radiant heat, retaining walls, and stairs shown on Structural, Architectural, and Landscape Drawings.

3.1.2 Provide Architectural Finish to all exposed concrete walls, including foundation where exposed.

3.1.3 FLOOR FINISHES:
   a) Steel Trowel Finish
      Applies to all exposed concrete floors, concrete slabs on grade, and concrete roof slabs with roofing and waterproof membranes
   b) Sealed Floor Finish
      Applies to exposed concrete floors such as Porches and Terraces
   c) Light Brush Finish
      Applies to concrete floor slabs for receiving stone and/or ceramic tiles

3.2 CONCRETE TOPPING

3.2.1 Supply and install light-weight concrete topping to accommodate radiant heating/cooling system to Structural concrete slab. Concrete topping, to minimum of 1-1/2" deep, to achieve finished floor elevations indicated on detail drawings.

4 MASONRY

4.1 Supply and install all stone veneer masonry walls. Wall system to be stone veneer masonry in a rainscreen wall assembly on wood frame wall structural backup.

4.2 Sample Wall: Prior to start of work, construct a sample wall of required masonry for Architect’s review to show reinforcing, ties, layup pattern, mortar jointing and colour, and workmanship. Sample wall shall become the standard of comparison for all stone veneer masonry built of same materials.

4.3 Veneer Stone to be ledge stone style and sourced locally.
5  METAL

5.1 Supply any Structural supports or connections required. Refer to Structural Specifications and Details.

5.2 Supply items required to be built-in by other trades, including ledgers, sleeves, bolts and anchors.

5.3 Supply and install all ornamental metal listed below: Refer to Architectural Drawings for details.
   - Canopy brackets and structural support
   - Misc details

6  WOOD & PLASTIC

6.1 ROUGH CARPENTRY

6.1.1 Provide all wood framing required.

6.1.2 Refer to Structural Diagrams and Report for sizing of members and to Architectural Drawings for scope of work.

6.2 FINISH CARPENTRY

6.2.1 Supply and install all wood siding, soffits, and exterior wood paneling, interior and exterior wood trims, baseboards, and ceiling slats.

6.2.2 EXTERIOR
   - Soffits: 1x4 KD Cedar smooth finish T & G with transparent stain finish
   - Wood Siding: 1x4 KD Cedar rough finish T & G with transparent stain finish in a horizontal application.
   - Window & Door Trims: Double Dressed Select Douglas Fir suitable for transparent stain finish

6.2.3 INTERIOR
   - Baseboard, Window & Door Trims
     Kiln-dried Fir or other species to be determined for stain finish to profiles specified on Drawings.
   - Sills: All sills to be Kiln-dried Fir for stain finish.
   - Ceiling Slats: 2x6 Kiln-dried Pine @ 8" o.c. with transparent stain finish

6.3 MILLWORK

6.3.1 Scope of this section to include:
   - Welcome Desk
   - Story Telling Pit house
   - Multi-Purpose Room Kitchenette
   - Staff Room Kitchenette
   - Washroom Vanities
   - Special Collection shelving and integrated Display cabinets
   - Display cabinet at Entry
7 THERMAL & MOISTURE PROTECTION

7.1 DAMPROOFING
7.1.1 Dampproof all exterior surfaces of foundation walls below final grade.

7.2 INSULATION
7.2.1 Supply and install all insulation and vapour barrier required to insulate building from the outside and where noted below and on the Drawings.

7.2.2 RIGID INSULATION
Supply and install rigid insulation:

Styrofoam S.M. to thickness indicated, as manufactured by Dow Chemical or approved alternative conforming to CGSB Specification 51-GP-20M-1978.
- R:10 – 2” on all exterior walls
- R:20 - 4” under slab on grade.
- R:20 - 4” thick perimeter insulation blanket extending a min. of 4’ out from foundation wall

Poly-isocyanurate high R-value rigid insulation:
- R:48 - 8” to top of all roofs.

7.2.3 ACOUSTIC INSULATION
Supply and install acoustic insulation to acoustically isolate all individual rooms from all other spaces.

7.2.4 BATT INSULATION
Fibreglass friction fit, as manufactured by Fiberglass Canada Ltd., or approved alternative, to thickness indicated below:
- R:20 – 5.5” to all exterior walls

7.2.5 PLUMBING INSULATION
Pipes to be wrapped in foam wrapping for acoustical treatment.

7.3 SHEET METAL ROOFING & PANELING
7.3.1 Work includes the supply and installation of:
- Standing Seam Metal Roofing
- Metal Flashings for all roofs to profile shown on drawings.
- All rainwater leaders
- Miscellaneous metal flashings, and counter flashings and sheet metal.
- Caulking between roofing and other building components as required.

7.3.2 STANDING SEAM METAL ROOFING + WALL PANELS
24 gauge minimum galvanized steel sheet metal panels w/ factory applied metallic paint finish. Profile to be 16” wide with double lock standing seam.
7.3.3 SHEET MTL FLASHINGS / ACCESSORIES
22 gauge Minimum thickness sheet metal to match roof panels to profile shown on drawings.

7.3.4. GUTTERS & RAINWATER LEADERS
22 gauge pre-painted metal rainwater leaders to match roof flashing. Rainwater leader custom profile to be standard 3" diameter.

7.4 MEMBRANE ROOFING
7.4.1 EXPOSED ROOF MEMBRANE
Three ply SBS Modified Bituminous Exposed Membrane for torch down application. As manufactured by Iko Industries Ltd, Soprema Inc., Malarkey Roofing Company, or other approved equivalent.

7.5 WATERPROOF MEMBRANES
7.5.1 Supply and install waterproof membrane (moisture & air barrier) to substrate (concrete or wood sheathing) under all Stone cladding.

7.5.2 Supply & install 2 layers of 30 minute building paper under all wood exterior finishes.

7.5.3 Supply & install all membrane flashings including at transitions between building paper and waterproof membrane and between building paper and ledgers etc.

8 DOORS & WINDOWS
8.1 WOOD DOORS
8.1.1 GLAZED DOORS
Glazed doors to be Premium Stain Grade wood. Exterior glazed doors to have doubled glazed units and be minimum 1•3/4".

8.1.2 SOLID SLAB DOORS
All solid doors to be Premium Stain Grade flush face veneer solid wood door, 1 ¾" thick.

8.2 ALUMINUM WINDOWS
8.2.1 CURTAIN WALL
All exterior window framing shall be Metor Aluminum or Kawneer 1600 Wall Series extruded from Aluminum Alloy 6063-T6 in accordance with CAN/CSA-A440-M90, members for glazed sealed units, c/w exterior caps, pressure plates and associated hardware. Clear anodized finish.

8.2.2 GLAZING
All exterior windows to be double glazed.
8.3 ALUMINUM DOORS

8.3.1 STOREFRONT ENTRANCE DOORS
All exterior entrance doors to be double glazed thermally broken aluminium glazed storefront entrance doors.

8.3.2 BY-PASSING SLIDING DOORS
Interior sliders to be single glazed in aluminium frame in heavy gauge, rigid aluminium track, smooth running with door as shown. Track shall be sufficient to handle weight of door and concealed behind drywall.

8.4 GLAZING

8.4.1 Supply and install mirrors to full wall above vanities in all bathrooms above vanities Type 1A Float glass mirror with ground polished edges on all sides, glued in placed.

8.4.2 GLAZED ENLOSURES: Frameless tempered glass enclosure with satin chrome patch hinges. Glass to be mounted to wall & floor in stainless steel channel inset flush in tile or GWB at ceiling. Steam Shower enclosure and door to be sealed to standard acceptable for steam room application.

8.4.3 GLAZED GUARDS: Frameless tempered glass guards to be clipped into steel guard frame with patch glazing clips.

8.5 FINISH HARDWARE

8.5.1 Supply and install new hardware to all doors in accordance with manufacturer’s recommendations, using proper templates.

8.5.2 Supply and install concealed weather stripping to all exterior doors. Thresholds, weather stripping and astragals (for pairs of doors) to be supplied and installed. Set threshold in full bed of mastic with slope to exterior.

8.5.3 Hardware to be selected by Owner
9 FINISHES

9.1.1 Finishes are as follows:

FLOORS
Ceramic (porcelain) tile in Entry and Washrooms
Carpet tile generally (24”x24”)

BASE
6” rubber in all Back of House spaces
6” wood with stain finish in Public Areas
Ceramic tile in Washrooms

WALLS
Painted GWB generally
Ceramic Tile in Washrooms

CEILINGS
Refer to Reflected Ceiling Plans for layout of:
Wood Slats
Acoustic Tile (24”x24”)
GWB

10 SPECIALTIES

9.1.1 The following Specialties shall be supplied:

WHITEBOARDS
Multi-purpose Room 12’ wide
Group Meeting Room
Technical Services
Computer Lab
Staff Lounge
Director’s Office

NOTICE BOARDS
Entry - Community Notice Board
Teen Area - Teen Notice Board

LIBRARY SHELVING
To be purchased from Library Shelving supplier as required to augment existing wood shelving.
New shelving to be:
Adult Fiction + Non-fiction - metal shelving with wood panel ends. Fiction shelving on rollers
Children’s Shelving - wood shelving on rollers

WASHROOM PARTITIONS
Plastic Laminate suspended partitions
1.0 GENERAL

The proposed new single storey structure for the Smithers Library consists of a main stacks and study area with attached closed offices and meeting rooms. There is a small partial upper story designated for mechanical and storage purposes.

The primary objective in determining a structural concept and selecting structural materials is to maximize the use of locally supplied, cost efficient products. To this end, much of the design effort has focused on exploring the incorporation of locally sourced sawn timber components.

2.0 DESIGN ASSUMPTIONS

The buildings will be designed for the following load conditions specified by the 2005 edition of the National Building Code and local Building Bylaws as follows:

a) Roof Loads

Base Snow: \( S_{w} = 66.8 \) psf  
\( S_{i} = 4.2 \) psf

b) Floor Live Loads

Library and Storage: 150.0 psf  
Office Area: 100.0 psf  
Mechanical Area: 75.0 psf

c) Wind Loads

\( q_{1/10} = 6.5 \) psf  
\( q_{1/50} = 8.3 \) psf

d) Seismic

As per NBC 2005

3.0 FOUNDATIONS

The initial foundation scheme is based on extrapolation of geotechnical data for the town hall, a site in close proximity to the proposed library. A site specific geotechnical study has not yet been carried out; the following schematic design concepts will require confirmation following a specific study. Some buildings in the vicinity, including the existing library, are founded on piles.

Based on the subsoil profile below the town hall, the primary structure for the new library will likely be founded on spread footings, placed after an initial site preload of 3 to 5 months. Either a perimeter insulation blanket or adequate frost protection over the footings will be required to prevent adverse effects arising from frost penetration.
All foundation walls will be tied to the concrete slab on grade (ie quasi raft) for some additional stability during a seismic event. It may be necessary to remove up to 6’ of fill. Basement construction is not recommended, as the water table may be as high as 5’ below grade based on an end of summer test result, and may be even higher in spring.

4.0 SUPERSTRUCTURE

The structural concept revolves around a main central gull wing roof, with a light support structure below. The gull wing will be constructed using locally prefabricated gang nailed wood trusses at 24” o.c that will span perpendicular to the long axis of the building. The shape of the gull wing will create a central valley along the length of the building.

In regard to the central valley and ice buildup, the BCBC 2006 applies an additional factor of 25% to the centre half of the roof, meaning a specified design load of 71 psf (approximately 1’-2” of equivalent ice buildup) will be used. This accounts for snow sliding, drifting and creeping to the centre. It should also be noted that an additional 50% factor of safety increase must be applied to these specified snow loads. In regard to ice buildup, positive drainage should be provided toward the ends of the building coupled with heat tracing in the vicinity of the gutters/downspouts. In our view, a safe design is attainable with this roof profile.

The trusses will sit on perimeter 8” glue laminated beams spanning between exposed built wood columns existing of 2x6’s. The individual members of the columns will be spaced apart with structural blocking between in order to provide aesthetic interest. Some steel elements will be required in the region where the building is cranked in plan.

The lower roof will be constructed of locally prefabricated gang nailed wood trusses at 24” o.c, supported by load bearing 2x6 walls. The front and rear entrances will be supported along the outside edges by conventional sawn timber framing.

The repetitive nature of the locally sourced wood framing system will yield both cost effectiveness as well as flexibility for placement of mechanical/electrical services, and will also result in an attractive ceiling structure with a warm ambience provided by the exposed wood finish.

5.0 LATERAL LOADS

Lateral resistance for wind and seismic loading would be provided by plywood sheathed wood stud shear walls distributed along the edge of the building and in the office area.

Nick de Ridder, EIT
May 22, 2009
MECHANICAL CONCEPT DESIGN REPORT

FOR

SMITHERS PUBLIC LIBRARY

PREPARED BY:

COBALT ENGINEERING
#305 - 625 Howe Street
Vancouver, BC V6C 2T6

Project Architects:

URBAN ARTS ARCHITECTURE
#401 134 Abbott Street
Vancouver, BC V6B 2K4

PROJECT NO: 08-K071-000

DATE: June 01, 2009
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1. INTRODUCTION

The intent of this report is to describe the integrated mechanical systems for the new Smithers Public Library, as per our proposed concept design. Also, this report refers to the revised Architect’s Schematic Design detailed on drawings A101, A201, A202, A203, A300, and A400. The report is general in nature and intended to solicit comments and feedback from the client group, as well as to present information for preliminary quantity surveys.

2. PROJECT DESCRIPTION

The Smithers Library will serve city of Smithers as a new Public Library with Multi Purpose Rooms and Computer Lab. The new building will be constructed in Veterans Peace Park in Smithers, BC with approximately 12,000 sq. ft floor area.

The building and mechanical system design incorporates as many passive and sustainable design features and energy saving measures as possible in an effort to minimize energy consumption.

3. DESIGN OBJECTIVES

The plumbing and mechanical systems will be designed to provide a comfortable environment for the facility and meet the following criteria:

- Provide for passive thermal and indoor air quality control whenever possible by utilizing shading and natural ventilation;
- Utilize Geo-exchange system as the main source for heat during winter and Domestic Water pre-heat;
- Utilize High Efficiency Gas-fired Condensing Boiler as auxiliary source for heat during winter and Gas-fired Water Heater for production of domestic hot water throughout the year;
- Incorporate as many energy and water saving strategies as practical;
- Achieve 50% reduction in annual municipally-provided potable water consumption for building sewage conveyance by utilizing low flow fixtures, waterless urinals and dual flush toilets, and
- Achieve 30% reduction in annual potable water use consumption for plumbing fixtures.

4. APPLICABLE CODES AND GUIDELINES

The mechanical systems are being designed and installed according to good engineering practice and all applicable codes, including but not limited to the following list of codes, ordinances and guidelines:

- British Columbia Building Code (BCBC)
- Model National Energy Code of Canada for Buildings (MNECB)
- ASHRAE 62.1-2007- Ventilation for Acceptable Indoor Air Quality
- ASHRAE 55- Thermal Environment Conditions for Human Occupancy
- NFPA 13 – National Fire Protection Association
- Natural Gas Installation Code CAN/CGA B149.1-M91
- Industrial Health and Safety Act B.C.W.C.B
- Duct Construction Standards: SMACNA
5. DESIGN CONDITIONS

The most stringent design parameters prescribed by either the MNECB or British Columbia Building Code will be used for the mechanical system design and building energy analysis.

British Columbia Building Code:
- Winter Outdoor Temperature: -31°C
- Summer Outdoor Temperature: 25°C DB, 17°C WB
- Degree days below 18°C: 5200

In general, indoor design conditions will meet the comfort conditions outlined in ASHRAE Standard 55-2004, which allows for the following range of operative temperatures:

- Winter Indoor Operative Temperature Range: 20°C to 25°C
- Summer Indoor Operative Temperature Range: 24°C to 27°C

More specifically, the target indoor design conditions are as outlined below:

<table>
<thead>
<tr>
<th>Area</th>
<th>Season</th>
<th>Operative Temperature</th>
<th>AC</th>
<th>General Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library</td>
<td>Summer</td>
<td>23°C</td>
<td>No</td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td>Winter</td>
<td>20°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offices &amp; Admin. (including boating Centre)</td>
<td>Summer</td>
<td>24°C</td>
<td>No</td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td>Winter</td>
<td>20°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrance Lobby, Corridors</td>
<td>Summer</td>
<td>26°C</td>
<td>No</td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td>Winter</td>
<td>18°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washrooms &amp; Change Rooms</td>
<td>Summer</td>
<td>24°C</td>
<td>No</td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td>Winter</td>
<td>19°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting &amp; Multipurpose Rooms</td>
<td>Summer</td>
<td>26°C</td>
<td>No</td>
<td>1,3</td>
</tr>
<tr>
<td></td>
<td>Winter</td>
<td>21°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General Notes:
1. Summer time temperature in non-air conditioned spaces will vary according to the outdoor air temperature.
2. Generally allow an additional float of +/- 2°C for most spaces.

6. ENVELOPE REQUIREMENTS

The following lists the minimum acceptable assembly thermal resistances prescribed by ASHRAE Standard 90.1-2007 for Smithers, B.C. These values are the minimum requirements and must be exceeded to minimize energy consumption.

---

1 Also referred to as Resultant Temperature, operative temperature is the average of the surrounding surface temperatures and the air temperature. This measurement is the best indication of the temperature perceived by an occupant.
The following lists the minimum envelope parameters recommended by ASHRAE 90.1-2007:

<table>
<thead>
<tr>
<th>Envelope Elements</th>
<th>Ins. Min. R-Value</th>
<th>Assembly Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofs</td>
<td>R20ci (hr ft(^{2})(^{0})F/Btu)</td>
<td>RSI 3.5 (m(^{2})(^{\circ})C/W)</td>
</tr>
<tr>
<td>Walls (Wood-Framed)</td>
<td>R13+R7.5ci (hr ft(^{2})(^{0})F/Btu)</td>
<td>RSI 2.28+RSI 1.32ci (m(^{2})(^{\circ})C/W)</td>
</tr>
<tr>
<td>Floors (Heated S.O.G.)</td>
<td>R20 (hr ft(^{2})(^{0})F/Btu)</td>
<td>RSI 3.5 (m(^{2})(^{\circ})C/W)</td>
</tr>
</tbody>
</table>

Glazing (Metal frame Curtain wall) | Kawneer 1600 | U=0.40 (Btu/hr ft\(^{2}\)\(^{0}\)F) | SHGC (all)=0.45 |

The proposed envelope parameters are as follows:

<table>
<thead>
<tr>
<th>Envelope Elements</th>
<th>Ins. Min. R-Value</th>
<th>Assembly Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofs</td>
<td>R48ci (hr ft(^{2})(^{0})F/Btu)</td>
<td>RSI 8.5 (m(^{2})(^{\circ})C/W)</td>
</tr>
<tr>
<td>Walls (Wood-Framed)</td>
<td>R20+R10ci (hr ft(^{2})(^{0})F/Btu)</td>
<td>RSI 3.5+RSI 1.76ci (m(^{2})(^{\circ})C/W)</td>
</tr>
<tr>
<td>Floors (Heated S.O.G.)</td>
<td>R20 (hr ft(^{2})(^{0})F/Btu)</td>
<td>RSI 3.5 (m(^{2})(^{\circ})C/W)</td>
</tr>
</tbody>
</table>

Glazing (Metal frame Curtain wall) | Kawneer 1600 | U=0.40 (Btu/hr ft\(^{2}\)\(^{0}\)F) | SHGC (all)=0.45 |

7. **SUSTAINABLE DESIGN STRATEGIES**

The following design features will be implemented and integrated between disciplines.

**Building Envelope**

The building envelope performance is critical to comfort, passive building operation and the efficiency of the mechanical systems. Increased insulation levels in the building envelope and effective external shading elements will reduce heating and cooling loads respectively.

The following architectural strategies will be implemented:

- Thicker walls, roofs and exposed floors for additional insulation
- Continuous insulation on the exterior side of the envelope to reduce thermal bridging

**South and West Elevation Solar Gain Control**

The south and west elevations have two conflicting requirements: high window-to-wall ratios to maximize the view and low window-to-wall ratios to limit summer solar heat gains and heat losses. These needs will both be met by high performance glazing in combination with fixed exterior louvers for shading and wide overhangs. The purpose of the shading is to block summer sun and admit low angle winter sun.

Retractible (roller) insulating shutters are also being considered for large expanses of glazing to limit heat loss during winter night-time.
Thermal Mass

Thermally massive materials have the ability to absorb and store heat energy. Exposed interior thermal mass stabilizes temperatures within the space and can reduce cooling energy requirements. Mass also absorbs solar heat on winter days and slowly releases it to the space during the evening. The thermal mass of the green roof will absorb and store a significant amount of solar energy and reduce the building cooling load.

The following architectural/structural strategies will be implemented in this regard:

- Sufficient building mass (wall, floor, ceiling)
- Insulation on the exterior side of the envelope (requires Floor Space Ratio dispersement)

Natural Ventilation

Apertures, such as operable windows, trickle vents, louvers and operable skylights can provide natural ventilation for the building and if properly designed can be incorporated with low energy ventilation strategies.

Nocturnal cooling by natural ventilation can be achieved in buildings with sufficient levels of mass (e.g. concrete or brick). Apertures left open during cooler night time hours remove heat from the building structure.

Benefits:
- occupant perception of comfort
- low fan energy consumption
- opportunity for nocturnal cooling

Limitations:
- dependent on outdoor air quality
- can be left open accidentally
- must be coordinated with building architecture
- variable and uncontrolled indoor humidity level

As another sustainable and passive design strategy in summer time and shoulder season (whenever outdoor temperature permits), natural ventilation will be introduced through providing operable windows at low and high levels to provide proper circulation of air for the ventilation of interior spaces.

Displacement Ventilation

Displacement ventilation systems supply a relatively small volume of 100% outdoor air (typically < 1 air change/hour at 20 cfm/person for a typical space). These low air flow rates can be easily met with low supply air velocities (≤40 fpm) resulting in a non-mixed “displacement ventilation” air flow pattern. The air must be supplied at a temperature lower than the space temperature (1-3°C lower). The ventilation air disperses across the floor without causing any perception of discomfort, and stratifies as it is warmed by people and other internal heat gains. The warm, contaminated air forms a stratified layer below the ceiling, and it is exhausted from the space at high level. The one-directional displacement air flow pattern assures effective removal of pollutants from the space without re-introducing them to the occupant breathing zone, providing ventilation effectiveness and indoor air quality unmatched by other types of “all-air” HVAC systems.

This strategy decouples the ventilation function from the space temperature control function allowing for high indoor air quality yet requiring additional space heating control. Low-intensity hydronic radiant heating and cooling is well suited to function with displacement ventilation.
Displacement Ventilation providing 100% outdoor air can operate effectively in combination with natural ventilation strategies.

**Forced Ventilation with Heat recovery system**

All occupied areas shall be mechanically ventilated, generally using displacement type air terminals strategically positioned at or near floor level providing an even distribution of low velocity fresh air throughout the building. The central source for the forced ventilation system will be an air handling unit which will be located in the upper floor Mechanical room with Supply & Return fan, heat recovery element and hydronic reheat coil.

It is important to note that the mechanical element of the ventilation system to the library is primarily there to provide consistent and controlled ventilation, particularly during design winter conditions, when natural ventilation is difficult to control and likely to cause severe discomfort to occupants.

In winter time, return fan of Air Handling Unit will return air from ceiling mounted return grilles (at high ceiling levels) into the unit to exhaust the excessive air and mix the remaining with demand fresh air (controlled by CO2 sensor) where finally supply fan will suction the mixed air thru the heating coil to heat up the air to room temperature so as to be supplied to the space thru supply ducts and diffusers. The heat recovery element inside the air handling unit which is located in fresh and exhaust air streams, will recover heat from the exhaust air and transfer it to the cold fresh air intake. DDC control system will modulate fresh air intake and exhaust dampers upon demanded ventilation (controlled by CO2 sensor).

Also in summer time and in peak summer days when natural ventilation can not provide satisfactory indoor conditions, the operation of the air handling unit in a free cooling mode thru displacement diffusers will meet acceptable comfort conditions inside the building. Capacity of Ventilation System will be calculated according to Ashrae 62.1-2007 which will be a minimum of 20 CFM/person (9.51/s/person) of outdoor air at an average air circulation rate of 1.25 CFM/ft² (6.4l/s/m²)

General air conditioning ductwork will be designed for internal pressures not exceeding 3” W.C. (750 pa). All ductwork would be galvanized sheet steel. Supply air and return air will be ducted to each space.

All supply air ductwork serving areas with mechanical cooling will be wrapped with 2” (50mm) duct insulation for energy efficiency, except where it is exposed in the room or space served.

Ductwork will be sized based on an average of 0.08” W.G. (20 pa) pressure drop per 100 ft. (30 m) of ductwork or with air velocities matched to the acoustic considerations.

Supply air terminals will be selected in accordance with location and method of air diffusion, with egg-crate return air and/or exhaust grilles. All grilles and diffusers would be specified as off-white painted finish unless otherwise noted.

**Geo Exchange System (GHX)**

Geo exchange system typically consists of open or closed loop Geothermal field, ground source heat pumps and circulation system where ground acts as a heat source or heat sink for the water to water (ground source) heat pumps to generate low temperature hot water in winter time or chilled water in summer time for use in low grade heating and cooling systems such as radiant slab for heating or cooling or domestic water preheating.

Due to mild summer temperatures in Smithers and because of limited mechanical budget, this project will not have summer air conditioning system.

Geo-exchange systems are generally cost effective when used for both heating and cooling and since there’s been an offer from a local mining company for free drilling of the field; this system can be utilized for this project at the minimum cost.
Depending on the Geology and the area of the site, GHX system shall be a vertical geothermal arrangement and water shall be circulated between the geothermal field and heat pumps installed in the mechanical room at upper floor level.

Low-Intensity Hydronic Radiant Slab Heating and Cooling

The radiant slab heating system will consist of small diameter plastic tubing (½” or ¾” ø) configured in a closed loop hydronic system embedded in the concrete slabs. Heated water at fairly moderate temperatures circulates through the embedded piping to maintain the exposed floor surfaces at a set temperature. Typically, with a properly designed high-performance building envelope, the floor surface temperatures are kept within a relatively narrow range over the course of the year i.e. 22 °C (72 °F) during winter. The radiant heat transfer occurs between all solid objects within the space (e.g. walls, floor, furniture, equipment and people), and it is completely unaffected by distance (on the building scale), temperature, air flow patterns, and space pressurization. Radiant heat transfer is the main factor assuring superior thermal comfort, as radiant temperature dominates comfort levels perceived by people. Note that Radiant heat transfer is not a function of distance; rather, it is affected by view angles and the orientation of the surface with respect to the space and occupants. Radiant heat transfer is not affected by air, however it is affected by solid objects such as drop ceilings, furniture, or surface finishes such as carpet.

This type of radiant slab system with piping integrated directly into concrete structural slabs is typically installed on site. Although the piping installation within the concrete formwork is a relatively simple process, protection of the installed piping against potential damage requires proper attention and supervision until the concrete pour is complete. Extra care must also be taken when coring openings through the floor after the structure is poured. Accurate As-Built drawings of the tubing layout or available thermal imaging technology will assist if additional coring is needed after the floor is poured. However, if the tubing should become damaged either during construction or after, the tubing can be repaired with mechanical coupling devices.

Zoning of the radiant slab system will depend on the final building envelope performance. If the building envelope is “high” performing, then the number of radiant slab zones can be significantly reduced, otherwise multiple zones will have to be considered. Fewer zones reduce control and piping cost and complexity. With regards to architectural drawings, the radiant floor system shall be divided into zones to provide individual temperature control inside each room. Larger spaces shall be separated into external and internal zones in order to enhance temperature control and comfort levels.

Radiant space heating can operate effectively with windows open. Unlike conventional all-air heating, the space tempering function is independent of the air in the space, allowing windows to be opened during a wide range of outdoor temperatures.

This system in combination with displacement ventilation at floor level will ensure practically constant space temperature and comfort conditions with only minor and gradual fluctuations on a seasonal basis. In order to get the most efficiency out of Radiant Slab Heating System, it’s highly recommended that floor covering doesn’t interfere and undermine the operation of Radiant Slab and having said that, the most suitable floor coverings can be: bare concrete, tiles or very thin layered Carpet.

Also due to the high water table on site, it’s recommended that slab on grade insulation be put between two layers of concrete to protect the insulation from moisture.

According to numerous power failure or block outs in Smithers and in absence of Emergency Power from Diesel Generator, it’s recommended that the radiant heating system be filled with appropriate Glycol solution to prevent radiant tubes from freezing and damages.

It’s noteworthy that although this project is not intended to have any cooling system but in case of selecting the GHX system, the whole infrastructure will have the potential to provide cooling for the radiant slab at a minimum additional cost.
Gas-fired Condensing Boiler

As another sustainable design strategy, High Efficiency Gas-fired Condensing Boiler is recommended as auxiliary or back up heat for the hydronic heating system in winter.

Condensing Boiler technology is based on condensation of flue gases at lower hot water return temperatures to achieve efficiencies as high as %95. These boilers will suite application radiant heating slab with low heating hot water temperatures.

Since the condensing boilers are not recommended to operate at low turn down ratios and since the fuel source is natural gas, it's recommended that we use gas fired domestic water heaters for domestic hot water generation.

8. MECHANICAL ROOM

All the equipment will be located on the upper floor Mechanical Room as follows:

- Ground Source Water-to-Water Heat Pump
- Domestic Hot Water Generators (Immersion type coil tank)
- Circulating pumps for the Hydronic systems
- Expansion Tanks for Hydronic Systems
- Glycol Fill Tank and Expansion Tank
- Air Handling Unit with heat recovery system
- Gas-fired Condensing Boiler on Upper floor Mech. Room
- Indirect Gas-fired Domestic Hot Water Generator on upper Mech. Room

9. PLUMBING SYSTEMS

Domestic Hot Water

Domestic hot water will be generated by Domestic Water Heater in mechanical room. In winter time and in presence of GHX System, domestic hot water will be preheated by flow of low temperature heating hot water from ground source heat pump in an immersion type hot water storage tank. Additional heat will be generated by Indirect Gas-fired domestic water heater.

Domestic hot water will be generated and distributed at 60°C (140°F) for local blending as required. A recirculation pump and piping system will circulate the hot water on a scheduled basis to ensure 60°C water at each fixture.

Domestic Cold Water

Generally all domestic water piping services will be insulated type ‘L’ copper. Shut-off valves will be provided at every branch line from the primary riser and at every plumbing fixture grouping. Water hammer arrestors will be used wherever quick closing or solenoid valves are encountered in the water system. Exterior hose bibs will be the recessed freeze resistant type with a keyed access door. Backflow preventers will be provided in accordance with the ‘Cross Connection Control Manual’ published by the British Columbia Section of the American Water Works Association in order to reduce the probability of domestic water contamination through water backflow. Flanges and/or unions will be utilized at all equipment connections thereby permitting ease of equipment disconnection or removal for maintenance.

Water distribution piping will be sized so that the flow velocity does not exceed 6 feet per second in order to minimize erosion-corrosion and the associated noise problems at higher velocities. All solder used for the joining of copper piping will be lead-free. Insulation will be provided on the entire domestic water piping system to prevent condensation on cold water piping and to reduce heat loss from hot water piping.
Low-Flow Fixtures

Low flow faucets, shower flush heads, toilets and urinals will be installed. All toilets will be the wall mounted flush type and the urinals will be waterless to reduce the burden on the Municipal water system. Reliable performance of the low flow toilets will be ensured by maintaining adequate slope on horizontal sanitary lines and by avoiding double-Y fittings.

10. GAS SUPPLY

A new gas supply will be provided and this service shall be connected to the domestic hot water boiler and gas fire in the living room area of the library.

11. SANITARY

Sanitary drain waste and vent branches will be extended as necessary throughout the proposed facility to all those new fixtures requiring service. All sanitary fixtures will be connected to a new sanitary waste drainage system by gravity and will be provided with venting to prevent pressure fluctuation and trap seal loss.

Gravity sanitary waste piping will be combustible or non-combustible; generally, either acrylonitrile butadiene (ABS), polyvinyl chloride (PVC) or cast iron (CI) for under slab or buried service and non-combustible cast iron pipe for above slab interior service. All sanitary system floor drains will be cast iron with a nickel bronze grate where exposed to the view in finished areas of the facility. Floor drains will be provided in all washrooms in order to reduce the flooding effects of malfunctioning plumbing fixtures. Readily accessible cleanouts extended to floor level or to above the flood level of specific plumbing fixtures in suitable locations will be provided to permit ease of clearing blockages.

12. STORM

Storm water drains from the roof shall be connected together into a common outfall and connected to the public storm drain.

13. FIRE PROTECTION SYSTEM

The building sprinkler system will be a fully operational stand alone system that can operate independent of the buildings on campus. The entire building will be sprinklered in accordance with NFPA 13:

- A fire department Siamese connection will be provided at the exterior face of the building will be located in close proximity; within the code stipulated distance of 45 meters (150’), to the existing fire hydrant.
- Multi-purpose portable hand held fire extinguishers will be provided and installed in recessed wall cabinets for each 300 m2 of floor area.
- The fire protection installation shall meet seismic code requirements.
- The sprinkler system complete with inspector’s test stations will consist of a wet system for the whole building. The main building wet sprinkler system is to be zoned on a per floor basis according to the building occupancy.
- Equivalencies may be required to serve the glazed exposures.
- All sprinkler zone control valves and supervised valves will be installed in the Mechanical Room.
14. AUTOMATIC CONTROLS

The H.V.A.C. Controls will be specified based on a computerized electronic Distributed Digital Control system (DDC). A central personal computer station equipped with system graphics and control functions, a telephone modem and a printer will be used for the base control system. Stand-alone control panels located in the fan rooms will provide local area network control, and would be connected to the central computer station. This type of system will assist the building operators in their operating and maintenance duties as well as increase the energy efficiency of the buildings.

The H.V.A.C. Controls will also include building automation systems control and monitoring for lighting switching control, security alarm (as required), and fire suppression system alarms.

Space temperature setback for night and unoccupied periods will be incorporated for energy efficiency.

15. COMMISSIONING

The mechanical contractors will be required to perform complete commissioning of the systems, as well as the air and water balancing. The balancing and commissioning will be made a requirement for acceptance of the system to be considered SUBSTANTIALLY COMPLETE.

Commissioning checklists will be provided in the Mechanical Maintenance Manuals.

16. CLOSURE

We trust that the foregoing provides the information required at this time. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Report Prepared By: COBALT ENGINEERING

Vladimir Mikler, P.Eng.  
LEED® Accredited Professional  
Partner

Jubin Jalili, P.Eng.  
Project Manager

VM/JJ/  
C:/documents and Settings/JJalili/My Documents/Reports/090528_Mechanical_Design_Development_Report(Smithers Library).doc
Displacement Diffusers (1st Floor level):

- D1: 22" x 6" - 480 CFM.
- D2: 22" x 6" - 440 CFM.
- D3: 16" x 6" - 300 CFM.
- D4: 32" x 10" - 960 CFM.
- D5: 16" x 6" - 300 CFM.
- D6: 40" x 18" - 2400 CFM.
- D7: 40" x 18" - 2400 CFM.
- D8: 40" x 18" - 2300 CFM.
- D9: 26" x 10" - 800 CFM.

Smithers Public Library
Cobalt 08-K071-000 IT
June 01, 2009 11-03
Smithers Public Library
Cobalt 08-K071-000J5
June 07/2009 M-04
Smithers Public Library
Cobalt 08-K071-0002
June 07/2009 M-05
ELECTRICAL SCHEMATIC DESIGN REPORT

FOR

SMITHERS PUBLIC LIBRARY

Project Architects

URBAN ARTS ARCHITECTURE

3310 West 12th Avenue
Vancouver, BC    V6R 2M9

PREPARED BY

COBALT ENGINEERING

#202 – 1378 5th Avenue
Prince George, BC    V2L 3L4

PROJECT NO:  08-K071-E15

DATE:  May 26, 2009
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1. **INTRODUCTION**

This report will outline the proposed electrical systems design for the new Smithers Public Library. The report is general in nature and intended to solicit comments and feedback from the client group, as well as to present information for preliminary quantity surveys.

2. **SITE SERVICES**

2.1 Provide new underground electrical, telephone and data services to site. Service utilities to determine final sizing and routes.

3. **DISTRIBUTION-POWER**

3.1 Power for mechanical and Owner’s equipment will be provided at 208 volt, 3 phase, for units 1 horsepower or larger and 120 volt, single phase for small ratings.

3.2 Distribution for lighting and convenience power circuits will be provided utilizing bolt on circuit breaker panelboards and will be located to suit the architectural arrangement and equipment loads of the project.

3.3 The distribution throughout the project will be sized to ensure twenty-five percent (25%) future capacity.

3.4 Branch circuit panels will be organized to isolate and consolidate basic lighting and building mechanical loads. The grouping of similar loads to the same panel will facilitate possible future measurement and verification of the Building Performance.

4. **LIGHTING**

4.1 The general lighting will be provided using T8 32 watt tri-phosphor fluorescent lamp technology with electronic ballasts. All lighting products will be commercial grade or better.

4.2 Motion sensors are to be incorporated into the washrooms, storage rooms and utility rooms.

4.3 Compact fluorescent light sources will only be installed within areas where standard fluorescent lighting is not possible.

4.4 LED light fixtures will be considered for use in common spaces where the public will be able to see current technology applications being utilized.

4.5 Exterior site lighting will be mounted away from the building, as practical, with sharp cut-off luminaires located throughout the project site. The “area” lighting source will be pole-mounted. The sharp cut-off luminaires will ensure light trespass onto neighbouring properties is minimal.
4.6 The exterior lighting control will be via a photocell and DDC system utilizing low voltage components or line voltage contactors.

4.7 The lighting designs throughout the project will follow the recommendations of the Illuminating Engineering Society of North America, the rules and regulations of the Work Safe BC, and BC Building Code Energy Management/use.

4.8 The lighting designs will also follow the energy use recommendations as set out by ASHRAE/IES 90.1 as a base maximum.

4.9 Components relating to ‘Green / Sustainable Design’ will be implemented.

4.10 Perimeter building lighting outside exits will be provided utilizing surface/wall mounted metal halide units rated 70 or 100W. Soffit style fixtures will only be used in those areas where an adequate mounting height is not available at the exit locations. Generally, all security lighting will be incorporated by the implementation of pole mounted fixtures, remote from the building, and positioned to illuminate dark recesses for security protection purposes.

5. WIRING METHODS

5.1 Main service entrance raceways shall be direct buried rigid PVC complete with warning tape.

5.2 Feeders to sub-distribution panelboards and MCC’s shall be aluminium. All branch circuit conductors to be R90 copper

5.3 Branch circuit home-runs shall be EMT conduit. Drops to receptacles shall be BX. Wiring for lighting fixtures and switches shall be BX.

6. INTRUDER ALARM

6.1 The system wiring and components will be incorporated within the Electrical Contract utilizing a Security Company specializing in the area.

6.2 It is proposed all exterior doors be provided with concealed magnets.

6.3 Passive infrared units will be incorporated throughout corridors and designated ground floor rooms/areas. Glass-break devices will be implemented at main doors or areas where back up to the roll shutters is required.

6.4 “Smart” key pads be provided where entry is required.

6.5 The control panels, zone expander panels, wiring, and devices will be supplied and installed by Security Company’s Licensed Representative.
7. FIRE ALARM

7.1 The fire alarm system shall be complete in every respect to meet or exceed the requirements of the latest/current releases of CAN.4-S524, S537, the BC Building Code, and requirements of the Local Fire Marshall.

7.2 The main control panel shall be modular type complete with all necessary plug-in modules or plug-in cords, and shall contain zone indication and all manual operated functions in the front cover behind a lockable door with viewing window.

7.3 The main control panel shall contain detection zone modules, trouble module, audible signal modules, and contacts for magnetic door holders, fan shutdown, and remote monitoring connections to both School District and monitoring company.

7.4 The remote annunciator will be provided at the main entrance in coordination with the requirements of the local Fire Marshall. The unit shall consist of a graphic design layout with zone designations highly visible when illuminated.

7.5 Automatic devices (heat and smoke detectors) will be incorporated to ensure the desired zoning requirements are implemented.

7.6 Smoke detectors, duct detectors, pull stations, strobe lights and gongs will be provided in compliance with all regulations of the Code and Local Fire Marshall.

8. EMERGENCY LIGHTING

8.1 Emergency lighting will consist of self contained battery back-up with remote light fixtures, as required to suit the building layout. Exit signs will be LED.

9. OUTLETS AND MOTORS

9.1 Convenience receptacles will be provided throughout to suit the equipment to be provided therein. Cleaning outlets will consist of 15 amp and 20 amp receptacles installed approximately 100 ft. on centers Power connections will be incorporated to suit the Owners and Mechanical Trade equipment as incorporated within the final documents.

10. COMMUNICATION SYSTEMS

10.1 Provision consisting of conduit, outlet boxes, cabling, and jack termination will be incorporated throughout the facility.

10.2 Telephone and computer outlets will be wired and terminated complete with necessary distribution equipment to facilitate operation of the outlets.

10.3 At the direction of the Architect/Owner, selected television outlets will be wired and terminated complete with necessary distribution equipment to facilitate operation of these selected outlets.
10.4 All cabling will be 2-4 pr. UTP Level 5E, FT-4 for each communication outlet, terminating on rack mounted RJ45 patch assemblies. T.V. (R.F.) cables will consist of RG6U terminated at a coupler/splitter.

10.5 All cabling will be installed on Cat. 5E J hooks and will be separately identified.

11. DESIGN LUMINANCE LEVELS FOR EACH AREA

11.1 Design luminance levels throughout the facility will follow the guidelines of IESNA.

We trust that the foregoing provides the information required at this time. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Report Prepared By:

COBALT ENGINEERING

Lane RJ Logan, P.Eng.
Associate

Jaco Kruger
Intermediate Electrical Designer
APPENDIX B: PROGRAM SUMMARY CHART
# Program Summary Chart

<table>
<thead>
<tr>
<th>Program Component</th>
<th>Area (sq. ft)</th>
<th>Area (sq. m)</th>
<th>Public Computer Stations</th>
<th>Public Seats</th>
<th>Staff Work Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Public Spaces</strong></td>
<td></td>
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## Program Summary Chart

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**APPENDIX B**
### Project #: 5450

**CLASS C - ELEMENTAL ANALYSIS**

2-Jun-09

Smithers Library
Newhaven Construction Management Ltd

<table>
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<tr>
<th>Major Group / Group Element</th>
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<th>Element Quantity</th>
<th>Unit</th>
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<th>Item Cost</th>
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<td>Element &amp; Sub-Element</td>
<td>Quantity</td>
<td>Unit</td>
<td>Cost</td>
<td>Cost%</td>
<td>% 1-12</td>
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**A.342 Skylights & roof glazing**

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**A.343 Balconies and projections**

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**B.111 Fixed partitions**

| Type 1 - Non Insulated Drywall     | SF   | 24,995 | 1.35  |
| Type 2 - Insulated Drywall        | SF   | 6,922  | 0.40  |
| Interior glazed screens           |      | 0      | 0.00  |
| Interior storefront               | SF   | 12,540 | 1.09  |

**B.112 Moveable partitions**

| Operable Partition                | m²   | 0      | 0.00  |
| Roller Shutters                  | m²   | 0      | 0.00  |
| Operable Stage Partition          | EA   | 0      | 0.00  |
| Demountable partitions            | m²   | 0      | 0.00  |

**B.113 Structural partitions**

| Type 1 - Plywood Shear Wall       | SF   | 17,572 | 1.52  |
| Type 2 - Insulated Shear Wall    | m²   | 0.00   | 0.00  |
| Type 3                           | m²   | 0.00   | 0.00  |
| Smoke Baffle                      | m    | 0      | 0.00  |

**B.12 Doors**

| Type 1 Solid Core Wood Doors      | LVS  | 15,600 | 1.35  |
| Sliding Wood Doors                | LVS  | 8,500  | 0.74  |
| Metal Doors                       | LVS  | 0      | 0.00  |
| Glass Doors                       | LVS  | 0      | 0.00  |
| Shower Doors                      | LVS  | 0      | 0.00  |
| Shower Fixed Panel                | LVS  | 0      | 0.00  |
| Carved Cedar Doors                | LVS  | 0      | 0.00  |
| Storefront doors                  | LVS  | 12,000 | 1.04  |
| Hardware                          | LVS  | 0      | 0.00  |

**B.15 Ceilings**

| Drywall Ceilings                  | SF   | 15,515 | 1.34  |
| Acoustic T-Bar Ceilings           | SF   | 8,440  | 0.73  |

**Carried Forward**

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- **Element & Sub-Element**: Element & Sub-Element
- **Unit Quantity**: Unit Quantity
- **Unit Cost**: Unit Cost
- **Item Cost**: Item Cost
- **Sub-element/Element Total**: Sub-element/Element Total
- **Cost/Gross SF**: Cost/Gross SF
- **% 1-12**: % 1-12

### B.2 Finishes
- **Brought Forward**: 1,743,323
- **$225,268**: 19.50
- **5.17%**: 39.99

#### B.21 Floor finishes
- **Carpet tile**: 10,520.00 SF, 6.00, 63,120
- **Ceramic Tile**: 1,030.00 SF, 10.00, 10,300
- **Sealed Concrete**: 943.00 SF, 2.00, 1,890
- **Slate/Stone flooring**: 0.00 SF, 0
- **Epoxy/Plastic Flooring**: 0.00 SF, 0
- **Rubber paint**: 0.00 SF, 0
- **Sprung Wooden Floor**: 0.00 SF, 0
- **Stair finishes**: 0.00 SF, 0

#### B.22 Ceiling finishes
- **Painting to Drywall**: 2,335.00 SF, 1.00, 2,335
- **Wood slat pine**: 7,620.00 SF, 15.00, 114,300
- **Cedar ceilings**: 799.00 SF, 15.00, 11,985
- **Special Finish**: 0.00 SF, 0
- **Finish to exposed structure**: 0.00 SF, 0
- **Stair soffit**: 0.00 SF, 0

#### B.23 Wall finishes
- **Painting to drywall**: 15,181.00 SF, 0.75, 11,386
- **Ceramic Tile**: 1,244.00 SF, 8.00, 9,952
- **Stone Cladding/Plaster**: 0.00 SF, 0
- **Glass Feature Panels**: 0.00 SF, 0
- **Wood Panelling/Cladding**: 0.00 SF, 0
- **Vinyl/Industrial Wallcoverings**: 0.00 SF, 0
- **Baseboard/Chair Rails**: 0.00 LF, 0

### B.3 Fittings and equipment
- **$205,509**: 17.79
- **4.71%**: 39.99

#### B.311 Metals
- **Handrails**: 1.00 EA, 500.00, 500
- **Ladders - Roof Access**: 0.00 LS, 0

#### B.312 Millwork
- **Millwork**: 182.50 LF, 459.32, 83,825
- **General**: 0.00 LS, 0

#### B.313 Specialties
- **Chalk, Tack and Whiteboards**: 256.00 SF, 4.00, 1,024
- **Toilet Partitions**: 6.00 ea, 850.00, 5,100
- **Washroom Accessories**: 34.00 ea, 120.59, 4,100
- **Lockers**: 0.00 ea, 0
- **Wall and Corner Guards**: 0.00 LF, 0
- **Fireplaces and Settings**: 1.00 ea, 25000.00, 25,000
- **Shelving systems**: 294.40 LF, 250.00, 73,600
- **Mirrors**: 80.00 SF, 17.00, 1,360
- **Signage**: 1.00 LS, 10000.00, 10,000

#### B.314 Furnishings
- **Tables, chairs desks**: 0.00 LS, 0
- **Other Furnishings**: 0.00 LS, 0

### Carried Forward
- **$1,968,591**: 170.44
- **45.16%**: 39.99
## Major Group / Group Element

<table>
<thead>
<tr>
<th>Element &amp; Sub-Element</th>
<th>Element</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Item Cost</th>
<th>Sub-element/Element Total</th>
<th>Cost/ Gross SF</th>
<th>% 1-12</th>
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### Brought Forward

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<tr>
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### B.331 Elevators

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<th>Unit</th>
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<tr>
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### B.332 Escalators

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### B.333 Material handling systems

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<td>Dummy Waiters</td>
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### C.1 Mechanical

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### C.2 Electrical

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<th>Sub-element/Element Total</th>
<th>Cost/ Gross SF</th>
<th>% 1-12</th>
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<tbody>
<tr>
<td>Service and Distribution</td>
<td>11,550.00</td>
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### Z.1 General Requirements & Allowances

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<th>Allowance Type</th>
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<td>General requirements</td>
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<td>OH&amp;P</td>
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<tr>
<td>Contingency</td>
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<td>Location</td>
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### BUILDING TOTAL

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<tr>
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<th>Unit Cost</th>
<th>Item Cost</th>
<th>Sub-element/Element Total</th>
<th>Cost/ Gross SF</th>
<th>% 1-12</th>
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| | | | | | | | |
## CLASS C - ELEMENTAL ANALYSIS

### Brought Forward

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<th>Quantity</th>
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### D.1 Site Development

<table>
<thead>
<tr>
<th>Element &amp; Sub-Element</th>
<th>Quantity</th>
<th>Unit</th>
<th>Cost</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.111 Sitework Clearing</td>
<td>0.00 m³</td>
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<td>0.00</td>
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</tr>
<tr>
<td>D.111 Sitework Grading</td>
<td>0.00 m³</td>
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<td>0.00</td>
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<tr>
<td>D.112 Hard Surfaces Winter parking</td>
<td>4,970.00 SF</td>
<td>6.00</td>
<td>29,820</td>
<td>2.58</td>
</tr>
<tr>
<td>D.112 Hard Surfaces Hard surface entry area</td>
<td>2,462.00 SF</td>
<td>4.00</td>
<td>9,848</td>
<td>0.85</td>
</tr>
<tr>
<td>D.113 Site Improvements Fences</td>
<td>0.00 LS</td>
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<td>0.00</td>
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</tr>
<tr>
<td>D.114 Landscaping Landscape planters</td>
<td>1.00 LS</td>
<td>7500.00</td>
<td>7,500</td>
<td>0.65</td>
</tr>
<tr>
<td>D.2 Site Services Mechanical Services Water Service &amp; Hydrant</td>
<td>1.00</td>
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<td>16100.00</td>
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<td>D.2 Site Services Sanitary System</td>
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<tr>
<td>D.2 Site Services Storm System</td>
<td>1.00</td>
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<td>21000.00</td>
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<td>D.2 Site Services Electrical Services BC Hydro Fees</td>
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<td>D.2 Site Services Telus Fees</td>
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<td>D.2 Site Services Site Lighting</td>
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<tr>
<td>D.2 Site Services Plug-Ins &amp; lighting</td>
<td>1.00 EA</td>
<td>28900.00</td>
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### D.3 Other Items

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### NCML COST OF PROJECT ADJUSTED TO 2009

| $ | 4,515,796 | 403.66 |
## D.1 Site Development

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<th>Cost %</th>
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<tr>
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### D.111 Sitework

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<td>Clearing</td>
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<td>0.00</td>
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<tr>
<td>Grading</td>
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### D.112 Hard Surfaces

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<th>Unit</th>
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<td>Hard surface entry area</td>
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<td>4.00</td>
<td>9,848</td>
<td>0.85</td>
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<td>Curb &amp; Gutter</td>
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### D.113 Site Improvements

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<td>Site Furnishings</td>
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<td>Pathways</td>
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<td>Playground Equipment</td>
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<td>Flagpole</td>
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### D.114 Landscaping

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## D.2 Site Services

### D.21 Mechanical Services

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<th>Cost %</th>
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<tbody>
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### D.22 Electrical Services

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<td>Telus Fees</td>
<td>0.00 LS</td>
<td></td>
<td>0.00</td>
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<tr>
<td>Cable</td>
<td>0.00 LS</td>
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<tr>
<td>Site Lighting</td>
<td>0.00 LS</td>
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<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Plug-Ins &amp; lighting</td>
<td>1.00 EA</td>
<td>28900.00</td>
<td>28,900</td>
<td>2.50</td>
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<tr>
<td>Substation</td>
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</table>

## D.3 Other Items

### D.311 Demolition

<table>
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<tr>
<th>Element</th>
<th>Quantity</th>
<th>Unit</th>
<th>Cost</th>
<th>Cost %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition</td>
<td>4,001.00 0.00</td>
<td>9.00</td>
<td>36,000</td>
<td>3.12</td>
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<tr>
<td>Asbestos Removal</td>
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<tr>
<td>Selective Demolition</td>
<td>0.00 m²</td>
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</table>

### D.312 Non-Construction

<table>
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<th>Cost %</th>
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</thead>
<tbody>
<tr>
<td>Design Fees</td>
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<td>0.00</td>
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<tr>
<td>Fit-Up</td>
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<tr>
<td>Contingency</td>
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### NCML COST OF PROJECT ADJUSTED TO 2009

$4,515,796 | 403.66