A CONCEPTUAL DESIGN STUDY FOR THE BRITANNIA CENTRE FOR MINING INNOVATION

PREPARED FOR: NATURAL RESOURCES CANADA

FINAL DRAFT

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TOBY RUSSELL BUCKWELL & partners | architects

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1 PROJECT OVERVIEW

1.1 A VISION OF SUSTAINABILITY

For many years, the riches of the earth were taken for granted. Our increasing understanding of the fragility of nature and the impact of human development on the ecosystems that sustain us, is changing our view of how we should be interacting with our environment. This change in perspective has resulted in a new paradigm that defines the relationships between people, the environment and the economy that defines our progress as a society. Sustainable development, defined in the 1987 report of the Brundtland Commission "*Our Common Future*" as "development that meets the needs of today without compromising the ability of future generations to meet their own needs", is part of that new paradigm. Sustainable development is about achieving human and ecosystem well-being together.

This report presents a vision of future sustainability for Britannia Beach, a historic industrial mining property that is situated on Canada's rugged west coast just north of Vancouver. The stunning beauty of the area is currently contrasted with an image of an industrial past that, upon reflection, was not inherently sustainable. The project considers a means by which to realize a new future for Britannia. It is anchored by the design of a world-class mining and minerals research and innovation centre.

The Britannia Centre for Mining Innovation brings together business, education and research, community, government and local stakeholders in defining a vision for the future of Britannia that is based on the principles of sustainability.

The Britannia Centre for Mining Innovation project represents an unparalleled opportunity for Canada to create a lasting monument that will be on display for the world - a monument that is a reflection of Canadian values and innovation. The opportunity for world-class mine reclamation research on an existing legacy mining property, together with the more than 10 million people from all over the world that pass by the site every year, provides a unparalleled potential for Canada to continue its acknowledged leadership in the mining industry and communicate that leadership to the world. The exposure generated could be even more significant if the Vancouver-Whistler bid for The 2010 Winter Games is successful.

Canada is consistently ranked by the United Nations as one of the top places in the world to live. Part of the reason for this ranking is the commitment demonstrated by the citizens of Canada to carry out their activities, both at home and abroad, in a manner that is consistent with the principles of sustainability. The concept presented herein provides a design for a world-class research and interpretive facility that will display to both a domestic and international audience the values by which Canadians live and the spirit of innovation that characterizes us as a people.

1.2 MINERALS AND METALS – CANADA LEADS THE WAY

Canada is a world leader in minerals and metals development, processing and research. It is a major supplier of equipment, services and technology to the global mining community. Canada's knowledge of mineral exploration and development is founded on more than 100 years of expertise and collaboration worldwide. As a result, Canadians have developed a large global network of infrastructures to find, mine, process, distribute and recycle minerals and metals. Canada's vast geological assets, combined with a well-established mining, transportation and communications infrastructure and a highly skilled and productive workforce, have earned it an international reputation for excellence in mining.

The minerals and metals industries represent a key component of Canada's economic and social well-being. For example, well over 100 communities across Canada, with a total population of more than 600,000, are dependent on the mining industry. These communities are located in all regions of the country, but are mainly found in remote and rural regions. More than 2,200 Canadian-based companies sell specialized equipment and services to the mining industry in Canada and around the world. The urban centres of Toronto, Montreal and Vancouver are home to a substantial component of the international mining community. This includes a large number of corporate head offices and the financial institutions that account for the majority of worldwide financing for mining projects. For Canada's Aboriginal population, the minerals and metals industries hold promise of significant economic development opportunities. In recent years, examples of these opportunities have been demonstrated by the world-class Ekati and Diavik diamond mine developments in northern Canada.


Raw diamonds from the Ekati diamond mine

Canada is well known for the quality and innovation of its minerals and metals sector. For example, the Government of Canada is a partner in a global mining research alliance which links major government-funded mining research organizations in the world's most advanced mining countries. Canada, South Africa, Australia and the United States are all working together on this initiative. This partnership allows for the sharing of research and technical expertise with others around the world, particularly research and technologies that lead to more sustainable industry practices.

As much as the statistics quoted above are impressive and substantiate the importance of the minerals and metals industries to the development and continued prosperity of Canada, mining is also about stories and people. Whether the subject is the Yukon Gold Rush of the late 1800's or the many remote communities that were founded on the basis of the riches held in their soils, mining is part of the lore and adventure that characterizes the building of Canada as a great nation. The community of Britannia, which is nestled amongst the trees and snowcapped mountains of British Columbia's west coast, is part of that lore. In its early days as one of the largest and most prolific copper mines in the world, Britannia represents both the proud history of Canada and the Canadian mining industry. As values and technologies changed through time, Britannia came to symbolize mining practices that were the antitheses of sustainable development.

1.3 PURPOSE OF THIS DOCUMENT

The opportunity now exists to write a new chapter in Britannia's history. This document is first and foremost the articulation of a vision of what is possible. The objective of this project was to present the conceptual design of world-class mining and minerals research and innovation centre and the means by which this design can be realized. It is a collection of thoughts and principles that form an overall notion for a project that will combine a world-class research facility with a major public interpretive centre. Together these elements are known as the Britannia Centre for Mining Innovation.

The following key components are described herein:

- **Chapter 2 – The Concept.** This chapter defines the underlying principles for a major new research facility and interpretive centre with regional, national and international appeal;
- **Chapter 3 – Site Development.** This chapter describes the planning concepts for the project, based on a critical analysis of the site;
- **Chapter 4 – The Business Case.** This chapter outlines critical factors that will ensure success for this project;
- **Chapter 5 – Next Steps.** This chapter describes what steps will be necessary to move from this concept towards implementation.

1.4 NATURAL RESOURCES CANADA

Natural Resources Canada (NRCan) is a federal government department specializing in the sustainable development and use of natural resources, energy, minerals and metals, forests and earth sciences. These issues are considered from both a national and international perspective, using the department's expertise in science and technology, policy and programs. The department carries out and applies leading-edge science and technology research, maintains a national knowledge infrastructure on Canada's land and resources, and ensures that federal policies and regulations on issues such as the environment and trade enhance the natural resources sector's contribution to the economy. At the same time, NRCan is responsible for ensuring that these policies and regulations protect the environment and the health and safety of all Canadians. Together with international agencies and other nations, NRCan promotes open access to global markets to the benefit of Canadian products, services and technology.

The project considered in this report has been undertaken through the leadership of the Mineral and Metal Policy Branch, Minerals and Metals Sector of Natural Resources Canada.

1.5 BRITANNIA BEACH

1.5.1 Britannia - The Site and the Past

The community of Britannia Beach lies approximately 45 minutes by car (52km) north of Vancouver. Britannia is situated along the famous Sea-to-Sky Highway and is on the shores of Howe Sound. It is a typical picture of a rugged but beautiful coastal town. The mine, which was named after the community, was established some 110 years ago and, at one point, was the largest producer of copper concentrate in the British Empire. Through the late 1930's to the mid 1940's the mine was a significant contributor of raw materials to the allied war effort during WWII. A key feature of Britannia is the Concentrator Building. This building has been designated a National Historic Building by Parks Canada and is a lasting symbol of Canada's storied industrial and pioneering past.

Despite Britannia's proud history of economic achievement, the current legacy of the property has become a symbol of industrial development and its unsustainable practices. Indeed, the Outdoor Recreation Council of BC has consistently ranked Britannia Creek, which flows through the property, as one of the most "endangered" rivers in the province. Acid mine drainage, elevated levels of heavy metals in runoff from the property and the decaying infrastructure have all plagued the community of Britannia for years.

Through this stark visual representation of an unsustainable past, Britannia has been reinforcing the negative stereotypes, so common in public discourse, about mining and minerals extraction and use.

1.5.2 Britannia - A Reclamation Strategy

The situation at Britannia is improving. The work of UBC's Centre for Environmental Research in Mining, Minerals and Metals (CERM3) in preventing acid mine drainage from entering Britannia Creek is an example of recent efforts to clean up and remediate the property.

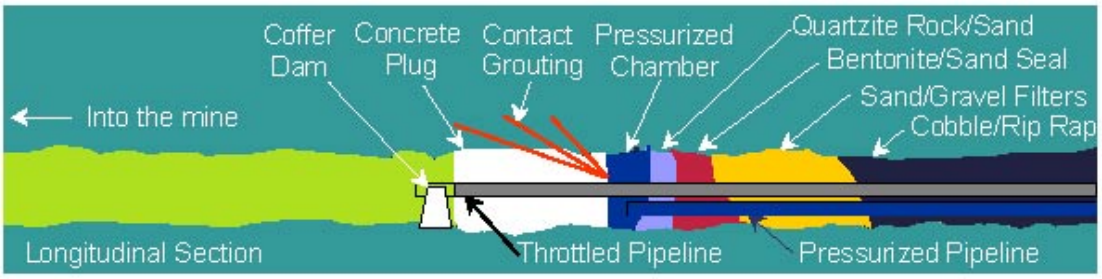


Fig 1.1 - A schematic longitudinal section of the 'Millennium Plug' installed at the Britannia mine site

The Millennium Plug Project is the first step in a remediation plan to eliminate all pollution at the site. The plug prevents Britannia Creek and the surface waters of Howe Sound from being contaminated and at least 20% of the metal content in the mine waters now precipitates within the mine workings and no longer is discharged into the environment.

In addition and as a complement to the work by UBC, the Government of BC, through the Ministry of Sustainable Resource Management, has been developing a comprehensive plan for remediation of Britannia. Studies are ongoing in this regard and the next major step is the construction of a water treatment plant. It will be used to treat all contaminated surface waters from the site prior to their discharge into Howe Sound. Construction is proposed to begin in the spring of 2003 and is to be in full operation by early 2004. Additional work on the cleanup of contaminated soils and flood control are also planned as part of these remediation efforts.

The CANMET Mineral Technology Branch (CANMET-MTB) of NRCan has also assisted in the remediation efforts at Britannia. Scientists from the Mining and Mineral Sciences Laboratories of CANMET, one of three main technology laboratories operated by the MTB, are investigating methods for the treatment of acid mine drainage from the site, defining appropriate methods for remediation and reclamation of contaminated soils and carrying out test programs for revegetation of disturbed mining areas. NRCan has established a small site office at Britannia that is used to conduct these research activities.

The Britannia Beach Historical Society operates the BC Museum of Mining at Britannia Beach. The Society owns approximately 40 acres of land in Britannia, much of which contains the historical remnants of the past mining activity. With modest resources, the Museum manages to attract more than 30,000 people per year to their exhibits with many of these being school-aged children from the surrounding region. The Museum also receives significant revenues from the motion picture industry. Such famous movie productions as Scooby Doo and X-Men and numerous TV productions such as X-Files have been shot at Britannia. It is expected they will continue to look to the site as an excellent location for dramatic sets and stunning scenery.

The community of Britannia supports some 250 people, many of whom have been residents here for 20 or more years. Much of this community has taken advantage of the infrastructure that supported workers at the mine. A private company based in Vancouver owns the land that constitutes the Community of Britannia. Although there have been attempts in the past to try and re-develop and improve the area, they have always failed due to issues around potential liabilities associated with site contamination from historic mining practices. The work by UBC and the BC Government in recent years have begun to address many of the liability and contamination issues and a number of plans are now being proposed to move forward with community redevelopment including a major upgrade in site infrastructure. The project considered in this report will have a significant positive influence in helping to stimulate a more prosperous future for Britannia.

1.6 THE BRITANNIA CENTRE FOR MINING INNOVATION

The theme of the Britannia Centre for Mining Innovation is envisioned as 'the legacy of the past – the promise of the future'. The project is being carried out in cooperation with the BC Museum of Mining. Other contributors in development of the ideas presented in this report include the University of British Columbia (UBC), the Government of British Columbia, the community of Britannia Beach, representatives of the Canadian mining industry, a number of non-governmental organizations and several departments of the Government of Canada, including Parks Canada and Canadian Heritage. Based on the themes established for this project, the following objectives were identified to guide the development of the project concept:

- Prepare a conceptual design of a facility that will feature the significant role Canada plays as a leader, investor and innovator in the international world of resource development, environmental stewardship, reclamation research, technical and social innovations and sustainable development;
- Prepare a conceptual design of a site concept that will communicate the history of mining and its impacts on the economy, society, the environment and communities. The design should allow for telling the story of mining today and into the future as it adapts to meet society's values and expectations concerning a high quality of life;
- Develop a strong and appealing visitor experience incorporating these themes;
- Help to establish Britannia as a site for research and testing for innovative mining technologies and processes;
- Stimulate partnerships and collaborative mechanisms on a local, national and international level and provide a forum for dialogue on issues relating to sustainability, communities, innovation and responsible resources use;
- Foster the development of Britannia as one of the top visitor destinations for the Vancouver – Whistler area.

To meet the objectives outlined above, a number of major elements have been identified as critical components in developing a successful centre for innovation. These elements are as follows:

i. The facilities must be designed in such a way that they foster an interface between research, education and the public.

ii. The site should be envisioned as a window on Canada for the world. A world-class Centre for Innovation will be seen as a flagship for displaying and interpreting Canadian technological innovations, our commitment to sustainability and Canada's approach to the responsible development of natural resources.

iii. Partnerships are the key to success. Public sector institutions, academe, the private sector and community stakeholders will all be important players in making the concepts presented herein a reality.

iv. The visions, values and desires of the residents and stakeholders associated with the community of Britannia must be respected in all aspects of any future development proposals considered for this site.

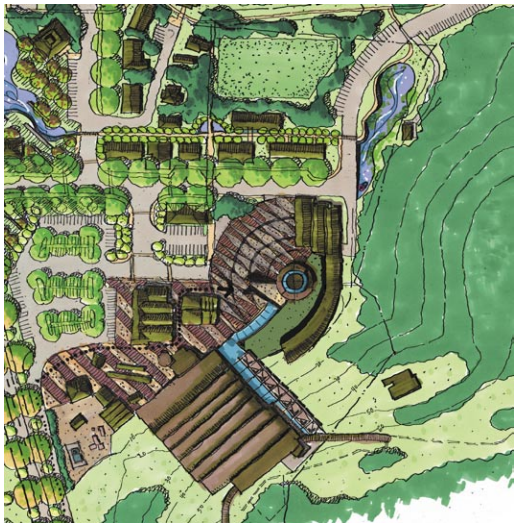
v. Financial sustainability in all of the design concepts is essential.

Britannia is ideally placed to host a world class centre for innovation. The site provides a working example of Canadian researchers and businesses developing globally relevant site reclamation and mineral processing technologies. This research can then be combined with a strategic location that has the ability to support a major public attraction. Together, the Britannia Centre for Mining Innovation can be used to communicate Canada's leadership role in promoting the responsible use of the earth's resources to the world.

1.7 PARTNERSHIPS & COLLABORATION

As discussed above, partnerships and collaboration will be key aspects to achieving success in this project. Partnerships refer to the involvement of a number of groups and institutions, government and industry, community and public, non governmental organizations (NGO's), and international organizations that will contribute to making this vision a reality. Collaboration suggests an active dialogue with all stakeholders with an interest in the future of Britannia.

A dialogue with a number of public stakeholders has been initiated as part of this conceptual design project. However, much more needs to be done. We have only scratched the surface with other Federal Government departments, the community, local and regional governments, the Province of BC and other important stakeholders. Expanding this dialogue will be a key aspect of any future work on this project and its ultimate success.



2 THE CONCEPT

2.1 A NEW FUTURE FOR BRITANNIA

Significant progress is being made in the efforts to rehabilitate the Britannia site. This progress, together with plans for the installation of a water treatment plant in the summer of 2003, the UBC millennium plug project and other community based initiatives is providing the foundation for a new, more sustainable future, for this storied community. The proposed Britannia Centre for Mining Innovation project could be an important part of stimulating a new future for Britannia. Building on the strategic location of the site and the more than 10 million people that travel past the site per year, there exists an unparalleled opportunity for developing a world class research and interpretive facility that is recognized internationally for excellence and innovation and serves as a tangible example of sustainability and its ideology.

2.2 MAJOR ELEMENTS OF THE CONCEPT

The concept envisioned for the Britannia Centre for Mining Innovation combines a world-class research facility with a major public attraction designed to be one of the top 5 destinations in the Greater Vancouver area. The common element and connector between these two is an International Dialogue and Conference Centre that serves as both a symbolic and physical link between scientists and researchers engaged in cutting edge research and the general public. The Britannia Centre for Mining Innovation will consist of a series of new contemporary structures that will support the research, dialogue and conference centre and public attractions. Together these will showcase the future of sustainable mining and minerals development.

Fig 2.1 - A widely used image, sustainable development is seen as a three legged stool, equally supported by social, environmental and economic considerations.

Fig 2.2 - Graphic of the major project components

The history and stories of mining at Britannia will be communicated through a number of restored historical buildings, including the dramatic Concentrator Building, which is a Canadian National Historic site. Complementing all of this is a vibrant commercial area based on a mining theme that provides the necessary amenities and infrastructure services that are required to support the Britannia Centre for Mining Innovation. These elements, taken together, constitute the critical success factors for the project and are defined in detail in the next pages.

2.2.1 A World-Class Research Centre

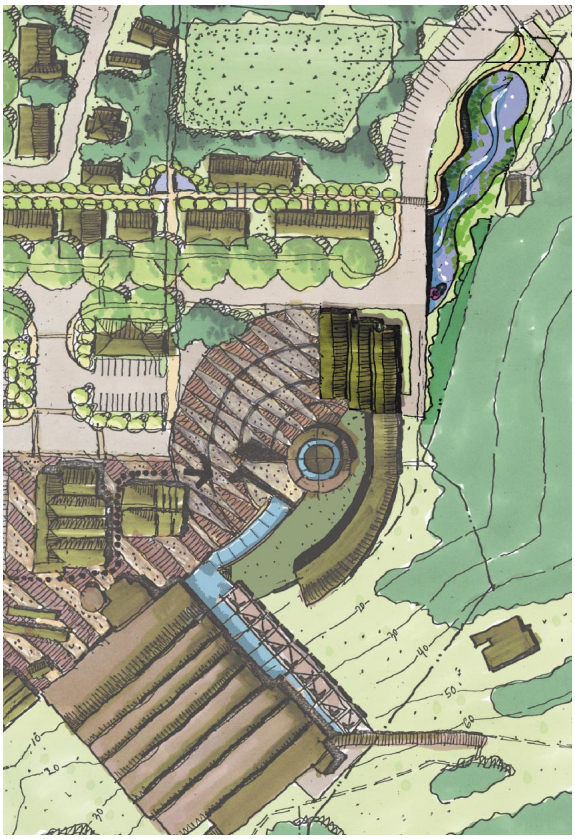
The Britannia Beach of the future can be a living testament to current and evolving research and technologies that are helping to define responsible mining practices in the new millennium. This will be made possible through a partnership between NRCan, specifically the Department's Mineral Technology Branch, and the UBC's CERM3. The NRCan-UBC partnership has been formed around the idea of developing a world-class research centre at Britannia, which constitutes one of the three legs of the overall Britannia Centre for Mining Innovation concept.

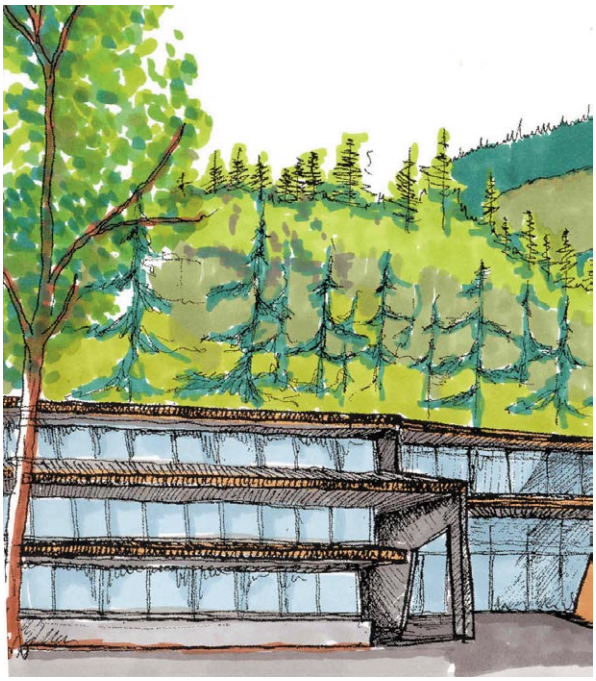
The CANMET Mineral Technology Branch (MTB) is a key research and technology development arm of Natural Resources Canada. CANMET-MTB comprises three laboratories that focus on mining and mineral sciences, metals and materials technology, and explosives. CERM3 is part of the Department of Mining Engineering at UBC and focuses on innovative research into the challenges of mining in the 21st century.

The Britannia Research Centre will have application to the work of all three of the CANMET-MTB laboratories, but most specifically to the Mining and Mineral Sciences Laboratories (MMSL). The CANMET-MMSL focuses on research and development in the following main areas of mining, processing, and related environmental issues:

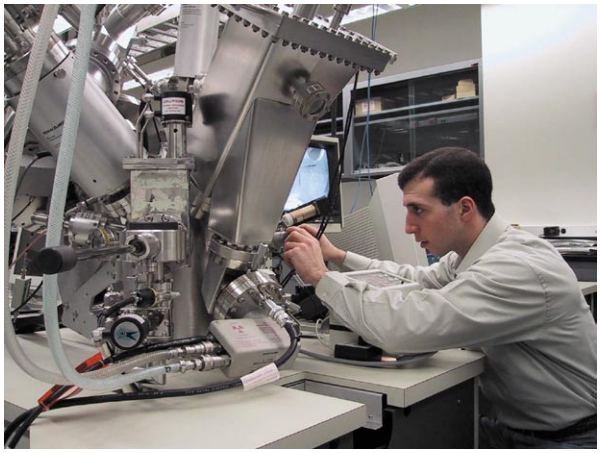
- mine site reclamation;
- ground control;
- mine mechanization/automation;
- underground mine environment;
- metallurgical processing;
- mineralogy;
- mining effluents;
- tailings and waste rock; and
- metals in the environment.

CANMET-MMSL's has an international reputation for technical excellence in conventional mineral processing and are recognized leaders in the development of technological solutions that reduce the environmental impact of mining activities. CANMET-MMSL works in partnership with industry, provincial/territorial governments, universities and other research institutes. Current activities of MMSL focus on three principal strategic directions:





NRCAN/CANMET-UBC ENVIRONMENTAL MINING RESEARCH LABORATORIES



Natural Resources Canada

Ressources naturelles Canada

CANMET Energy Technology Centre - Ottawa

cerm3
Centre for Environmental Research in Minerals, Metals and Materials

- promoting sustainable development by finding technically sound solutions to environmental problems;
- improving industry competitiveness through enhanced productivity; and
- improving health and safety in the underground mining environment.

The unique characteristics of the Britannia site allow for applied research to take place within an actual mining environment. Research carried out at Britannia could lead to the development of solutions to technical challenges faced by the industry and society both within Canada and around the world. Some examples of the more prominent challenges that could be investigated at Britannia include: mitigation of Acid Rock Drainage (ARD), reclamation of contaminated soils and underground safety. These and other technical problems have broad based application to mining companies, governments and communities around the world who have an interest in mining. Given the global reach of Canadian mining companies, the opportunity for the transfer of knowledge gained through research at Britannia is significant.

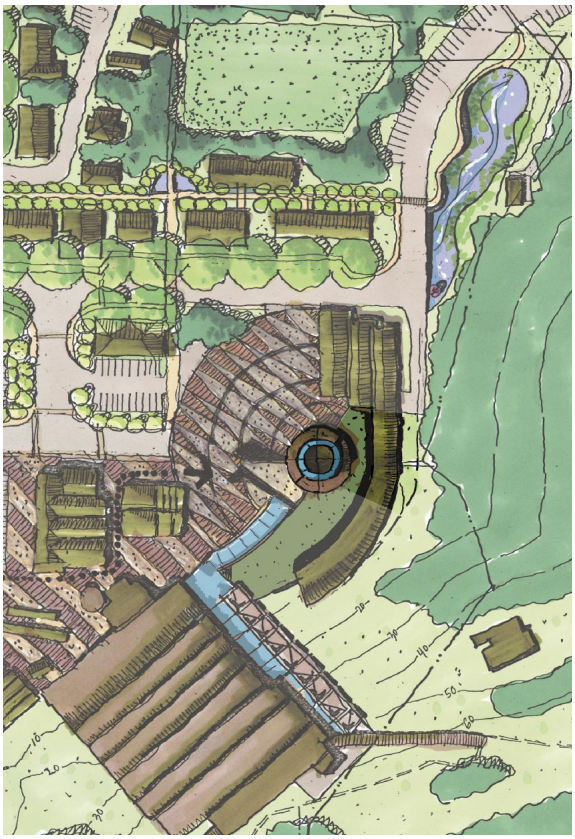
The objectives of the Mineral Technology Branch at Britannia are, in turn, complementary to those of UBC's CERM3. UBC is in the process of applying for funding from several sources including the Canadian Foundation for Innovation (CFI) to support their research objectives at Britannia. UBC received their initial funding for Britannia in the amount of $3.5 million for the Millennium Plug Project. A decision on funding for this research centre project is expected by November 2003.

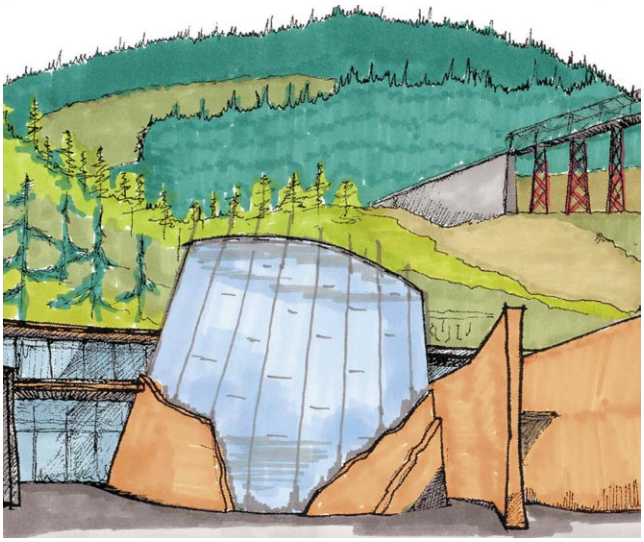
Research proposed by CERM3 at Britannia is to initially focus on the operation of a water treatment plant and the treatment of ARD from the mine. In addition, research will also be done to reduce the operating costs of the research facility with respect to renewable energy use and water recycling practices. A set of constructed wetlands is proposed for the site, which would be used to conduct investigations into passive treatment technologies.

The research objectives of UBC are consistent and complementary with the interests of NRCan. Together, the skill, expertise and global reach of NRCan with CERM3 provide an excellent opportunity for the development of a world-class research facility at Britannia. The outcomes of this research will be applicable worldwide to industry, other post-secondary institutions, governments and the millions of people globally who rely on the mineral and metals industries as a significant part of their well-being.

2.2.2 An International Dialogue and Conference Centre

An International Dialogue and Conference Centre is the second leg of the Britannia Centre for Mining Innovation concept. It will demonstrate the intense national and international interest in discussing and developing new and more sustainable ways of approaching resource development in the future. This centre will act as a 'link', both physical and symbolic, between the NRCan-CANMET/UBC Research Facility and the new Innovations Gallery discussed in the next pages. This centre can provide institutional and support services expressly designed and dedicated to foster understanding and positive action for the resource dependant communities locally, nationally, and





INTERNATIONAL DIALOGUE & CONFERENCE CENTRE

An example of constructed wetlands

internationally. The centre can host any number of industry specific conferences and internationally significant issues that require communication and collaboration. The state of the art facility will provide a venue that will again place Canada at the forefront of the industry and lead it into a positive 21st century.

In addition, this will be the area of the Centre for Innovation that will serve as the administrative centre for the entire facility and house a number of offices for use by people engaged in both the research facility and the public attractions, a conference room and break-out rooms.

"The World Bank estimates about 3.9 billion people live in today's 56 "mining countries". About 3.5 billion of them live in 51 developing and economic transition countries where mining contributes more than 6% to exports and domestic mining sectors are large."

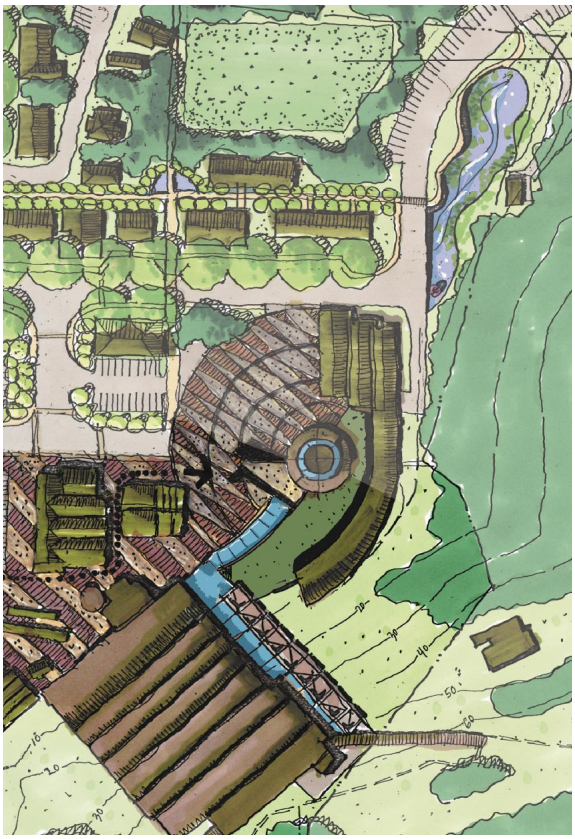
Speech to Global Mining Initiative Conference, Toronto, May 13, 2002 by Dr. Emil Salim, Chair, Extractive Industries Review Project,

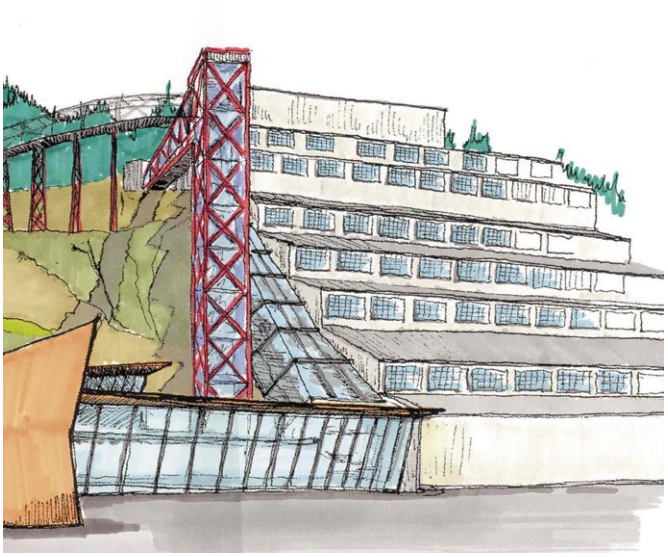
The main intent of a dialogue and conference centre such as this is to provide a venue that fosters ongoing dialogue and collaboration on issues relating to people, the environment and the responsible use of our natural resources. It will also have a number of other uses such as a place to hold conferences and meetings, serve as a resource and meeting place for stakeholders worldwide interested in discussing sustainable development issues and ideas, and as an educational facility open for use by schools, universities and colleges and other public institutions. Canada could use the dialogue centre as a place through which to establish an international awards program for sustainable mining and as a host to a repository of best practice and research publications available to all interested in this field. There remains a tremendous opportunity to link this within a broader international initiative to support sustainable development within the mining industry. The Britannia Centre for Mining Innovation could become the place in which these international efforts are focused and catalogued.

The configuration and the size of the Dialogue and Conference Centre will require careful consideration. As there are a number of other facilities in Vancouver and Whistler that are in the business of conferencing and dialogue, how the Britannia Centre for Mining Innovation is positioned will require careful consideration. It is not the intent of this project to compete with these facilities but rather to provide a unique alternative that is not currently available elsewhere.

2.2.3 A World-Class Museum/Visitor Attraction

The final leg of the Britannia Centre for Mining Innovation concept is a world-class attraction that combines a dramatic and engaging historical interpretive experience with a vision of mining today and into the future. This component of the concept is the "paid" visitor experience. It will house a state-of-the art innovations gallery, that will showcase high technology advances in the industry pioneered by Canadian companies and institutions such as robotic mining and the life-cycle use of





MINING INNOVATION GALLERY & MAIN EXHIBIT HALL

metals in all facets of our lives. It will also be the place in which to interpret and demonstrate to the world how practices have changed over time and how sustainable development is very much a part of the operating principles employed by mining companies within Canada and around the world.

Additionally, the new centre for innovation can also be a lesson in revitalization of existing infrastructure and fostering new modes of adaptive re-use . The new facility can evoke and portray Canada as a leader in sustainable development in all facets of society, through both design and technology. The new facility can reach beyond being a simple enclosure, it can act as a catalyst for new studies in designing and building sustainably. The possibilities for this new facility go much further than the simple act of building. The notion that sustainability is a driving force throughout the world today must reinforce every decision we make. The project's true intent must be the responsible treatment and use of the environment.

The Innovations Gallery/Main Exhibit Hall, illustrated on Page 15, is a centre to display and interpret Canada's commitment to sustainable development in the resource sector. The following is a partial list of some of the interpretive opportunities the Britannia Centre for Mining Innovation can create:

- Issues around the life-cycle of mining, minerals and metals;
- The materials used in construction;
- How metals and minerals are recycled for re-use;
- Mining and metals in the biomedical and pharmaceutical industries.
- The technology behind hydrogen fuel cells and their use in underground mining;
- Climate change and how Canada is implementing the Kyoto Protocol;
- How chemicals are transported in the environment;
- Marine and freshwater ecosystem science;

This new facility could present these and many more interpretive experiences and will offer a venue in which Canada speaks to the world on the leadership role the country is actively taking in finding solutions to today's environmental and social challenges.

Mill No 3 - The Concentrator Building

The Concentrator Building, a phenomenal exhibit and artifact in its own right, will be essential to the success of the whole project. This National Historic Site along with its commemorative integrity will at first be stabilized and then fully integrated into an adaptive role for communicating a message to visitors (See appendix C-3 for the Commemorative Integrity Statement). The scope and size of the building is never fully realized until a person enters it, whereupon the scale can be truly overwhelming. The building sat on the mountainside for decades as a stoic reminder of the past age of mining. Through this project it will be transformed to become a relevant symbol of progress once again. The notion of revitalizing the building is an important component of this concept and will be pivotal to telling the story of mining in Canada. Visitors will have access to several levels of the concentrator, fully interpreting the huge scale of operations that existed here.

2.2.4 Concept Esquisse Sketches

BRITANNIA CENTRE
FOR MINING
INNOVATION

MAY 2003

PRELIMINARY PERSPECTIVE

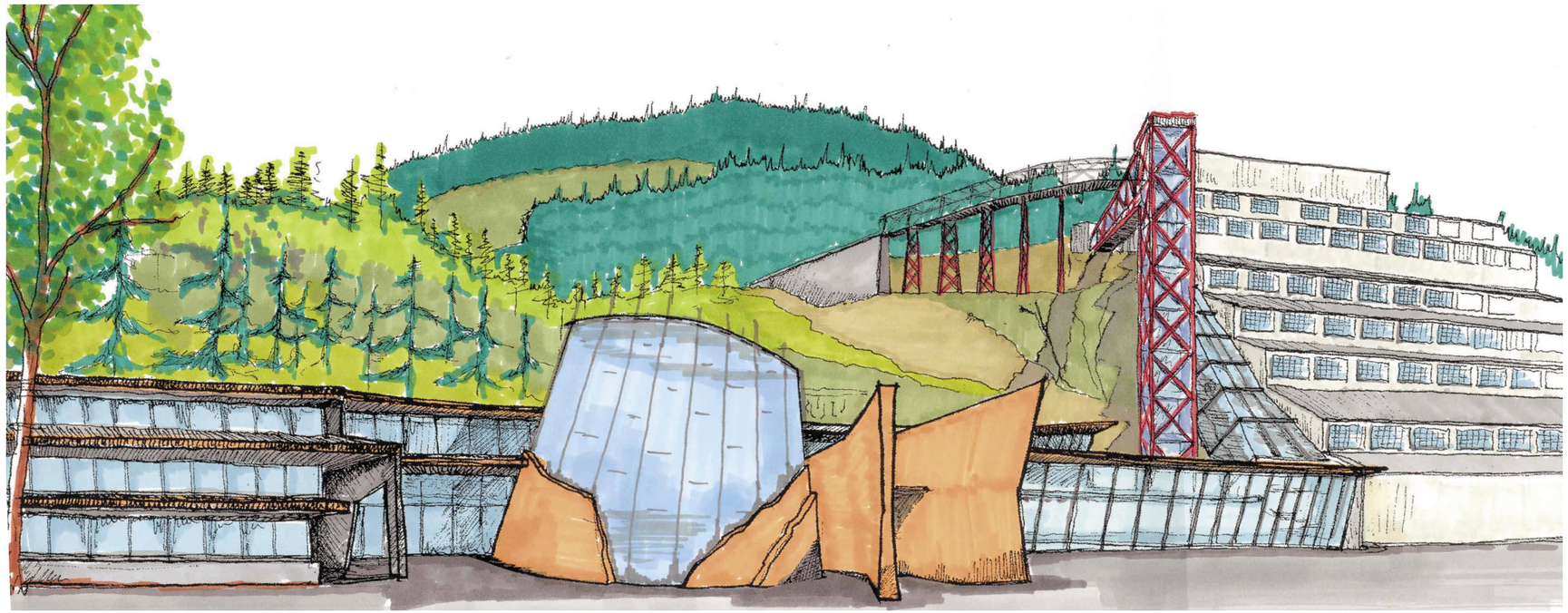


Fig 2.7 - Preliminary Perspective

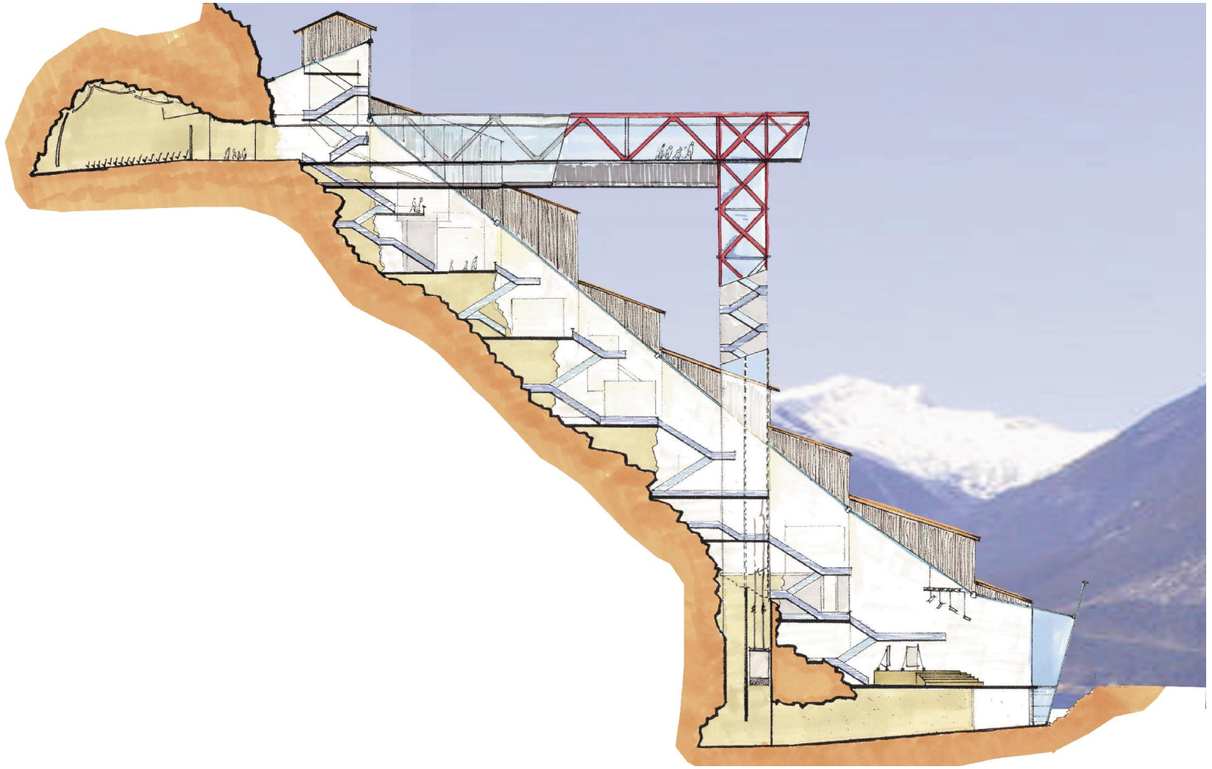


Fig 2.6 - Section through mill and People Mover

BRITANNIA CENTRE
FOR MINING
INNOVATION

MAY 2003

SECTION THROUGH PEOPLE MOVER
AND CONCENTRATOR BUILDING

2.3 INTEGRATING THE CONCEPT COMPONENTS

Originally the mandate of this conceptual design study was to assess and create an experience that was bound by the existing museum lands. It was quickly realized, however, that moving beyond the physical boundaries into the broader site was essential.

Taking into account adjacent lands and the interests of the Britannia community, a private developer, governments and the BC Museum of Mining alike was the best possible course of action to ensure success. Our reason was a simple one: a common vision for the entire area is required to make this project work.

The concept components are still notional yet they are seen as representing physical space on the site during the design development. The main theme of the site and exhibit presentations is innovation and more specifically sustainability. Each of these themes informs the other and the connection is a natural one. By utilizing the Britannia site as an example of how things used to be, the intention is to contrast mining practices of the past with the new techniques and technologies of today, including research into future improvements. To achieve all this it is necessary to provide a template to emphasize the planned relationships for the various design components. By allotting these components within a spatial or diagrammatic relationship on the site, a preliminary visual graphic of the planned interrelationships of all the individual components on site emerges. This now provides a sense of how the various components relate to the visitor experience. As the entire process moves forward into a full feasibility study a comprehensive program and list of requirements and services can be developed.

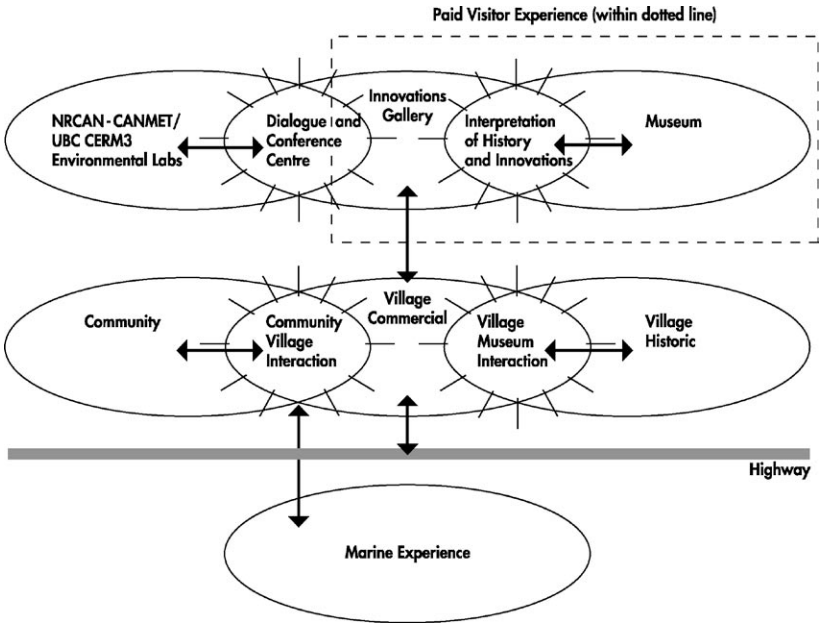


Fig 2.8 - Diagrammatic view of the spatial relationships on site.

2.4 THE VISITOR COMMUNICATIONS STRATEGY

The strategy to best communicate key themes and messages is to both complement and contrast the old with the new. Complement, in the sense that everything on the site will relate in some way to mining and offer a glimpse of the early industrial heritage of BC. Comparing old and new mining practices using the vernacular of existing, dormant, early industrial buildings simultaneously contrasting and 'reflecting' with contemporary architecture and exhibitry.

Part of this contemporary approach to architecture is utilizing materials, methods and systems that produce a project that is inherently sustainable, or as popular definitions go, 'green'. All aspects of design and development reflect the concept of sustainability as an environmental, economic and social movement for the betterment of society. To do this, a built form can imply and demonstrate itself as sustainable through all its systems, which in many ways was brought from the earth through mining minerals and metals.

Relevancy is also an important aspect for any new facilities on site. Designing and constructing with a designated National Historic Building such as Britannia's Concentrator must be done with skilful creativity. The creativity lies in acknowledging and respecting the past and what it stands for without blindly mimicking it. New architecture and buildings must be relevant to today's technologies and social values as well as aesthetic tastes. A contemporary approach to the site is introduced with a drive to reinforce the past both physically and through subtleness in building. A creative solution to a complex problem does not only stand for exhibitry and displays but can be further iterated through design and material choices as well as construction methodologies and practices on how old and new interact with each other.

An effective way of achieving a successfully themed project is through the presence of an 'authentic' atmosphere. The site, being an authentic mining town with actual equipment is one way. The fact that researchers will be conducting internationally acclaimed research in the vicinity is yet another. Britannia Beach is a community built by the mining industry, like many others around Canada. Preserving that authenticity is paramount for this community and this project. It is therefore important that visitors have opportunities to interact with people involved with the business of mining, scientists doing research into improved mining practices, and people from the Britannia community.

2.4.1 Goals

Within this context the following goals are suggested for the visitor experience, as reflected in what they will experience, see and hear during their visit to Britannia.

- Make the stories of mining relevant to the visitor by showing the important role minerals and metals play in people's everyday lives.
- Recognize and serve diverse audiences.

In general, the visitor to the site is seeking an enjoyable experience with opportunities to shop, eat, explore, relax and interact with others. There should also be recognition and celebration of the First Nations of this region: their history, stories and way of life today.[1] The community of Britannia needs to be actively engaged in this project from the beginning to ensure economic viability within the community. The facility will obviously need to provide the community with opportunities to participate in related commercial activities as well as enjoy the programs and amenities supplied. The mining community is interested in sharing innovations, presenting new sustainable technologies and showcasing mining as a high-tech and innovative industry.

The visitor experience will be based not on traditional museum exhibitory and Audiovisual presentations but rather on treating all aspects of the site and facilities as the "exhibit". This includes the buildings, landscaping, street furniture - anything that helps communicate a message consistent with the character of the intended theme. By this definition, everything on the site can be seen as an exhibit. The success of this project depends in large measure on how well all the various site components are integrated to provide one consistent, authentic, engaging and informative 'exhibit' experience. The notion of a truly interactive experience coupled with educational and informative displays and presentations will touch visitors from around the world as mining and mineral development has.

2.4.2 Message Themes

In addition to the themes and objectives of the original project brief detailed in Appendix C-1, an additional step was taken to ensure that all issues were identified. Preliminary consultations were undertaken to assist in identifying the priority messages for this project. This included a workshop in which professionals representing a broad range of interests within and outside of the industry brain stormed, ranked and prioritized the most important themes as they saw it. The main themes, ranked in order of importance, are noted below and are elaborated in Appendix C-3.

1. Sustainability
2. Benefits of Mining
3. Innovative Technology
4. Green Space and Environmental Issues
5. Society and History
6. Project Financing
7. Image of Mining

2.5 THE VISITOR EXPERIENCE CONCEPT

To fully detail the potential for a public attraction a walk-through of the visitor experience can help to visualize what will exist on the site. An understanding of how a visitor moves through exhibits and sees interpretive displays is also helpful in understanding the methodology used to design an attraction such as this. Exhibit design guidelines are elaborated on in Appendix C-2. A preliminary look at the visitor experience envisioned can be narrated as follows:

Arriving at Britannia

Coming north or south on the beautiful Sea-to-Sky highway, a traveller will come upon Britannia Beach differently. Travelling north, a visitor will descend to sea level, encounter a rock face then immediately view the west face of the Concentrator Building and Britannia Beach community. Travelling south a visitor will see the astounding concentrator structure through the cut in the trees growing ever larger as the approach continues. Turning off an expanded and well-marked highway, visitors drive up the main road of Britannia Beach with artifacts roadside and beyond setting the theme for the mining adventure to follow.

Image of the town of Britannia Beach, B.C.

The character of the town is early Britannia, sturdy little structures with minimal frills and a wooden boardwalk as a connector element. The buildings are positioned in an identifiable grid on either side of the main street, as they were originally. Open space between these buildings allow for visual connections through the site north to south. Likewise, the streets and lanes would afford views east to west. In this manner, the town reads as one collection of buildings retaining views to site activities, facilities, and surrounding scenery. A stream, that also acts as a stormwater drainage system meanders through the town to a pond lined with indigenous plants and greenery. Behind the buildings lies open green space for the community and historic buildings are restored to recapture their original character. The buildings on the main street provide the visitors and the community of Britannia with shops, restaurants, services and more. To the south, the imposing and magnificent rehabilitated Concentrator Building with the restored historic mining buildings of Britannia Mines adapted for demonstrations, and presentations by craftspeople making and selling merchandise relevant to the Britannia Beach historical past.

The Public Attraction

From the parking area visitors are drawn eastward towards the entrance of the Innovation Centre by a well-defined path. A jitney train service using a restored air powered locomotive can bring visitors from the parking area to the Innovation Centre entrance.

The Innovation Centre is slowly revealed to the approaching visitors. Elements of stark form and colour, symbolic of the mountainside and materials contained therein rise from the landscape to providing a sculptural entry that surrounds visitors as they begin their journey. The scale of old buildings reflects the early age of mining and exploration. The scale of the new Innovation Centre is respectful of that past, merging closely with the landscape yet still stands, efficiently, modern and relevant on its own. Visitors enter into a grand atrium, open and bright with natural light, it encourages visitors to begin their exploration of the story of mining–past, present and future.

Large industrial equipment on display is contrasted with the high-tech machinery of today. Interactive exhibits and audiovisual presentations will help visitors appreciate the knowledge and imagination needed to develop and operate mines in the modern age. Behind these exhibits stands a rock wall carved from the mountain backing this building. A roof deck affords a panoramic view out over the town, and down Howe Sound to the magnificent snow capped peaks and glaciers beyond.

Taking the tour a visitor is drawn along the front of the Innovation Gallery steadily ramping down where the rock slowly surrounds the group. The group is lead to a larger open cavern where everyone boards an elevator to ascend upwards to a viewing area 200 feet above ground. A connecting gallery walkway affords the visitors magnificent views up Howe Sound and of Britannia Beach. The visitor proceeds to a large, man-made cavern. Within the cavern, an audio visual presentation tells the stories of Britannia, mining across Canada as well as mining around the world. Following the film, visitors can move from this dark cave interior back out to a viewing area, again taking in the natural light. Visitors can linger in a cafeteria to enjoy the vista or have a bite to eat before proceeding back down the mountain. A train ride experience for visitors into one of the old mine tunnels, much like the ones that were used in the early days of mining at Britannia, gives the visitor a memorable underground experience. A grand stair and funicular inclined railcar runs down the length of the Concentrator Building's east face. It acts like a window, revealing the past. The grand stair is a large open space that fully reveals the inner workings and

Train ride through the Britannia Mine tunnels

A view at the base of the Concentrator Building

machinery of the old gravity-fed mill. Visitors can descend and experience the size and immensity of this building at various levels. Reaching the base, where the historic collection is presented to the visitor to learn of the past. Travelling back into the new innovation gallery visitors experience the present and the future of mining and mineral development.

Britannia's Great Outdoors

After leaving the Innovation Centre, visitors still have much to see and do in Britannia. Trails invite visitors to explore the hills behind the town. These hills are rich with the remains of old buildings and mining equipment. Discreet signs highlight and describe these artifacts as well as the native plants found along the way. Trail maps and directional signs allow visitors to choose a length of walk appropriate to their abilities. The more adventurous will be rewarded with some spectacular views of sea, sky, and mountains on their ascent up into the hills above the town.

For those more interested in shopping and eating, the village provides great opportunities for both. As visitors move through the village, they can cross the highway and walk towards the waterfront area busy with boats of all sizes and shapes coming and going.

A seawall walk gives visitors chance to sit and enjoy ocean views. A play area close by with an industrial maritime theme provides something for kids of all ages. Snack bars offer light refreshment or visitors can choose the restaurant on the point for great seafood with one of the best 180 degree ocean views anywhere on the coast.

Beautiful views are everywhere at Britannia Beach.

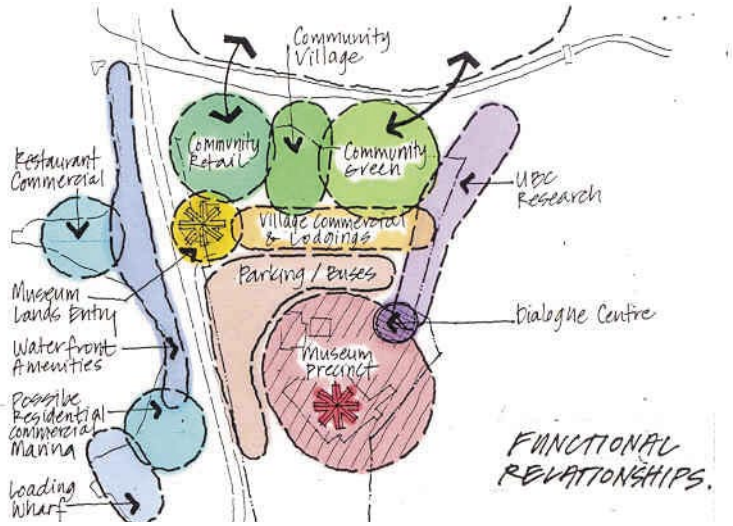
2.6 WHO WILL VISIT THE BRITANNIA CENTRE FOR MINING INNOVATION?

The majority of visitors to the Britannia Centre for Mining Innovation will be residents of the Greater Vancouver area and tourists. As a major attraction in the region, visitation patterns similar to the top attractions in the region can be expected. The business case for this project (discussed in Chapter 4) has been based on the Britannia Centre for Mining Innovation being in step with the top five attractions in Vancouver which draw between 400, 000 and 900, 000 visitors per year. The highest visitation will be in the summer months with specialty program and school groups playing an important role in the shoulder season and winter months. The audience for Britannia does not end with tourists and residents of the region however. It will also include:

- Researchers from around the world,
- International government dignitaries visiting Canada who are interested in Canadian resource development practices and technologies;
- National and international industry representatives interested in Canadian mining technology;
- Representatives of educational institutions that may be interested in the subjects being discussed at the Britannia Centre for Mining Innovation or who are participating in conferences and symposiums with their industry counterparts;
- Convention groups and multi-disciplinary professionals involved in corporate development and networking internationally.

(Footnotes)

[1] It is recognized that the development of material relating to Canada's Aboriginal peoples will require considerable collaboration with individuals and communities of Aboriginal descent, particularly with the people of the Squamish First Nations whose traditional territory encompasses Britannia. It is also understood that a major cultural centre is being considered in Whistler and that the Britannia presentations will obviously need to complement these in some way. The resources available for this brief study have not permitted the time required for a meaningful exploration of these issues. Therefore, although Aboriginal themes are understated within this report they are seen as important to this project and will be carefully considered in the work to follow.



3 SITE DEVELOPMENT

3.1 SITE DEVELOPMENT STRATEGY

A critical analysis of the site and development of a series of working ideas that apply specifically to the Britannia Beach property has been undertaken. This strategy incorporates many of the design components with such site development studies as land-use zones, pedestrian and vehicular traffic and view corridors.

The methodology used to develop a preliminary site development strategy for the Museum Lands layers new functional requirements for the Britannia Centre for Mining Innovation over the existing conditions of the site and its environs. Detailed site development sketches and notes are in Appendix B. Sustainability, the Visitor Experience and the Community's needs are the primary decision-making drivers of decision making for a Masterplan. These three drivers are inseparable and interdependent.

It should be noted that for this preliminary work the assumption has been made that the existing ground plane is our base regardless of any future remediation. It is understood that the plan may have to accommodate changes in the future. The residents of Britannia Beach have a direct interest in the northern portions of the site with their playing field. The site development strategy has embraced a theme of considering the needs of the community on a holistic basis rather than a fragmented way

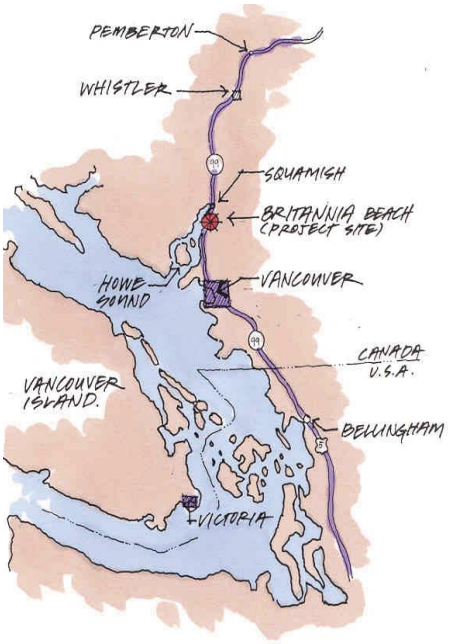


Fig 3.1 - Key map of southwest British Columbia

Fig 3.2 - Aerial photo of the Britannia Beach town site.

Panoramic view of Britannia Beach.

3.2 SITE AND CONCEPT

In order to effectively communicate the ideas being described in this report we have considered the entire site including lands adjacent to the museum. Taking the next step and sketching these ideas, spaces, interchanges on the Britannia site we can see a formal concept for the plan evolving. The concept plan and the constituent parts identified in the previous chapter are a large part of the Conceptual Masterplan shown in its entirety on page 29.

View of the town site from the top of the concentrator

In short, the plan is a conceptual idea. There are many different solutions and the path chosen will be depend on a number of different factors. The first step - identifying a concept, its principles and what to achieve - is presented in this report. The next step is to determine a design route for the project; Identify and detail what will be required to fulfil this concept and the principles outlined in this report; determine the physical shapes and define the parameters; explain the process of physical integration of this new concept within the site and begin to determine the path that will lead to the best possible experience both ecologically and economically for all stakeholders.

The image shown on page 29 is a conceptual masterplan of the Britannia Centre for Mining Innovation and on a larger scale the Town of Britannia Beach. The Britannia Centre for Mining Innovation including the Research Labs, The International Dialogue and Conference Centre as well as The Innovations Gallery and Concentrator Building is the basis of the conceptual plan. The Concentrator building is discussed throughout this document and a structural assessment of the building is provided in Appendix A. The other historic buildings are briefly defined and explained in the appendix but they remain inherent to maintaining the character of the town.

The concept plan identifies all the key components for the site and the Britannia Centre for Mining Innovation. Along with these, other key components, inherent to the philosophy of the design, will sustain and complement the Innovation Centre. They include a commercial centre for community, open green space for visitors, hikers and the community, the potential for re-establishing a waterfront presence including ferry service and a cruise ship berth, restaurants and amenities.

3.2.1 Conceptual Masterplan

BRITANNIA CENTRE FOR MINING INNOVATION

MAY 2003

CONCEPTUAL MASTERPLAN

4 THE BUSINESS CASE

4.1 BACKGROUND

The business case for the Britannia Centre for Mining Innovation will ultimately rely on two main factors, the partnerships program and the world-class museum and visitor attraction.

The partnership program, will bring the necessary energy, synergy and commitment to ongoing research and dialogue related to sustainability and natural resource development issues. It will generate considerable ongoing investment in research, commitment to funding best practices publications, resource libraries (virtual), and conferences, symposiums and awards ceremonies, all of which contribute revenues to the Britannia Innovation Centre.
A major world-class museum and visitor attraction, appealing to a resident market in British Columbia and visitors from the rest of Canada and internationally will also generate revenues. The Britannia Centre for Mining Innovation will serve as a significant destination, offering an outstanding and relevant visitor experience related to sustainable mining in a beautiful setting and with all of the support amenities one would expect from one of the top five attractions in the Vancouver area.

In order to achieve sustainability for the visitor experience component of the concept, Britannia must establish itself as a destination. The market opportunity is significant including:

- the visitor market to Vancouver including both overnight and cruiseship visitors;
- the resident Vancouver Greater Vancouver Regional District (GVRD) market;
- summer and winter markets for Whistler – the vast majority of which pass by Britannia on the Sea-to-Sky Highway both to and from Whistler; and
- specialty markets including convention participants in Vancouver, a specialty meeting market that may hold events and sessions in the Britannia Innovation Centre.

The business case for the Britannia Centre for Mining Innovation will be developed through a comprehensive feasibility analysis (see Chapter 5 – Next Steps). The key consideration is the degree to which the project can achieve sustainability on an operations basis.

The market opportunity described in this chapter indicates that there is good reason to expect that the project can meet this requirement, provided it is designed to have a strong destination orientation and proper market positioning. A basic premise of the project is that the world-class museum and visitor attraction aspect of this concept will support the research and dialogue centres.

An overview of the potential market opportunity is discussed below. It begins with a review of attraction trends and implications for establishing Britannia as one of the top five attractions in the Vancouver area.

4.2 ATTRACTION TRENDS

Attractions face considerable competitive challenges in today's markets. As more attractions are introduced to the marketplace and as more destinations vie for tourists, major attractions play a key role in the competitiveness of any destination. At the same time, most of the significant attractions in cities throughout North America are managed either by the public sector or by non-governmental organizations. They have arisen from a need on the part of the public sector to reflect public values to protect historical artifacts (e.g. museums), showcase historical stories particular to a destination, impart messages related to scientific endeavours (e.g. science centres), protect and interpret nature (e.g., national parks) as well as other similar motivators. As government agencies have gradually curtailed financing support for attractions, attraction managers have found themselves in positions where they need not only to ensure that the integrity of the values and messages for which they are responsible are successfully delivered but also to ensure a self-sustaining attraction, to the extent possible. As such, they find themselves in the tourism, events and meetings business, in addition to operating as an attraction.

Some of the key competitive trends driving the attractions business today include:

- the introduction of interactive and multi-media exhibits and programming;
- maintaining relevance for the story lines and the main messages of an attraction – including constant "refreshing" of exhibits;
- the adoption of professional, private sector oriented marketing and business practices;
- seeking multi-use from the physical facility including such strategies as providing space for meetings, events and even weddings;
- strengthening linkages to communities in which the attractions are located and fostering partnerships in corporate programs that help to support attraction activities and drive additional business for the facility.

These are all trends that must be carefully considered in the development of a major "attraction" at Britannia. In addition to these broad trends, there are a number of attractions strategies that can be adopted as a strategy for success on the part of attractions. There are several examples in Vancouver.

Strategy	Example
Destination approach	Capilano Suspension Bridge/Canyon (800,000 visitors annually) – where the suspension bridge is the main attraction but the facility includes a range of shopping opportunities and food services. It is marketed as a destination attraction.
Entertainment "Edu-tainment" approach	The Science Centre (600,000 visitors annually), with its strong multi-media experiences base and with the IMAX Theatre, all geared to providing a 2+ hour experience for visitors.
Community integration approach	Science North in Ontario, with a very strong community based programming partnership, programming for children including interactive and ongoing programs such as providing "trading" programs for children in the community with storage at Science North. The Vancouver Aquarium has also excelled at this.
Education programs approach	The Vancouver Aquarium (900,000 annually) which has "reinvented itself" with an extensive interpretive program base, led by Vancouver Aquarium biologists and specialists. It is well integrated into the community and provides a foundation for business for the Aquarium.

Table 4.1 - Different approaches to attractions

4.2.1 Implications for Britannia

Britannia has both pluses and minuses in terms of location. It is situated along the Sea-to-Sky Highway, rapidly becoming one of Canada's most famous drives and home to some 2 million vehicles per year travelling from Vancouver to Whistler. At the same time, it is about a one hour driving time from Vancouver – a long distance for a typical 2-hour attraction visit.

The most strategic approach for Britannia Centre for Mining Innovation in terms of generating revenues for operations will be to position the project around the market opportunities it has – a generally up scale Whistler-based tourism market, a destination for a day trip from Vancouver, a meeting centre for the project partners, and an amenity stop for highway travellers who could be enticed to stop to shop or dine.

While the research facilities, dialogue and conference centres and the Britannia Centre for Mining Innovation show-casing resource development and sustainability will all be an important feature in generating visitor demand, in today's attractions markets it will not be enough. Even with the amount of traffic passing by on the Sea-to-Sky Highway, there will need to be a major "show-stopper" experience in order to drive demand. It is for this reason that the people mover bringing visitors from the Innovation Centre to the top of the Concentrator building, the underground experiences and the train ride, together with an audiovisual presentation in the mountain, have been included. This will be complemented by high quality shopping and food services – catering to a sophisticated and national/international audience.

Under these circumstances, the success criteria for the Britannia Innovation Centre will include the following:

- a destination orientation – establishing Britannia as a "must stop" location with all of the services;
- a travel generator experience – rising to the top ten attractions level for the Greater Vancouver Area;
- quality interpretation and experiences – making sure that integrity and values are evident in the messages in are responsive to the market expectations concerning sustainability, quality and respect;
- high-quality shopping and food services – catering to a sophisticated and national/ international audience;
- market positioning to appeal to an international audience;
- ensuring that the mining industry world-wide and agencies that deal with/collaborate with the mining industry are involved.

4.3 THE AVAILABLE MARKET IN VANCOUVER

This market comprises both overnight visitors and residents. The total market was estimated at 10.4 million in 2001, of which visitors comprise about 80% (8.3 million) and residents about 20% (2.0 million).

4.3.1 Vancouver Visitor Market

Overnight visitation to Vancouver in 2001 was 8.3 million, based on growth rate forecasts developed by tourism authorities in Vancouver. Growth in the tourism market is expected to increase to over 10 million visitors annually by the Year 2010.

Market Segment	2004	2010
Overnight visitors (excluding cruise)	8.2 million	9.75 million
Cruise visitors	0.87 million	1.2 million
Total	**9.07 million**	**10.95 million**

Table 4.2 - Source: Tourism Vancouver and Port of Vancouver.

For the overnight visitor market, Canada is the primary market source, providing about 58% of all visitors in 2000. The top provincial markets include BC (30%), Ontario (about 11%) and Alberta (about 8%). The second most important market source for Vancouver overnight visitors is the US (26.7%), followed by Asia Pacific (9%) and Europe (5%).

Based on surveys conducted by Statistics Canada (1999) overnight visitors to the Greater Vancouver Area show high interest in sightseeing (58%), visiting friends and family (57%), and parks and historic sites (36%). It is particularly relevant for new attractions in that friends and family are excellent "attractions marketers", taking their visitors to explore the destination and participate in attractions. The propensity for sightseeing and visiting parks and historic sites provides a strong indication that a significant proportion of the market constitutes a target market for such a facility as the Britannia Centre for Mining Innovation.

4.3.2 Cruise Market

The Vancouver cruise market grew from about 700,000 passengers in 1996 to 1.1 million in 2001 (both embarking and disembarking). Eighteen percent or more growth rates experienced from 1996 to 2000 ended with 9/11 impacts, resulting in a growth rate of only 0.6% in 2001. The cruise industry expects that cruiseship travel will rebound with an average growth rate of 5%-6% annually in the next few years, as shown in the table below.


Canada Place cruise ship berth.

Total (individual) cruise passenger visitation is characterized by 42% who stay overnight, 23% who stay an average of 4.2 hours in Vancouver, and the remainder (35%) who stay less than one-half day (Exhibit 7.1). The former are important potential markets for the Britannia Centre for Mining Innovation. Overnight visitors taking a cruise also showed a high propensity for sightseeing (76%), parks and natural attractions (67%), and other paid attractions (24%), and museums/art galleries (21%).

4.3.3 Resident Market

The Vancouver resident market is forecast to grow at about 1.4% per year with a slightly lower growth rate forecast for the school population. Comprising about 20% of the available market for Britannia in any given year, forecasts for this market show an increase of the resident population excluding school aged children to about 2 million by the Year 2010. The growth in school population is modest, increasing from about 290,000 in 2004 (estimated) to 301,000 in 2010. The resident population from which a Britannia Centre for Mining Innovation can draw markets is significant. In addition, facilities such as these rely on generating winter business through such techniques as school programs developed in conjunction with school boards and districts. This is an important market for any attraction during the off season and also one that encourages visits from others through word of mouth. While it is a journey to get to Britannia from the Lower Mainland, this should be readily packaged as a day excursion for school children perhaps including a stop at other locations in the vicinity such as Squamish, Shannon Falls, and others.


Downtown Vancouver.

4.3.4 Vancouver Attractions

A recent study (1999) found that key Vancouver attractions influence almost 70% of visitors interviewed in their decision to visit the city. This same survey also noted that 56% of the sample had visited at least two of the associated attractions.[1]

The new Tourism BC project, the "GVRD Attractions Data Collection Project", assembled attendance data on the top 11 GVRD attractions[2],and shows that they received more than 3.2 million total visitors in 2001. July and August represent one third of the total attendance received. Total attendance from May to September comprised 60% of all attendance recorded.

Month	Attendance	% of Total
January	172,496	5%
February	189,428	6%
March	249,360	8%
April	224,554	7%
May	246,468	8%
June	318,463	10%
July	511,151	16%
August	539,844	17%
September	288,668	9%
October	159,300	5%
November	108,418	3%
December	207,565	6%
TOTAL	**3,215,715**	**100%**

Table 4.3 - Source: Tourism BC, 2002

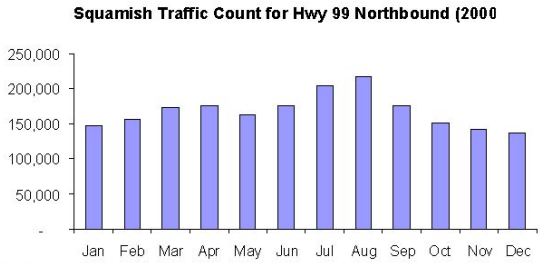
The visitor performance of selected GVRD attractions for 2001 is significant. Grouse Mountain leads the group at over 1.1 million visitors per year with the Vancouver Aquarium attracting 905,000 in 2001 and the Capilano Suspension Bridge attracting 800,000. Science World attracts about 600,000 visitors per year and the CN IMAX theatre located at Canada Place attracts about 400,000 annually.

4.4 TOURISM IN THE WHISTLER-SQUAMISH AREA

The Whistler destination provides an excellent market opportunity for Britannia Centre, attracting as it does almost 2 million visitors per year. Important features of the market opportunity are discussed below.

4.4.1 Sea-to-Sky Highway Use

An estimated 2 million vehicles pass by the Britannia site every year. In 2000, about 6,800 vehicles per day were counted by Ministry of Transport officials on average during the summer (June through August). Winter was not significantly less, with about 5,600 annual average daily vehicles on the Sea-to-Sky Highway during the winter months in 2000. Northbound traffic counted at Squamish in 2000 showed an estimated 2 million vehicles heading north to Squamish and beyond.



Graph 4.1 - Source: Ministry of transport.

4.4.2 Whistler Tourism

In 2001, Whistler attracted about 2.04 million visitors, of which 59% were summer visitors. This represents a decline from 1999 attributable to the 9/11 event. Whistler day visitors ranged from about 6% in the winter months (1999/2000) to about 14% during the summer months (2000). Winter visitors to Whistler showed a relatively even distribution by major market origin as compared to summer visitors.

Visitor Type	Winter (% of visitors)	Summer (% of visitors)
Canada	31%	44%
US	35%	36%
Overseas	34%	20%

Table 4.4 - Seasonal Visitor Table

4.5 SPECIALTY MARKETS

Britannia will be host to specialty markets, beyond those typical of any attraction in the Vancouver area (tourists, residents and school children). These include the movie industry, research projects on-site, and conferences/symposiums.

The Movie Industry. Britannia has attracted the movie industry to shoots in the area and on the property of the BC Mining Museum. This has proven to be a significant source of revenue for the mining museum and is expected to continue. The presence of movie-making activity on the site adds additional appeal to visitor markets. It is expected that this market will continue to provide a source of revenue for Britannia.

An International Research Community. This market, while modest in numbers, will contribute to Britannia activity because of their full-time presence while on research projects at the Natural Resources Canada/UBC research centre. It will include an international and national cadre of researchers who will probably work full-time at Britannia and live in the vicinity of Britannia while undertaking research projects.

The Conference and Symposium Market. This will range from conferences on sustainable development and resource use to symposia on specific issues related to local environmental or development issues for smaller groups to annual meetings of corporations and institutions. The availability of a Conference and Dialogue Centre provides an important infrastructure for the research activities of Britannia, the Innovation Centre, and the potential to host a variety of meetings and conferences. In off-peak times, the facilities can be utilized for local and regional activities on a rental basis.

4.6 RESEARCH, DIALOGUE AND CONFERENCE CENTRES

The business case associated with the Research Centre and the Interantional Dialouge and Conference Centre have not been explored in detail in this report. These aspects of the project will require their own detailed assessment in the next phases of this project.

Notwithstanding the lack of market information on these aspects, several key considerations should be noted. Regarding the Research Centre, the partnership between NRCan and UBC combines for a powerful synergy of interests and resources which will help to ensure the relevancy and marketability of the research both nationally and internationally. With respect to the dialogue and conference centre, there exists tremendous potential to attract parties to the site if it is developed in a manner that caters to an international audience. Infrastructure such as hotel accomodations would be needed for this to be successful and would require significant private sector involvement.

4.7 CONCLUSIONS

The market opportunity for the Britannia Innovation Centre is significant. It can draw on the markets exceeding ten million for Vancouver and Whistler including the resident market for the visitor experience. Moreover, Britannia is located on the Sea to Sky Highway, with over two million vehicles travelling northbound past the site every year.

Market Segment	2001
Visitor Market - Vancouver	8,347,000
Visitor Market - Whistler	2,030,000
Resident Market - Vancouver	2,048,000

Table 4.5 - Market Opportunity

With the concept designed to establish Britannia as a destination attraction including an exciting, high travel generator component, a relevant and high quality visitor experience and shopping and dining amenities, one can reasonably expect that Britannia could become a top five attraction in the region. Add to that the synergy and extensive market awareness that will be achieved with local, national and international partners through the research, innovation and dialogue centres, and one can further expect a continually relevant and refreshed attraction contributing to long term sustainability. A comprehensive business plan will be required to test and refine the concept and a sustainable business model. This preliminary assessment of the market opportunity provides confidence that the financial sustainability objectives for operations can be achieved.

(Footnotes)

[1] Marktrend, 1999. The attractions were the Burnaby Village Museum and Carousel, Capilano Suspension Bridge, CN IMAX Theatre, Dr. Sun Yat Sen Classical Chinese Garden, Grouse Mountain, Harbour Cruises Ltd., Hell's Gate Air Tram, The Lookout, Minter Gardens, Science World, and the Vancouver Aquarium

[2] Capilano Suspension Bridge, CN IMAX Theatre, Dr. Sun Yat Sen Classical Chinese Garden, Grouse Mountain, Harbour Cruises Ltd., Hell's Gate Airtram, The Lookout!, Science World, Vancouver Aquarium and Bloedel Conservatory

5 NEXT STEPS

5.1 MOVING FORWARD

The Britannia Centre for Mining Innovation concept provides a sound framework for proceeding to feasibility analysis and the preparation of a business plan. One of the key challenges will be to organize for implementation once there is consensus from partners on the business plan. Borrowing from previous successful experiences of the Federal Government on development projects involving many partners, it is suggested that a "Britannia Centre Development Corporation" (BCDC) approach be taken to meet implementation requirements.

5.2 FROM CONCEPT TO BUSINESS PLAN

The overall implementation approach is shown in Exhibit 1. The concept provides the basis for proceeding to detailed planning, research and analysis sufficient to establish the feasibility for Britannia Centre for Mining Innovation. This includes several components:

5.2.1 The preparation of a Master Land Use Plan for Britannia Beach

For this purpose, a partnership committee is recommended to oversee development of the Master Plan and ensure that project will complement and enhance existing and planned land use activities in the Britannia Beach area. The Master Land Use Plan should include specific consideration for community protection and enhancement, public access to the waterfront associated with the project activities, pedestrian and traffic circulation, heritage preservation and signage.

5.2.2 Partnership potential

One of the strengths of the Britannia Centre for Mining Innovation concept is the commitment of a variety of partners from international and national organizations to local participants. The feasibility analysis and business plan will need to specify potential roles and financing for the project in order to shape the final form of the Britannia Centre Development Plan. The range of potential partners for the project is shown in the table on page 38.

Area	Illustrative Potential Role	Comment	Potential Partner
Research Centre	▪ Site remediation ▪ Participation in research programs	Site remediation including research and environmental management projects directed by UBC have been ongoing for some time, funded by industry. The ongoing research can be expanded through the intent of UBC to establish a research centre for best practices and sustainable mining at Britannia. Their work has already attracted international attention and can form a strong foundation to illustrate to the public how mining practice can be sustainable and to demonstrate to the world industry how best practices in sustainable mining can be achieved.	▪ UBC ▪ Mining industry ▪ Natural Resources Canada ▪ International agencies such as United Nations and the World Bank ▪ BC Government agencies ▪ International research and educational institutions
The Museum/ Visitor Attraction	▪ Funding support for creating and delivering the visitor experience ▪ In kind support for interpretation ▪ Sponsorships	Collaboration among partners has already commenced with the identification and ranking of key themes/messages for the Britannia Innovation Centre. (See Chapter 4). Continuation of this partnership and attraction of partners to assist in financing through both financial contributions and in kind services will be an important aspect of concept implementation. Sponsorships will play an important role and could range from financial contributions to sponsorship of specific historical, present day and future "rooms" or exhibit spaces and interpretive elements in the facility.	▪ Local and international mining industry ▪ International agencies ▪ Federal Government ▪ BC Government ▪ the corporate sector (including mining and other sectors such as hospitality) ▪ suppliers to the industry including those involved in the original mine and concentrator building ▪ BC film industry ▪ First Nations ▪ Asian-Canadian cultural organizations.
Dialogue and Conference Centre	▪ Sponsorship of research publications and best practices series ▪ Sponsorship and support for industry meetings & symposiums ▪ An annual awards program for sustainable mining practices	The Dialogue Centre will touch on many aspects of sustainable mining practice world-wide. It will be the repository of sustainable best practices, a communication facility for discussing and publishing research results, a mechanism through which annual sustainable mining best practices awards will be identified and presented, a forum for dialogue and discussions on various aspects of sustainable mining including corporate governance practices related to sustainable development.	▪ International mining industry ▪ National mining industry ▪ World Bank, United Nations and other agencies interested in mining issues ▪ Federal Government agencies ▪ BC Government agencies ▪ UBC and other educational institutions ▪ Research institutions ▪ BC hospitality industry

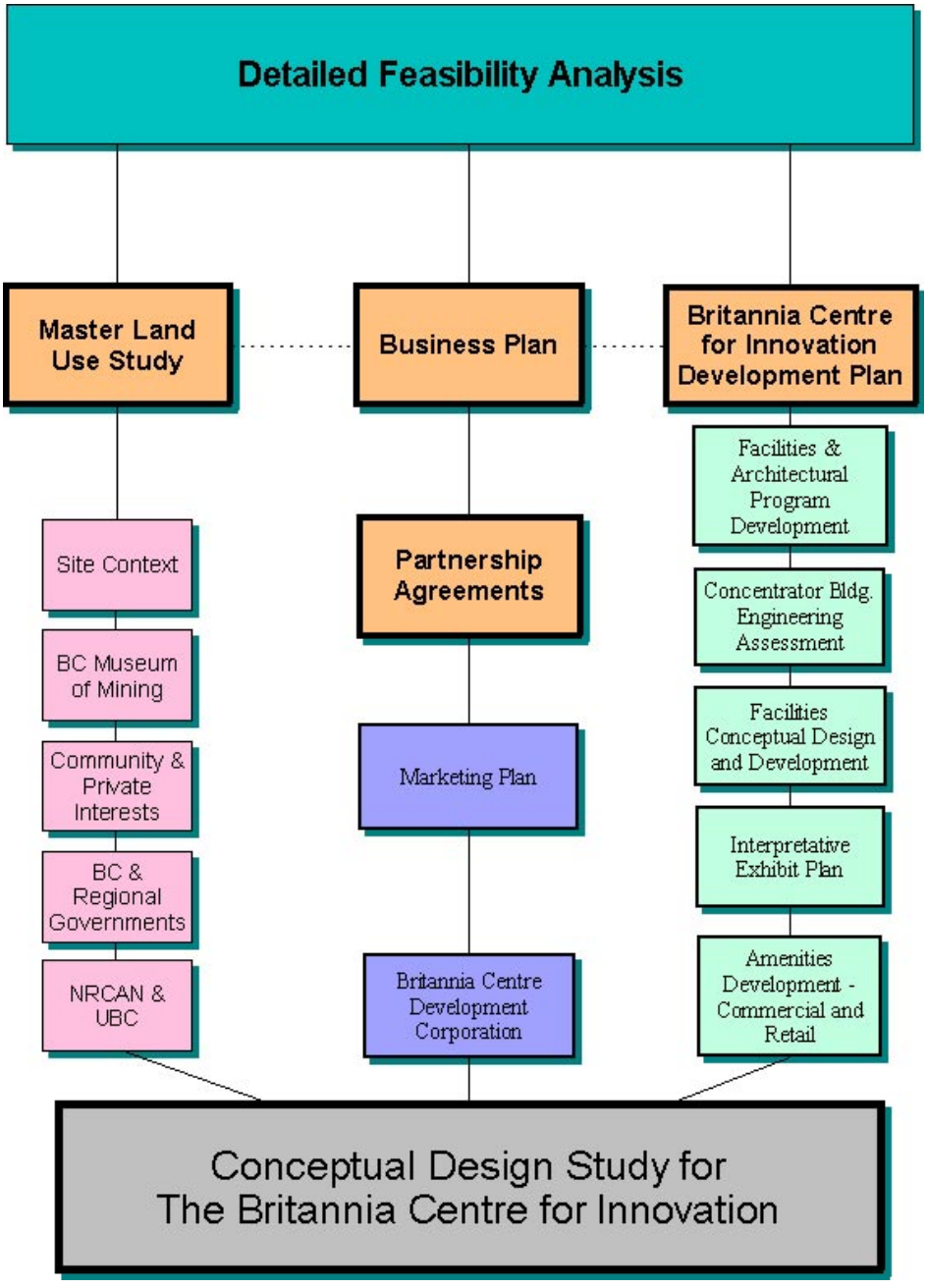
Table 5.1 - Potential partnerships in concept components.

5.2.3 Preparation of the Britannia Centre Development Plan

This includes architectural and engineering analysis related to the proposed concept components, the preparation of a comprehensive interpretation and exhibitry plan, visitor services facilities, restaurants and retail space, and a detailed market analysis to test market potential. The Britannia Centre Development Plan will be developed in parallel with the Master Land Use Plan for Britannia Beach and complement the provisions of the Master Plan.

Following these steps, the results will be synthesized as part of a comprehensive feasibility analysis including financial forecasts. The conclusions of the feasibility analysis provide the basis for the preparation of a comprehensive business plan for the Britannia Centre for Mining Innovation.

5.2.4 Feasibility Study Organizational Chart



5.3 FROM BUSINESS PLAN TO IMPLEMENTATION

The proposed organizational approach for implementation involves the creation of the BCDC which is mandated with responsibility for implementation on behalf of the partners in the Britannia Centre for Mining Innovation. This is a technique that has been used successfully by the Government of Canada to encourage redevelopment of many of Canada's urban waterfronts (e.g., Halifax, Toronto Harbourfront). In this case, a corporation comprising all levels of government (local, provincial and federal) created a business entity including private sector participation with the authority to implement the waterfront development plan. A model such as this could be appropriate for the Britannia Centre for Mining Innovation.

A business plan, will set out proposed roles and responsibilities for each of the partners in the project. This will include agreement on the Master Land Use Plan, the Britannia Centre Development Plan, site landscaping, circulation and public space elements,. It will also include partner roles and responsibilities including proposed financing contributions by partners. Finally, the business plan will set out the structure for the BCDC and its mandate. The corporation structure should include all participating levels of government, The BC Museum of Mining, together with national mining industry representation, the community, UBC, and other partners as appropriate. The corporation would be structured as a legal entity with authority under its charter to carry out the implementation for the Masterplan, operate the Britannia Centre for Mining Innovation, raise funds as appropriate, and develop land consistent with the Britannia Centre Development Plan for those parcels of land transferred to its ownership by the partners.

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APPENDIX A
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STRUCTURAL REVIEW OF EXISTING BUILDING STRUCTURES

BRITANNIA MINES, BRITANNIA BEACH, BRITISH COLUMBIA

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EXECUTIVE SUMMARY

The structures at the Britannia Mines Site are in various levels of deterioration. In general, they are still repairable, although extensive work will be necessary, particularly to Concentrator Building No. 3.

The remainder of the structures, apart from Concentrator Building No. 3, are mostly still occupied and these structures do not exhibit the same level of deterioration noted for the Concentrator Building No. 3 and rehabilitation and upgrading would be more easily achieved, although any major seismic upgrading could be more intrusive.

The major upgrading of the Concentrator Building No. 3 can be carried out in a manner which respects the heritage value of this building and would restore the building to a level whereby occupancy (or partial occupancy) can be achieved and the long term viability of the structure assured.

CONCENTRATOR BUILDING NO. 3

There have been several studies on the Concentrator Building No. 3, however, none of the studies have been sufficiently detailed to define the full extent of the structural deterioration or seismic performance. The level of survey and analysis done to date needs to be more definitive in order to properly assess the feasibility and magnitude of upgrading and hence the likely cost of upgrading the Concentrator Building No. 3. Further investigation and analysis needs to be done to reach this stage. This further investigation needs to incorporate the following steps:

- Physical survey of the building structure to conform member configuration and sizing.
- Prepare record drawings (update PWGSC base drawings) to incorporate structural content of existing record drawings, and information verified by the physical survey.
- Carry out a condition survey for the structural elements (decking, steel, concrete) of the building.
- Carry out detailed gravity load review based on the updated record drawings (incorporate where possible the likely impact of any proposed changes due to anticipated change of occupancy).
- Carry out detailed seismic (and wind) analysis on existing structure using NRC Methodology.
- Prepare a report with conceptual schemes for any remedial work to address structural deficiencies resulting from the condition survey or gravity load assessment.
- Prepare seismic upgrading report with conceptual schemes for seismic upgrading (incorporating where possible the likely impact of any proposed changes due to change in occupancy).

REMAINDER OF BUILDING STRUCTURES

The remainder of the building structures have not been studied to any meaningful extent and should have both condition surveys and structural analysis performed to define any problem areas related to either the condition of the structural elements of the seismic performance.

At this stage it is unsure to what extent these existing structures are to be retained. On this basis it is recommended that a limited assessment be undertaken and that the condition survey and physical survey are based on a simple visual walk through of the structures supplemented where possible with any available drawings.

The seismic assessment would be in the form of a Rapid Seismic Assessment based on the NRC "*Manual for Screening of Buildings for Seismic Assessment*". This will identify and rank each structure, which will assist in prioritizing the buildings for seismic risk.

A structural report briefly describing each building's condition and seismic risk level will be prepared as a planning aid for the next phase of the project.

ASSESSMENT COSTS

The estimated Professional fees for the assessment (structural) for both the Concentrator Building No. 3 and the Remaining Structures have been identified below in tabular form. These fees exclude taxes and are specifically presented to assist in the next planning phase of the project.

Building Description	Physical Survey	Condition Survey	Structural Analysis (A) and Report (B)	Total Estimated Fee (Structural)
Concentrator #3 Building	$15,000	$10,000	$15,000	$40,000
Remainder of Building Structures (26 total)	$3,000	$3,000	$9,000	$15,000

(A) Structural analysis for the Concentrator Building No. 3 is defined as structural review of gravity load systems, implications of the results of the condition survey and a seismic evaluation (based on the NRC Guidelines for Seismic Evaluation of Existing Buildings). The report phase includes the provision, in conceptual form, options for seismic (and gravity load) upgrading as appropriate, together with order of magnitude construction cost estimates.

(B) Structural analysis for the remainder of the buildings is defined as being in two groups and the level of review for each group is defined in Section II of this report.

UPGRADING COSTS

At this stage any upgrading costs estimates would be somewhat premature, as no seismic assessment, even at a basic level, has been completed. The 1990 H.A. Simons report had updated the previous (1982 Cost Estimates) but did not apparently include allowance for seismic upgrading.

The 1990 H.A. Simons report indicated the estimated cost of structural upgrading to be $2,900,000 (excluding electrical work) for the Concentrator Building No. 3 alone (the scope of this 1990 cost estimate update is included in Section 1.0 of this report). It is likely that this figure, when revised to current dollar values and including potential seismic upgrading, would increase to a level between $4,500,000 to $6,000,000. The upgrading costs for the remainder of the buildings cannot be estimated at this time due to the lack of any reliable information on their condition and structural integrity.

INTRODUCTION

Public Works and Government Services Canada (PWGSC) had issued a Request for Proposals (RFP) on behalf of the Department of Natural Resources Canada. The purpose of the RFP was to have a third party consultant undertake a conceptual design study for the development of a world class Mining Interpretative Centre and Heritage Park at the historic Britannia Mine site near Squamish, B.C.

The structural report which follows considers the practical engineering challenges of the site in terms of the existing buildings and other factors as to how the site and the existing structures can be adapted to meet the objectives of the intent to provide a facility of this nature.

SCOPE OF THIS REPORT

The scope of the work used in the main on the existing Concentrator Building No. 3 which was constructed in 1923 and remained operational until 1974.

Additional commentary is also provided on the remaining existing structures. The following tasks, outlined on our RFP response, form the basic core of this report:

- Review available structural drawings.
- Review existing Public Works and Government Services Canada reports.
- Discuss Public Works and Government Services Canada reports with Real Property Services staff.
- Conduct site evaluation visit.
- Provide recommendations on additional studies or fieldwork to complete assessment of the building(s).
- Discuss the building condition, and the feasibility of upgrading/renovation to meet proposed occupancy and current Building Code requirements.
- Provide “order of magnitude” cost information for proposed/required upgrading where applicable.

This report is not intended to include a new Design Study of the Concentrator Building No. 3 or to describe at length the previous studies undertaken on this structure. The main objective (structurally) is to provide a description of the challenges posed by the existing building condition, and to determine at a “pre-feasibility study level” what further studies and field work would need to be undertaken to enable a more definitive design study to be done.

PART A – CONCENTRATOR BUILDING NO. 3

1.0 SYNOPSIS OF PREVIOUS STUDIES

1.1 H.A. Simons International June 1982

The Report focuses only on the Concentrator Building No. 3, including an Analysis of compliance to 1980 national Building Code (NBC), report recommendations include the following:

- *Steel structure: Reinforce the roof purlin connections for snow loading, stiffen the end wall wind bents for suction wind loading, add lateral bracing to the roof levels, replace all missing members, install new sag rods if the cladding is replaced, repair all corroded column bases, and clean and paint the steel if a long term (20 year minimum) was desired.*

- *Concrete structure: No recommendations*

- *Roofing: Replace galvanized sheet roofing on levels 3 and 8 and remove loose gutters (for short term life) or, remove all roofing and replace with new roofing, insulation, flashings and gutters (for long term life).*

- *Cladding and windows: Replace all missing cladding, re-fasten all loose cladding, insulate walls, remove and replace all windows and frames (for long term life).*

- *Railway trestles: Replace timber decking and ties repair bent bracing, remove ore tailings from base.*

1.2 H.A. Simons International September 1990

A letter and copy of the previous 1982 report presenting a revised order of magnitude cost estimate repair recommendations to 1990 prices. The letter noted that a second "inspection" has been carried out, the noted observations included:

- *The steel structure had undergone further "minor" corrosion.*

- *"More" of the cladding was found to be loose.*

No new recommendations were made.

1.3 Public Works Canada Architecture and Engineering November 1990

A report based on a "cursory inspection" of the structure. Major observations included:

- *The steel structure was "affected by superficial rust and minor corrosion", some "elements" were "completely corroded", and interior structure has been affected to*

"different degrees" by corrosion.

- *Some of the concrete structure was found to have lost the concrete cover and reinforcing as a result of corrosion.*
- *The roof was found to be in "generally good condition".*
- *Missing corrugated metal panels of the cladding were noted.*
- *Some of the "structural elements" were in a state of "imminent collapse".*

Recommendations from this inspection included:

- *Conduct a "detailed" structural investigation.*
- *Consider the use of chemical treatments to slow the rate of corrosion.*
- *Perform maintenance, patching, and repair on the roofing to prevent water entry.*
- *Complete a heritage recording of the building.*
- *Post warning signage and limit access to the building.*

1.4 W.T. McGinn & Associates Ltd. July 1993

A letter relating to the "inspection" and "structural overview" of the concentrator building and other buildings at the site. Major observations included:

- *The structural steel trusses and beams appeared to be "in good condition with little evidence of rust or other forms of deterioration or structural failure", the lower levels of "several" columns and braces on the lowest level and at higher levels where columns were founded on the mountain were rusted "to the degree of compromising its structural integrity", and miscellaneous metal elements were found to have rusted to a degree to "threaten safe occupancy".*
- *The roof decking and asphalt shingles were "in good condition".*
- *The cladding and windows were in "overall poor condition" with loose panels, holes, missing panels and missing and broken window panes noted.*

The report noted that "the overall structural integrity of the building frame is good" and that the poor seal of the building envelope was contributing to the deterioration of the building frame. The following was recommended:

- Remedial work to correct rusted "primary members" of the frame.
- Install remedial cladding and glazing.
- Rechannel and collect ground water runoff.
- Manage the ventilation of the building.

1.5 H.A. Simons Ltd. July 1997

A report investigating four options for treatment of the Building to assist the Britannia Beach Historical Society in the decision to restore or demolish the structure. The level of inspection performed is not stated, major observations included:

- The upper levels of the steel structure were noted to be "in stable condition except for minor corrosion and damaged flanges", the lower levels of the "main columns" were "in poor condition" with "severe corrosion and deficient in strength", bracings were noted to be missing, interior floor gratings and handrails were a "safety hazard".
- The concrete structure was found to be "in good condition" though this was qualified by the difficulty to estimate damage without "proper site tests", lower levels of the concrete structure were noted to have "suffered severe chemical attack".
- The timber roof decking "appear[ed] to be relatively in good condition" except for local areas requiring waterproofing.
- The cladding and windows were noted to be in "very poor condition" with panels missing or completely rusted.

The report recommended further testing to determine of the building was "salvageable", and based in the results obtained, either engage a consultant to provide a "detailed analysis" of the structure or engage a demolition consultant.

1.6 J. McGuire June 2001

A letter providing a draft outline of a plan of action for confirming the structural integrity of the building. Previous structural reports were reviewed. No observations were reported. Recommendations included a step by step procedure for confirming the structural integrity of the building and protecting the structure from further deterioration.

To date, most of the structural studies and assessments of the concentrator building have been preliminary in nature, and are based on visual inspections and general analyses. The most detailed assessment and analysis, completed in 1982, is now over 19 years old. An exhaustive condition assessment is needed to obtain accurate, detailed up to date information on the condition of the structure and its envelope.

1.7 HCP Engineers Report November 2001

HCP Engineers Report dated November 2001 represents the most current inspection report, even so this report is a Level D, or cursory, inspection of the concentrator Building. This was followed by a more detailed conditions survey.

HCP Engineers inspected each level of the structure noting and recording the general condition of the structure and its envelope. The exterior of the structure was inspected at level 2, level 8, and along the south face at level 6 and 7.

The significant observations from these inspections include:

1.7.1 Structural Steel Framing

In general, the observations from the previous reports were verified with increased levels of deterioration from exposure to acid rock drainage and continued exposure to the elements.

Severe corrosion of the steel is generally concentrated to Level 8 (lowest level) with upper levels exhibiting general surface corrosion.

A number of steel members had been cut and removed to facilitate de-commission of the Plant in 1974 and some members damaged from non-conforming loading cases.

No instances of localized failure of the steel frame or its elements were noted.

1.7.2 Concrete Structures

In general, the observations from previous studies were verified with increased levels of deterioration from exposure to acid rock drainage and continued exposure to the elements.

Significant amounts of debris remain within areas of the structure preventing access to permit a full review of the condition of the concrete members. The majority of the concrete structure appears sound and in reasonable condition. Observed deterioration of the concrete is localized at openings in the slabs (e.g. pipe sleeves and other holes).

Ponding of acid rock drainage is occurring on many of the levels of the structure, this water runs down through the levels of the structure through openings in the slabs, creating the localized deterioration of the slabs at these openings.

Significant acid rock drainage at the lower levels, towards the Southern side of the building, has resulted in severe deterioration of parts of the concrete structure.

1.7.3 Roofing and Roof Decking

As noted in the case of both the structural steel and concrete elements, the previous observations were verified with increased levels of deterioration due to exposure to acid rock drainage and

exposure to the elements.

1.7.4 Wall Cladding and Windows

Extensive deterioration and damage was noted and the cladding and windows are in poor condition.

1.7.5 Railway Trestles

The lower elements of the steel framing for the trestles could not be fully reviewed as they are covered by ore tailings, visible bracing elements of the framing buried within the ore showed extensive corrosion.

The railway ties of the Northern trestle have been replaced with an uncharacteristic wood deck. The Southern trestle railway ties are extensively deteriorated.

The ore tailings piled below both trestles are resting at a significantly steep slope.

1.7.6 Interior Equipment

The ore bins at level 1 and 2 still contain a significant amount of ore. At level 1, all but one of the bins have been partially dismantled down to the level of the remaining ore, and the ore in some instances, is now piled up to 1 meter above the lip of the bins. The Northernmost bin on level 1 (which was not dismantled) appears to have ruptured as a result if loss of material integrity of its skin due to corrosion, and presents a significant risk of failure.

Significantly large and heavy piping is suspended from the roofs at the lower levels of the structure, and in some instances are also supported from below by wooden framing. The wooden supports are commonly decayed, and the adequacy of the suspension supports under seismic loading is highly doubtful.

The November 2001 HCP report represents the most current report on the condition of the structural elements of the Concentrator Building No. 3.

2.0 COMMEMORATIVE INTEGRITY STATEMENT

The Commemorative Integrity Statement (Draft 25 February 2002) is of significance as it forms the basis for the judgment of any proposed structural (or other) intervention on the Heritage values of the Concentrator Building No. 3.

The Statement of Commemorative Intent states that,

- *The Britannia Mines were an important source of copper ore for almost 70 years and during the 1920s and 1930s and constituted one of the largest mining operations in Canada.*

- *The present gravity-fed concentrator was highly innovative in its engineering design evident in the use of such features as bulk flotation.*

As such, any intervention must clearly respect these statements and be undertaken in such a manner as to retain the full integrity of these statements.

3.0 APPRAISAL OF CURRENT CONDITIONS

From our own examination of the previous reports and our visual inspections of the Concentrator Building No. 3, it appears that while there may have been some continuing deterioration of the structure, from both the acid rock drainage and the exposure of the structure to the elements, **the condition is materially the same as described in the November 2001 HCP Report.**

At the time of the HCP Report, the Commemorative Integrity Statement had not been drafted. This statement is now available and its review has been included as part of this report. It is evident that the structure of Concentrator Building No. 3 is of considerable historic importance and any upgrading or remediation schemes should be done on a manner that does not detract from this condition of historic importance.

4.0 IDENTIFICATION OF THE STRUCTURAL ISSUES

To date, most of the reports and structural studies on the Concentrator Building No. 3 have been preliminary in nature, based on visual inspection and minimal structural analysis. In order to proceed in any meaningful way, more detailed and exhaustive condition assessment needs to be done in conjunction with detail survey/confirmation of member size, configuration and load path identification.

The major issues related to structural performance are:

- The stability, safety and integrity of the base building structure, and the ability of the existing structure to be adapted to the proposed change of occupancy.

- Reduction (and elimination) of the level of deterioration of the structural elements from both acid rock drainage and exposure to the elements.

- Elimination of water/wind penetration into the building causing further structural deterioration.

- The stability of the ore tailings both within the building and at the base of the structural elements where their presence is accelerating structural deterioration.

- The stability and safety of secondary structural elements, for example guard rails, pipe supports, bins, lifting devices and platforms.

5.0 CONDITION SURVEY - RECOMMENDATIONS

As a pre-cursor to any structural analysis or possible structural intervention, an updated condition survey will need to be undertaken. The scope of the condition survey will need to include the following:

- Verification of the structural layout including member sizing for all primary and secondary steel elements. The drawings prepared by PWGSC for the 2001 HCP Report and the original documents stored at the Mining Museum Archives can be used as a basis for the verification and preparation of current framing plans. The framing plans should show all primary members and sizes, and digital photographs of critical connections can be taken to support these framing plans and original shop fabrication drawings.

- An extensive level "A" condition survey to obtain detailed information on the condition of the structure and cladding components. This condition survey will establish the location, severity and number of elements which require further analysis or upgrading.

- The condition survey will also include materials testing on the wood deck, structural steel and concrete elements to determine the material properties which in turn will assist in the detailed structural analysis of the building.

- Material testing will need to be as discrete as possible, bearing in mind the heritage designation of the building and all tests should be undertaken to the relevant ASTM Standards.

- Historical records and published data is available for materials in common use at the time of construction which could be used, but the rationale for use of unsubstantiated material properties needs to be carefully considered if this approach is followed.

6.0 CONDITION SURVEY - COMMENTARY

The condition of the structure has been described on previous reports and our own observations lead us to conclude that apart from some "hot spots", the primary structural components are in reasonable condition and can be repaired where necessary and cleaned to a level where they can be structurally upgraded to suit the revised occupancy. Some members have been modified or damaged, but these do not appear to be extensive in number.

The "hot spots" generally occur where the members have been exposed to either contaminated acid rock drainage or buried in mine tailings and occur predominately at either the lower level or the upper bin level and around the trestle supports.

Obviously the condition of the cladding and windows needs considerable attention and the condition of some of the roof decking had been identified as suspect in previous reports, we have not been able to access the roof to confirm the extent of replacement needed to address this issue.

The concrete structures do exhibit some corrosion but this appears again to be quite localized and

would not appear to offer insurmountable challenges for restoration.

7.0 STRUCTURAL ANALYSIS - RECOMMENDATIONS

The condition of some elements of the structure, coupled with the partial removal or modification of some of other elements of the structure give some concerns for the stability and integrity of the building. The fact that the structure was constructed prior to any seismic provisions in the Building Code is also a cause for concern.

Once a reliable and current set of drawings has been prepared and materials testing complete, the Analysis stage can commence.

A detailed Structural Review for gravity, snow, wind and seismic loading conditions should be undertaken. It is recommended that the following procedure is adopted is reviewing the structure:

- Initial gravity load assessment based on the recommendations at Commentary K of the HBC of Canada (1995) "*Applicable of NBCC Part 4 for the Structural Evaluation and Upgrading of Existing Buildings".*

- Following the initial gravity load assessment carry out more detailed check on individual members which are suspected of being corroded or damaged, identify any missing or undersized members and prepare schedule of members for repair of replacement.

- Ensure a complete load path exists for gravity load transfer to foundation level.

- Seismic Evaluation of the structure using the methodologies of the NRC "*Guidelines for Seismic Evaluation of Buildings*".

- Prepare a conceptual format seismic upgrading or mitigation options which respect and reflect the heritage nature of the Building. The NRC "*Guidelines for seismic*

Upgrading of Building Structures" can be used for this purpose with special emphasis on the heritage aspects of any remediation.

- Prepare "Order of Magnitude" Cost Estimate for both structural upgrading/repair and seismic upgrading, together with impact statements related to seismic mitigation options.

8.0 STRUCTURAL ANALYSIS - COMMENTARY

It is expected that a detailed analysis would reveal certain seismic deficiencies. The following commentary discusses some possible options for seismic upgrading:

The basic structure is a series of rectangular shaped building frames which step up the mountain side and consist of steel columns supporting beams and (generally) mono-pitch trusses which in turn support wood decking. The lateral support system consists of steel cross bracing, some of which has been modified to suit operational considerations, leading, in some cases, to a condition where there is no clearly defined load path.

Given the industrial nature of the building, the replacement and/or enhancement of the bracing would appear to be fairly straight forward and all of the building foundations are sitting directly onto either the bedrock or fairly massive concrete footings founded on the bedrock so the foundation upgrade associated with the seismic upgrading would again appear to be nominal.

Ideally, the seismic forces in the transverse direction would be transferred to the gable ends of the structure where vertical bracing systems can easily be integrated with the end wall cladding and leave the interior areas free from transverse bracing systems, thus maintaining the open space feel of the building.

For seismic forces in the longitudinal direction, upgrading or additional bracing can be added along each of the main roof steps with the lateral forces taken down to the corresponding step in the foundations. This is essentially the same lateral force resisting system currently existing and is in keeping with the original design intent of the structural framing.

The wood deck most probably lacks adequate shear capacity to span between the bracing bays particularly in the transverse direction, so we would expect a plywood overlay to be added to enhance the capacity of the deck for seismic load transfer. Alternately, a system of diagonal steel bracing could be added on the underside of the deck to act as a horizontal truss.

If the basic framing bays were to be seismically upgraded then the building as a whole would be acceptable for occupancy, as the intent of the Building Code could be met in respect of seismic upgrading.

Many of the bays have crane beams and crane gantries left in place. These could be retained and seismically restrained as part of the overall seismic upgrade.

Generally, the gravity load demand on the building will be considerably reduced by the change in occupancy as the live loads would appear to be considerably less than the original equipment loading and the removal of loads from the material being processed further reduces the structural demand. The original structure would have not been designed for seismic loads, but the stress levels remaining in some of the members by the reduction in gravity load stress can possibly be used to offset and resist the seismic loads.

There are several secondary structural elements of the building which present conditions which

could be deemed as a seismic risk. These are typically the secondary galleries, stairs, equipment platforms, pipe supports and the like. It would be necessary to carry out a detailed inventory of these elements and decide which can be demolished and which can be retained as possible exhibits or to support possible exhibits. These could then be upgraded appropriately on an individual basis.

Some of the secondary elements are independent of the primary building frames and if access to some areas is restricted, it might be possible to leave some of these structural elements unchanged, provided they offer no risk to the occupants during an earthquake. An example of this is the bins at Level 2/3 which do not appear to be connected to the main building superstructures.

PART B – REMAINING BUILDING STRUCTURES

The Commemorative Integrity Statement also covers these remaining structures and divides these into the following two basic categories:

9.0 ASSOCIATED INDUSTRIAL/ADMINISTRATIVE BUILDINGS

In addition to the Concentrator Building No. 3, which is the major building on the site, there are several other buildings of significant Heritage value. Very little in the way of condition survey information or structural review appears to have been done and/or documented on these structures. These structures are listed below:

• Machine Shop Complex	• Assay Building
• Welding Shop	• Diamond Core Sample Building
• Lime Mix Tanks	• Britannia Mines Administrative Building
• Roots Blower Shed	• First Aid/Fireman's Lounge building
• Copper Sulphate Plant	• Firehall and Service Garage
• Lead Plant	• Pozzolan Shed
• Pump House	• Conveyor Shed

10.0 LEVEL II (HERITAGE) BUILDINGS

There are several other structures on the site which were identified in the Commemorative Integrity Statement. These are identified as Level II resources within the site boundaries. Although not directly related to the industrial processes, they date from the same operational period (1904 – 1974).

- The Met, Ritz and York Bunkhouses
- Malm House (Mount Sheer House)
- House No. 122 (Building No. 30)
- Honeymoon Cottages (Building No. 31)
- Three Frame Houses (Buildings 44, 45 and 46)

- The “Dry” House (Building No. 29)
- Cookhouse/Treacherage (Building No. 29)
- Elementary School (Building No. 33)

11.0 RECOMMENDATIONS FOR STRUCTURAL REVIEW OF REMAINDER OF BUILDINGS

The remainder of the structures on the site do not appear to have been subjected to any analysis on respect to either their condition or structural integrity. Repair and some structural remediation appears to have taken place on some of the structures over a period of time.

Group 1 – Associated Industrial Administrative Buildings

The scope of the review of these structures (as listed in Section 9.0) would be to carry out a review in a similar manner to the Concentrator Building No. 3. However, as these are smaller structures, the level of survey work and condition surveys would not need to be as extensive, as generally deterioration and disrepair are not significant (except perhaps for the Lime Mix Tanks).

It is recommended that a preliminary seismic assessment of these structures is done to identify any major seismic deficiencies, and that the structural report for these buildings contains commentary on the condition, general structural deficiencies and seismic deficiencies. The report should make recommendations for upgrading where appropriate.

As these structures are much smaller in scale than the Concentrator Building No. 3, seismic mitigation may prove to be more intrusive and consideration must be given to balancing the need for seismic upgrading versus retention of the heritage value of the buildings.

Group 2 – Level II Heritage Buildings

The scope of the review of these structures (listed in Section 10.0) would be to carry out a less detailed review than is recommended for the Group 1 Structures.

At this stage, we understand that the future use of some of these structures is unknown and the purpose of a structural review would be to identify any serious deficiencies, comment on the condition of buildings and perform a seismic review at a basic level which would rank these structures for possible future, more detailed assessment.

In order to achieve this level of reporting, the structural review would be based on a visual inspection, supplemented by a drawing review (if available) and a rapid seismic screening of these buildings using the NRC methodology described in the NRC “Manual for Screening Buildings for Seismic Assessment”.

APPENDIX A

REFERENCE DOCUMENTS

H.A. Simons (International) Ltd., June 1982, ***Report on Study of the Existing Concentrator Mill Building at Britannia Beach, B.C.***

H.A. Simons Ltd., letter dated September 1990, ***The Britannia Museum of Mining Concentrator Mill Building Capital Cost Estimate Update***.

Public Works Canada Architecture and Engineering, November 1990, ***Structural Inspection Britannia Mines***.

W.T. McGinn & Associates (1980) Ltd., letter dated July 1993, ***Re: Structural Inspection of Buildings***.

H.A. Simons Ltd., letter dated July 1997, ***Re: Britannia Beach Historical Society British Columbia Museum of Mining Mill Building***.

J. McGuire, letter dated June 2001, ***BC Museum of Mining Concentrator Mill Building Proposed Procedure for Structural Remediation***.

Structural Review of Concentrator Building No. 3 prepared for Heritage Conservation Program by Public Works and Government Services Canada (November 2001).

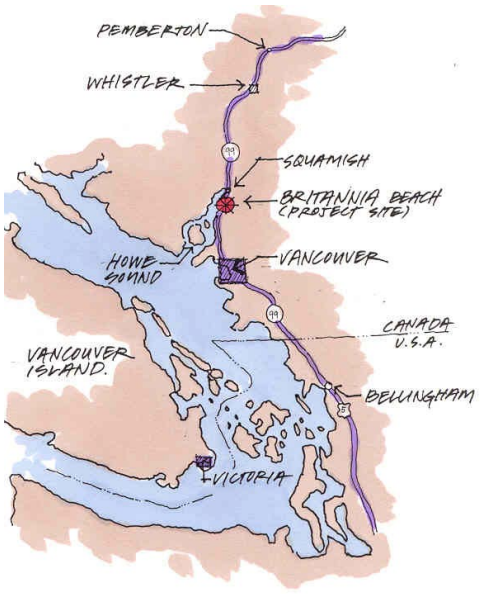
Commemorative Integrity Statement (Draft February 25, 2002).

Archival Information (Drawings) for the B.C. Museum of Mining.

APPENDIX B
SITE DEVELOPMENT STRATEGY

SITE DEVELOPMENT STRATEGY

As with many design studies, a critical analysis of the site and developing a series of working ideas that apply specifically to the Britannia Beach site has been undertaken. This strategy incorporates many of the design components with such site development studies as land-use zones, pedestrian and vehicular traffic and view corridors.



The methodology used to develop a preliminary site development strategy for the Museum Lands layers new functional requirements for the Centre for Innovation over the existing conditions of the site and its environs. The following diagrams and associated text articulate the process to reach a Conceptual Masterplan.

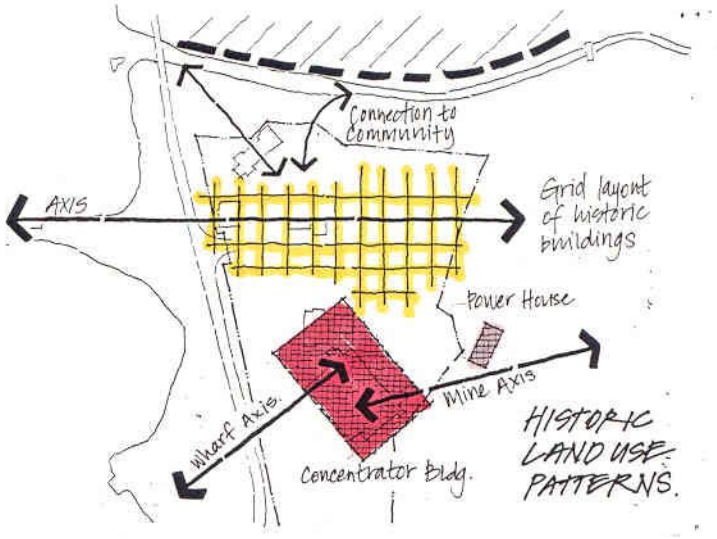
Sustainability, the Visitor Experience and the Community's needs are the primary drivers of the decision making for the Masterplan. These three in our minds, are inseparable and interdependent to make a whole Community.

It should be noted that for this preliminary work the assumption has been made that the existing ground plane is our base regardless of any future remediation. It is understood that the plan may have to accommodate changes in the future. The residents of Britannia Beach have always been users and have taken ownership of the northern portions of the site with their playing field and retail enterprises. Though much of these activities take place outside the Museum Lands they are an important factor in considering the whole rather than fragmented needs for the community.

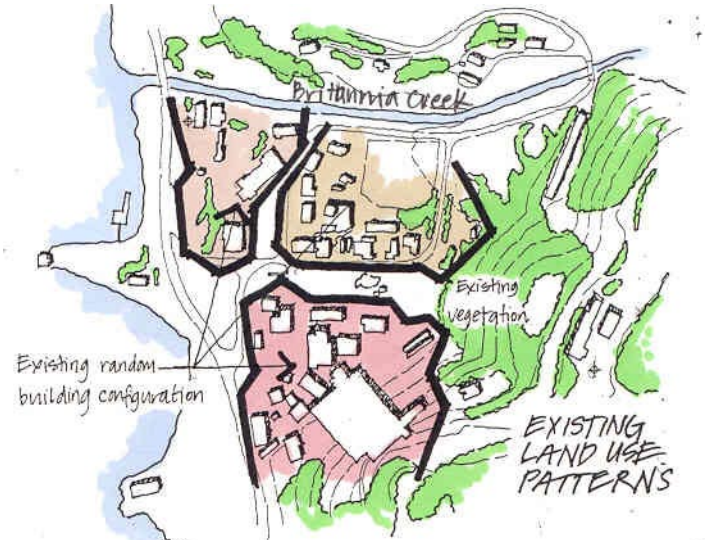
LOCATION

- Britannia Beach is located at the mouth of Britannia Creek 52 kilometres miles north of Vancouver on the way to Squamish and Whistler/Blackcomb on the east side of Howe Sound,
- the Museum Lands is positioned adjacent to the Sea-to-Sky Highway at the base of Coast Range on the alluvial fan of Britannia Creek.
- the Mining Museum Lands are bounded by Pacific Coast Rain Forest on steep slopes to the east; Britannia Creek and the Village of Britannia Beach to the north; and the highway, the BC Rail tracks and the waters of Howe Sound to the west, and to the south;
- visitors have several options for getting to the Museum: via car, taxi or bus - the Sea-to-Sky Highway, via boat - there is an existing marina on the waterfront

HISTORIC LAND USE PATTERNS



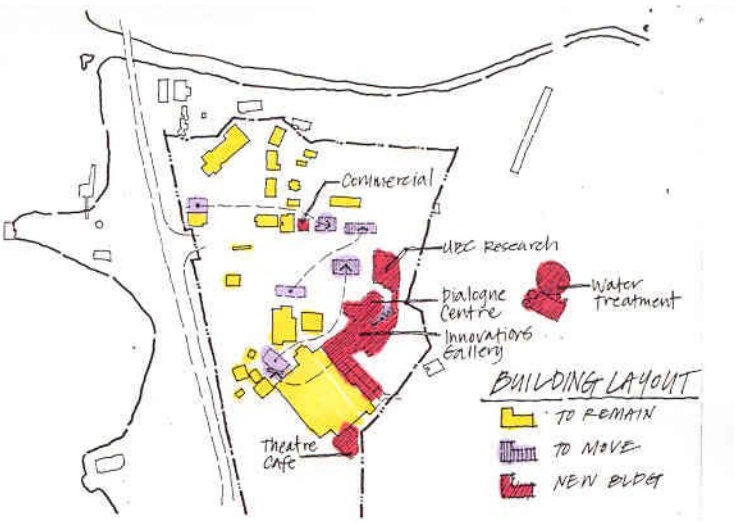
- within the Museum Lands there are at least four surveyed configurations of the layout of buildings that served the needs of the mining community and for the buildings that were an integral part of the mining operation itself,
- the early pattern of distribution of buildings had a strong geometric order that helped to make the functions of separate but adjacent groups of buildings identifiable - rows of houses, grouped community facilities and groups of industrial mine related larger scaled structures.
- This order was most likely the result of a need for functional arrangement that best served the needs of the industrial operations. The most significant ancillary buildings such as the Machine Shop and Welding Shop are positioned relative to the the previous (destroyed) Concentrator mills



EXISTING LAND USE PATTERNS

- as time has passed (particularly between 1945 and 1974) that order has been lost because buildings were removed or moved and new construction added with the result that, by intent or circumstance, the current condition has a random distribution of buildings and the legibility of the function of groupings of buildings or zones of the site have been obscured,
- Existing topgraphy consists of two general types of areas: relatively flat with a cross slope of less than 5% and generally steep with a slope of greater than 10%. The flat areas contain most of the existing amenity buildings while the steep areas contain much of the mine equiptment and underground tunnel network.
- The current configuration of buildings is a result of many different forces acting upon the site over the years. The community at Mount Shear was shut-down and residents moved to the base camp at Britannia. The introduction of the Sea-to-Sky highway made many buildings defunct and the realtionship to the water was no longer as significant.

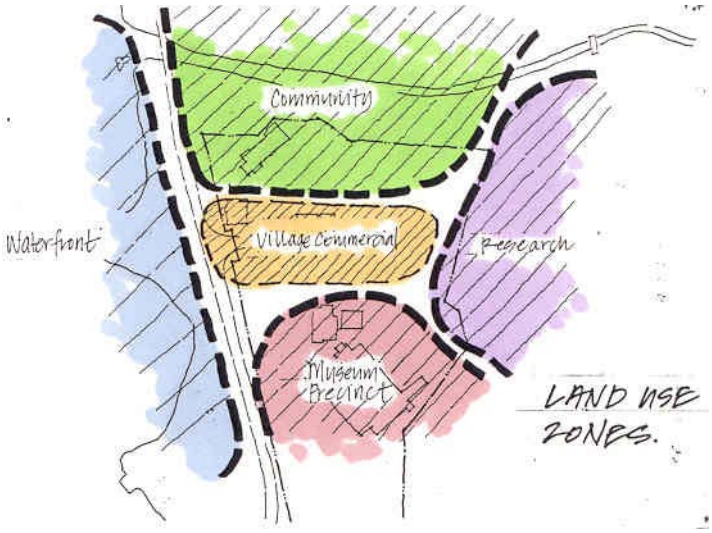
BUILDING COMPLEX



- it is proposed that the National Historic Buidling - The Concentrator Mill, The Machine Shop and The Welding Shop historic buildings still in their original locations be retained and that a further number, including bunkhouses, administration buildings, be relocated to accommodate the proposed concept
- these existing and relocated buildings and the proposed new construction will reinstate a legible order to the clusters of buildings, yet establish a new dialogue with the site and their intended functions.
- the list of buildings to be restored and put to an adaptive reuse within the context of this conceptual study include but are not limted to, The Machine Shop, The Welding Shop, 3 “Honeymoon” Cottages, The Ritz Bunkhouse, the York Bunkhouse, The Assay Bulding, The Dry House, The Core Sheds, The Fireman’s Lounge, The Administration Building. A full architectural and structural analysis would be required to determine the feasibility of fully integrating these buildings within the new project.
- in the interests of historic preservation, conservation and sustainability, it is proposed that the retained buildings be stabilized or restored and put to similar or adaptive reuse for the Britannia Innovation Centre plus retail, lodging and other uses that fit the functional program for the site. The character of the site is deemed to be an important attribute in the successful public attraction.
- new buildings for the proposed Britannia Centre for Mining Innovation include An Museum/ Innovation Gallery, A Dialogue and Conference Centre, A People Mover and an Environmental Research Lab.

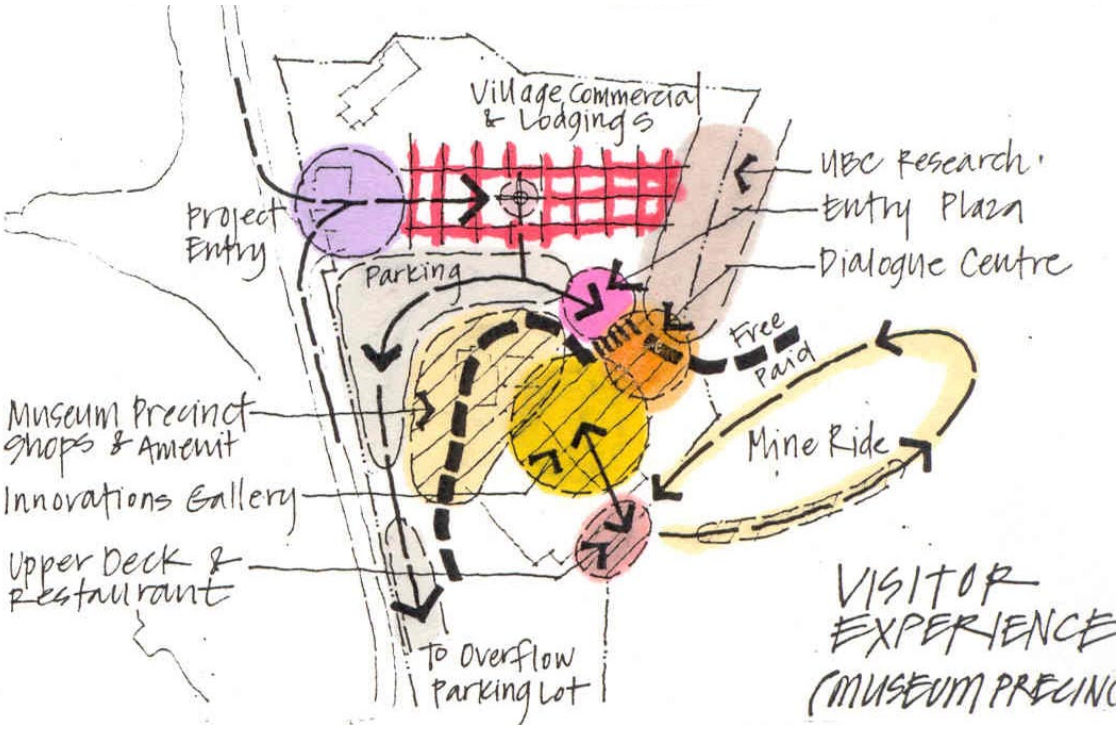
PROPOSED LAND USE ZONES

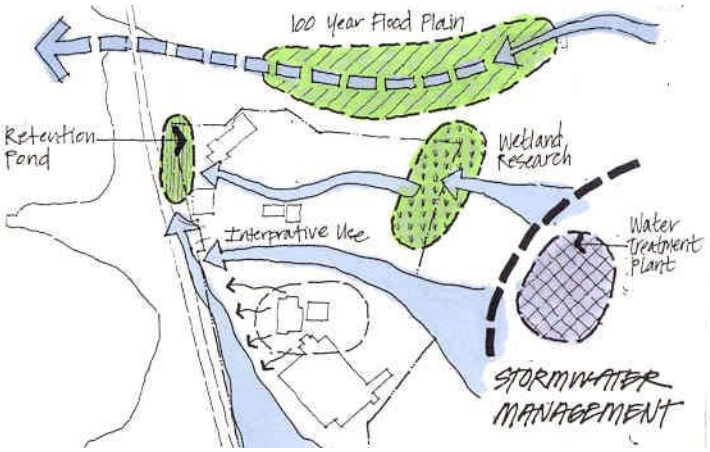
- though the study is focused on the lands held by the Mining Museum, it is prudent to consider possible future use for immediately adjacent land in tandem with the Museum Lands,
- renewed and meaningful identity will be given to groups of buildings



FUNCTIONAL RELATIONSHIPS

- the Waterfront to the west could include uses such as a marina with associated retail and residential units, lodging, waterfront park, community boat moorage, a wharf for commuter boats and possibly cruise ships, and a restaurant,
- the Community and Retail area and the community village to the north might include a church, post office, daycare, grocery store, office space, and recreation facilities etc
- the Village Commercial and Lodging area may contain retail and lodging such as a cafe, clothing, souvenir shops etc. with short term research student or visitor lodging above,
- the Community Green Space could upgrade the existing ball fields and provide green space and trails for visitors and the community
- The Proposed Britannia Centre for Mining Innovation will provide a new focus for the community and surrounding amenities and developments.
- the Innovations Gallery, the major public attraction of the site, will use the Concentrator Building, the nearby historic buildings with contemporary new buildings and strutures as the new Britannia Centre for Mining Innovation.
- the Environmental Research Labs will also include on-site research facilities as well as wetland areas to study water treatment methods
- the Dialogue and Conference Centre will serve as the seamless link between the UBC Research facilities and the Museum/Innovations Gallery, all designed to fully engage the visitor as a total experience.
- Arrival modes in addition to the existing modes of car and bus may expand to the construction of a rail station on the waterfront and / or improving the marina to accommodate large commuter vessels and cruise ships



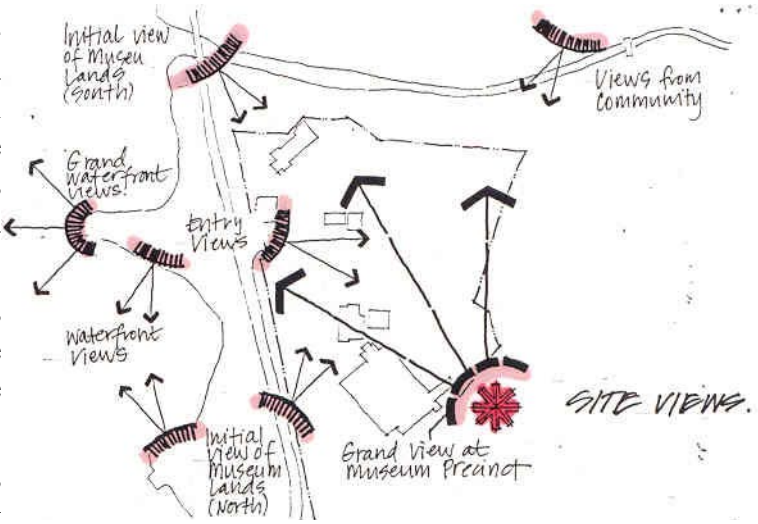


STORM WATER MANAGEMENT AND FLOOD CONTROL

- a widening of the creek channel is the preferred proposal for flood control across the fan area,
- this land form will provide opportunities for recreation space close to the creek and for a pathway along the berm as part of the pedestrian ways discussed below,
- interpretation (part of the Innovations Centre exhibit) that explains the creek environment and the state of the art decontamination of the water and the flood control device as part of the story to be told,
- the proposed reopening of the streams that once existed shall form a new, more sustainable and ecologically sensitive storm water drainage system for the Museum Lands site,
- the storm water system is proposed to take the place of traditional piped sewers by the use of permeable material, no curbs on sealed surfaces, vegetated swales to collected run-off, and detention ponds that ultimately allow the excess water to enter the Sound in an acceptable condition. This will also allow the groundwater supply to recharge,
- Biological Water treatment can be used as a demonstation exhibit and tie into the contaminated mine water treatment. The interpretation then serves a dual purpose.
- maximize the opportunity to treat grey water for reuse in the buildings and the landscape

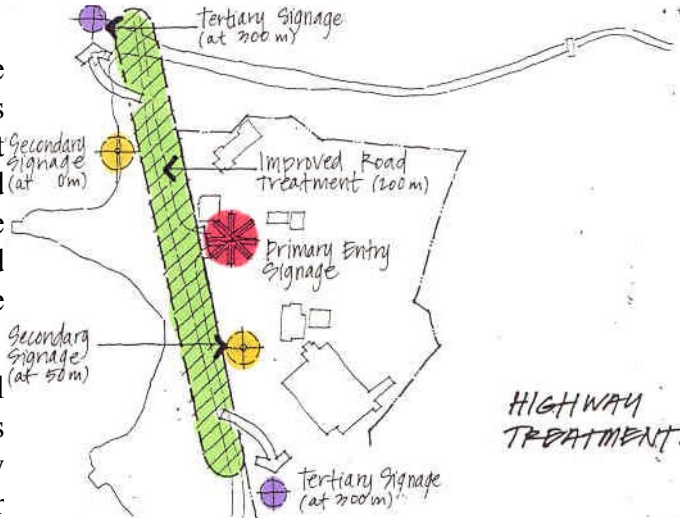
VIEWS

- Views to the spectacular off-site scenery of the sound and surrounding mountains will enhance the experience of the Museum Lands. These views should be highlighted and protected.
- Views of the Museum Lands by approaching visitors shall be highlighted with thematic signage and distinctive entry design.
- Establishing Visual Connections throughout the site and creating new oppotunities to view surroundings and the site within the new concept.

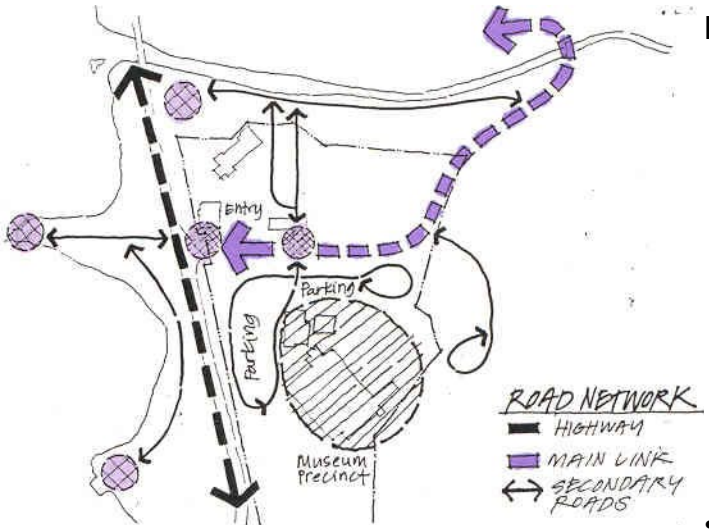


HIGHWAY TREATMENT

- The signage shall be sequential to give the visitor early and compelling reasons to visit the Museum Lands. The first category of signage shall be placed approximately 300 meters prior to the Museum Lands site entry to alert and inform drivers of the Britannia Centre for Mining Innovation.
- Larger and more thematic signage shall be placed at approximately 50 meters prior to the entry and will hopefully entice visitors to spontaneously enter the site.



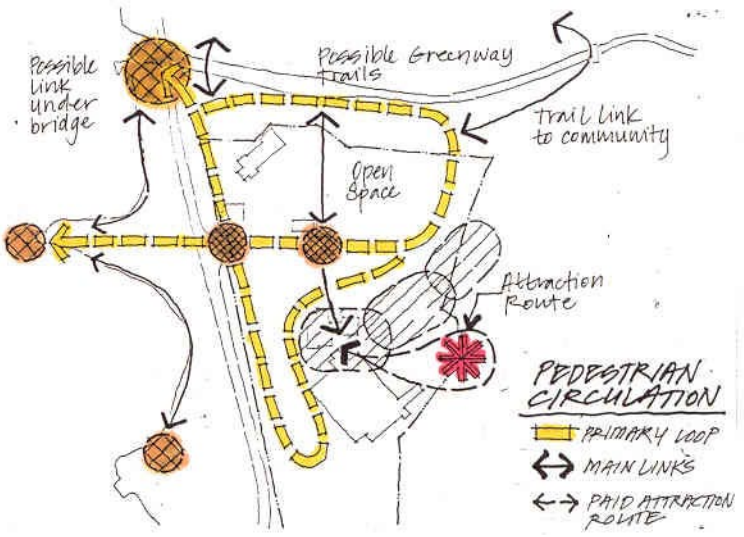
- The primary entrance sign shall be visible to drivers approaching the site from either direction and shall be appropriate for both drivers and pedestrians. This signage shall be highly thematic and the character shall be indicative of the major themes of the site such as mining, minerals, metals, sustainability and education.
- Enhanced highway treatment will be employed approximately 100 meters in each direction from the entry. An attractive and environmentally friendly streetscape shall compliment the amenities of the site, reinforce the themes and symbolism, and alert visitors to the presence of the centre.



ROAD AND PARKING NETWORK

- A hierarchy of paved roads shall link key areas of the Museum Lands and adjacent areas. A main link road shall connect the highway and the community to the north with the museum and commercial amenities. Narrower secondary roads shall link all the areas on and off site (such as the northern commercial areas, the community open space, and the parking lots) into the main link road.
- The use of public transport by visitors and staff will be encouraged by providing clear and safe links between bus and train drop-off areas and the museum amenities. This will also reduce the parking requirements of the site.
- Parking lots shall be of appropriate size to accommodate peak visitation rates. Parking shall be unobtrusive and provide accessible parking for the disabled. Bus and drop-off parking and turn around area shall also be provided.
- The road network shall be designed to minimize car use and maximize pedestrian use.Visitors and local users shall be encouraged to circulate on foot by providing a legible pedestrian circulation network.

PEDESTRIAN WAYS



- there is a hierarchy of pedestrian ways to experience the Museum Lands
- there is ample opportunity to include recreation, exhibits and other means of engagement along these paths,
- the paths (desire lines) will create greenways through the site in stark contrast to the proposed industrial character of the Museum Precinct,
- the pathway will highlight the storm Water system by being adjacent to the water ways in many instances
- Clear pedestrian links to the waterfront shall help overcome the highway as a potential barrier.
- Historic (and present) roads and tracks shall be incorporated into the circulation system to underscore the historic meaning of the site.

APPENDIX C-1
NRCAN PROJECT BRIEF

NRCAN PROJECT BRIEF

Project Title: Britannia Interpretive Centre and Heritage Park Design Study

Project Authority: Natural Resources Canada

Background:

The Mineral and Metal Policy Branch, Minerals and Metals Sector of Natural Resources Canada have initiated a conceptual design study for the development of a "world class" Natural Resources Interpretive Centre and Heritage Park at the historic Britannia Mine site near Squamish, BC. This project is being administered through the Vancouver office of the Mineral and Metal Policy Branch, Natural Resources Canada (contact information is below).

Objectives and Theme:

The theme of the Britannia Interpretive Centre and Heritage Park is envisioned as "the legacy of the past – looking to the future". The intent is to showcase both the history and "way-of-life" of Britannia when it was in full operation as a coastal mining community. This will be done in co-operation with the existing BC Mining Museum exhibits, which currently attract more than 30, 000 people per year from around the world to the site. The historical view of the property will then be contrasted with a vision of the future of the Canadian natural resources industry with a focus on sustainable development, technological and social innovation and building strong communities. The intimate relationship between First Nation's people and the land is intended to be a central theme of the centre.

The broad objectives of this project include the following:

- Build on the efforts of the existing exhibits at Britannia and showcase the rich history of the property and mining in general in BC and Canada.
- Build on the existing exhibits at Britannia and showcase to the world Canadian industry innovation and sustainable practices.
- Work collaboratively with the proposed "Mining and Environmental Research Park" initiative of the University of British Columbia. This collaboration could include integrated design planning for the Britannia property, sharing of facilities and exhibit designs that showcase the technological innovations being developed by UBC.
- Communicate, through interactive exhibits within the context of the themes of the interpretive centre and Heritage Park, the rich culture and history of coastal First Nations people and their intimate relationship with the land.
- Build on the strategic location of Britannia and its proximity to Vancouver.
- Integrate the proposed interpretive centre and heritage park initiative into the overall planning for the broader Britannia property. Other known or proposed projects include the Sea to Sky Highway upgrade, the UBC CERM-3 Research Park and various residential and housing developments being considered for the Britannia community.

Timeline:

- The contract for this project was let on December 14, 2002 after a public tender process that included 7 proposals.
- A draft report is expected from the successful consultant by late February 2003 and the final report by the end of March 2003.

Prime Contractor:

The successful bidder for this project was as follows:

Architect and Project Manager:	Toby Russell Buckwell and Partners
Exhibit Designer:	D. Jensen and Associates Ltd.
Landscape Consultants:	Durante Kreuk Ltd.
Structural Consultants:	CWMM Consulting Engineers Ltd.
Marketing:	DM Russell Consulting Inc.
Transportation:	ND Lea Consultants

Consultation:

Informal consultation regarding this proposed study has been ongoing since July 2002. Meetings with key stakeholders will be held during January and early February 2003. The intent of these meetings will be to discuss a vision for the future of Britannia and to assess how the interpretive centre and heritage park project might complement this vision.

Following the completion of the draft and final reports, there will be extensive consultation on the project. The emphasis for this first stage of a much bigger project is on a "conceptual" design that can be used to stimulate discussion and ideas.

Project Outcomes:

The principal outcome of this project will be the conceptual design of an interpretive centre and heritage park. The design will include a detailed outline of how these facilities would fit within the overall planning for the Britannia site. The report produced from this study will be a "Starting Point" by which to engage more detailed discussions of how the site could be developed in partnership with the various other initiatives under consideration.

The ultimate development of this centre will be dependent on the cooperation of the various stakeholders involved with Britannia and appropriate funding sources being identified and allocated to move the project forward.

Natural Resources Canada's Interests and Objectives with Respect to Britannia:

1. Act as a technical (e.g. Natural Resources Canada's CANMET Laboratories) and policy resource for the stakeholders at Britannia.
2. Act as facilitators in the development of a "world class" facility at Britannia for the citizens of Canada that will become recognized around the world as a significant attraction.
3. Help to encourage and facilitate broad-based involvement of all stakeholders with a sincere interest in the future of Britannia.
4. Encourage and support partnerships between the various interests at the site including the Government of Canada, the BC Government, the BC Mining Museum, local residents and landowners, educational institutions (e.g. UBC, BCIT) and the corporate sector.

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APPENDIX C-2
EXHIBIT GUIDELINES

How visitors typically move

It is helpful to look at how visitors typically move through exhibits. By understanding, for example, when the visitor's attention is likely to decline, the exhibit designer can change techniques or even offer a complete break from the exhibit 'route.'
Obviously, every visitor is different, depending on his or her interest plus the time available for that particular visit. We can, however, make some generalizations. Three typical patterns of behavior emerge, one each for first-time and occasional visitors, frequent visitors, and those in organized groups. Studies reported in The Museum Experience by John H. Falk and Lynn D. Dierking (Washington D.C., Whalesback Books, 1992) confirm the following:

First-time & occasional visitors:

4-phase pattern	
Orientation:	3 to 10 minutes
Intensive 'looking':	15 to 40 minutes
Exhibit 'cruising':	20 to 45 minutes
Leave-taking:	3 to 10 minutes

Orientation:

- Studies show that the first few minutes of a visit can be visually overwhelming.
- Maps and signage often–but need not– increase rather than reduce initial confusion.
- First questions for many visitors: "How much does the ticket cost?" "Where are the restrooms?" "Where do we start?" and "What time does the Museum close?"

Intensive 'looking'

- Visitors may focus 60% to 80% of their time on exhibited objects or labels or a discussion of them.
- They move systematically through the exhibit as designed.

Exhibit 'cruising'

- Unless close attention is paid to keeping the visitor experience varied and interesting (e.g., theatre presentations versus walk-through exhibitry, indoor versus outdoor activities), concentration drops significantly after fifteen to forty minutes.
- Visitors no longer read all labels nor attend closely to all objects or exhibits. Instead, they skim or 'browse.'
- 'Museum fatigue' begins to set in. Visitors increasingly discuss issues such as hunger, the need to use restrooms, and the wish to check out the gift shop.
- It is also during this period that visitors also broaden their horizons to look at all aspects of the museum setting, including architecture, who else is visiting, the cleanliness of the institution etc.
- People become more conscious of time, and people travelling in groups start talking about topics totally unrelated to the museum. Leave-taking
- Visitors dramatically change their focus from things to people, where to go for lunch, what to do next etc.

Frequent visitors:

2-phase pattern
Intensive 'looking'
Leave-taking

Frequent visitors (e.g. locals, winter visitors) tend to spend about the same amount of time during a visit and are concerned about the same conditions–parking, fatigue, washrooms, etc.– but they are more focused in what they wish to see. They do less cruising and go directly to the parts of the museum that interest them.

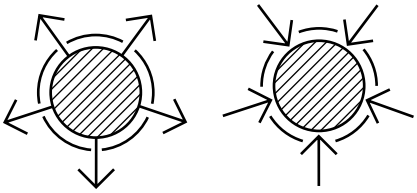
Organized groups:

2-phase pattern
Intensive looking: long period
Exhibit cruising: brief period

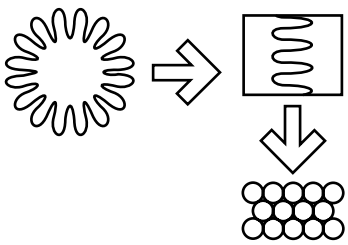
Most groups are led through the museum by guides who may or may not be sensitive to the needs and desires of the group (that is, for rest, food, shopping, cruising)."The initial orientation phase is not normally part of a guided museum tour. This is not necessarily the way it should be," suggests The Museum Experience, "but often guides are not trained to be sensitive to a visitor's needs."

EXHIBIT GUIDELINES

Connections



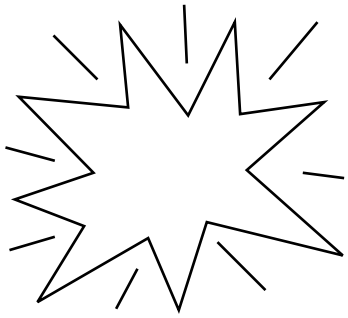
For this Centre to remain relevant to the visitor and industry following opening, an active exchange of people and exhibits is suggested. The NRCan/CANMET-UBC research component will certainly encourage an exchange of people from all over. As much as possible this Centre should be reaching out as well as receiving and presenting ideas, information and exhibits from around the world, on a regular basis.



Mood Changes

Often site and exhibit environments are enhanced if contrasted with a previous environment. Changing exhibit techniques and moods throughout the site not only holds the visitor's attention but encourages him or her to explore, making for a more interesting and memorable experience.

Surprises



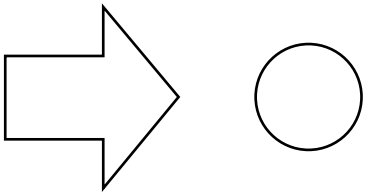
'Surprises' are always welcome and enjoyed by the visitor.

• Providing opportunities for changing displays and commentaries, as well as adding temporary additions to exhibits.

• Providing visitor comment books or bulletin boards so people can 'converse' and comment on a particular exhibit. This becomes part of the process-oriented style of exhibits.

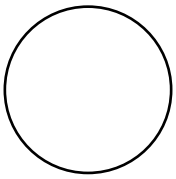
• Using a 'Quick Response Team' to create low-cost mini exhibits or posters about topical events, current issues at the site and world-wide.

Orientation



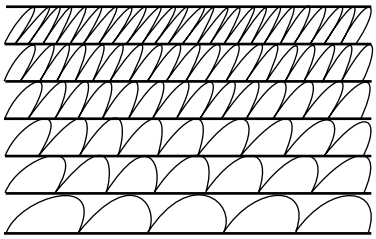
It is important to present mining stories in ways that make the topics clear, understandable and relevant. Orientation is one of the keys to this. Visitors tend to become more involved in a subject if they are given clear orientation and a logical progression of ideas to follow.

Simplicity and Order



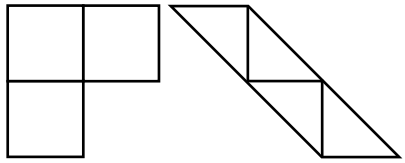
The most successful exhibits use a minimum of words, and keep the presentation of ideas simple, direct and easy to understand. Presentations, demonstrations, diagrams, interactive displays, models and quotes are useful tools in communicating concepts directly. Special effects (including spectacular views) play a large part in generating the drama and intrigue needed for a successful presentation. However, these effects are usually not enough on their own. They must be used in combination with clear content messages.

Layering



Visitors have different interests, different levels of knowledge, and different preferred ways of learning. How do you make the same 'story' or exhibit interesting to all visitors? Layering is a critical exhibit approach which allows you to 'involve' different visitors in different ways. An obvious example is the newspaper approach to written information, offering the casual 'reader' a large headline which will also draw more interested 'readers' into a more detailed subheading and finally the story itself. Photographs, video, film, and audio tape all add another dimension, both in technique and messages. There are other ways of 'layering' information that also allow the visitor to easily progress through a series of experiences (and information) from the simple and entertaining, to the more complex and contemplative, from the familiar to the new and extraordinary.

Flexibility and Adaptability

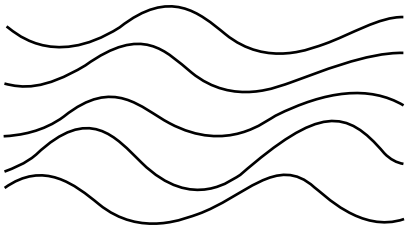


Ideally, the architecture and exhibits should be designed not just to permit change, but to invite it. The use of flexible structures and changeable graphics would allow changes that would generate continuing interest for both the return visitor and the people of the community.

The flexible approach can:

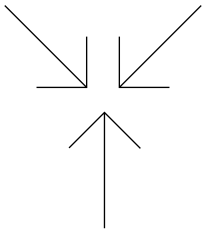
- Create maximum opportunities for sharing of activities, ideas and values with other centres.
- Provide communication and management systems that can express contemporary issues effectively and can quickly adapt to changing circumstances to ensure this expression remains relevant over time.
- Provide spaces that can adapt to a variety of different needs e.g., workshop areas, classroom facilities, exhibit galleries.

Consistency



The design of buildings and outdoor structures needs to reflect and/or compliment the aesthetics, material, construction methods and scale of an industrial site. The design of facilities, exhibits and landscaping also needs to compliment one another so the character of the experience remains consistent and aesthetically pleasing.

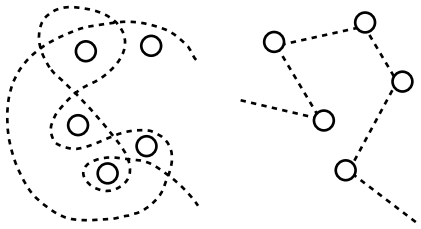
Emphasis



Several parts of the 'mining story' need to be stressed in the exhibits to ensure key messages are communicated to the visitors.

- Emphasis on people. The visitor should feel he or she is enjoying a 'first person' encounter with a 'real' individual who wishes to share information. This should be the case whether viewing a film, or exploring exhibitry, workshops or outdoor experiences.
- Emphasis on mining as it relates to land, people and sustainability.
- Emphasis on the present as it arises out of the past. Use the past as a reference to put the present in context, focusing on the challenges and achievements of today.

Free Flow Vs. Control



Visitors to exhibits are usually given either set paths to follow, or allowed to wander freely. Studies show that people like to be directed at the beginning, but then allowed to 'cruise.' This works well. The 'directed' or 'guided' portion of the experience is an excellent chance to get across a major message or theme idea. The 'cruising' period allows visitors to stop and spend more time where something or someone intrigues them, or in the case of families, to stop and discuss a particular exhibit.

APPENDIX C-3
INDUSTRY WORKSHOP RESULTS

THE MESSAGE THEMES

Consultations with industry were undertaken to assist in identifying the priority messages for the project. This included a workshop in which industry representatives brainstormed, ranked and priorized the most important themes as they saw it. The table on appendix C, page 36 contain the results of this workshop

Source: The industry workshop was held on February 18, 2003. A list of participants is provided in an appendix to this report.

For each theme there were a number of sub-themes identified by the workshop. These were ranked within each theme as shown below. This provides an excellent framework for developing the visitor experience and guiding the partnership development to not only create the project but to sustain it.

Sustainability (35 votes overall)	votes
Profile Canadian Best Practices, both in Canada and internationally.	**6**
Model elements of sustainability in exhibits.	**6**
Showcase small-scale mining around world. More people employed at the small-scale level.	**5**
Tie in green energy; hydro power, geothermal energy	**5**
Showcase advances made in Canada on land-use planning and environmental standards. How today developing a mine is rigorously controlled.	4
Showcase environmental technology in mining	4
Showcase sustainable communities	4
Have good examples of Canadian contributions to sustainability.Canada is one of the least forgiving nations environmentally.	1
Benefits of Mining (14 votes overall)	
Mining by itself is not sustainable. Need to link metals and mined minerals to products and what they contribute to society.	**6**
Mining as an economic generator	4
Message of how mining contributes to society has been OVERDONE. Has become an empty message. Deliver it playfully. With hands-on interactivity…	3
Word mining is a detriment. "You can extract it or you can grow it." Without extraction we can't live.	1
Innovative technology (11 votes overall)	
Mining industry as technical innovators, as very high tech industry	**7**
Show new reclamation methods and other innovations	4
Future: totally people-less mining, remotely controlled mining	0
Green space (10 votes overall)	
Important to integrate green space into project.Have green space experience.	**5**
Trails around wetlands with interpretive signs; have an outdoor experience	**5**
Open up access up-country for hiking, etc.	0
Society & History (8 votes overall)	
History of the people at Britannia Mine: how they came there, the contributions they made to building of BC.	**6**
First Nations' story	1
Ongoing living history of mining communities. Current stories of mining communities and communities affected by mining.	1
Link in mines around the world in real time	0
Use children to capture video histories of mining communities	0
Innovative lifestyles in mining.	0
***Project financing (6 votes overall)**	
Obtain a named benefactor for the project from the mining industry	**6**
Image of Mining (5 votes overall)	
Building is an embarrassment and a liability. Project is opportunity to turn this around and make it a plus for the industry.	3
The graying of the industry. How to attract the bright young minds…	2
Opportunity to change image of Britannia	0
Diversity that Canada brings to mining: skilled people, engineers, geologists, etc.	0
Public Education	0
Should only be embarrassed that Britannia, as a National Historic Site, is in such bad condition.	0
Unique opportunity to explain what mining is	0
Miscellaneous	
At Britannia, a strong link to the ocean: everything came by sea	2
Consider accommodation facilities on site, i.e., for conferences, meetings.	1
Cruise ship facilities?	0
Building has appeal just as a relic	0
It's multidimensional, many facetted	0
Big mining truck and washrooms are initial car stoppers	0
Currently, most people are going somewhere else	0
Need good food	0

*Project financing is not considered an interpretive theme but is included here given the importance ascribed to it by workshop participants

APPENDIX D
COMMEMORATIVE INTEGRITY STATEMENT

COMMEMORATIVE INTEGRITY STATEMENT (DRAFT 25 Feb. 02)
Britannia Mines and Concentrator National Historic Site

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1.0 INTRODUCTION

1.1 Overview

1.2 National Historic Site Objectives

The objectives of the Government of Canada for the national historic sites program are:

- To foster knowledge and appreciation of Canada's past through a national program of historical commemoration.
- To ensure the commemorative integrity of national historic sites by protecting and presenting them for the benefit, education and enjoyment of this and future generations, in a manner that respects the significant and irreplaceable legacy represented by these places and their associated resources.
- To encourage and support owners of national historic sites in their efforts to ensure commemorative integrity.

1.3 Commemorative Integrity

1.3.1 Definition of Commemorative Integrity

The term commemorative integrity is used to describe the health or wholeness of a national historic site. A national historic site possesses commemorative integrity when:

- *the resources that symbolize or represent its importance are not impaired or under threat;*
- *the reasons for the site's national historic significance are effectively communicated to the public;*
- *the site's heritage values are respected by all whose decisions or actions affect the site.*

1.3.2 Definition and Purpose of the Commemorative Integrity Statement

The purpose of this Commemorative Integrity Statement for Britannia Mines and Concentrator National Historic Site is to elaborate its nationally significant values in order to:

- focus managers and/or owners on what is most important about a building and to ensure that matters relating to national significance - whether resources or messages - are always the highest management priority;
- ensure the focus on the "whole", and not just the individual resources;
- provide the fundamental document for the preparation of Conservation and Presentation Reports, which plan concrete actions to assist with ensuring commemorative integrity.
- enunciate a set of heritage values and objective which can be used in analysing and evaluating the impact of development proposed for a site or nearby property;
- the basis for design guidelines for development which may take place nearby and have an impact on the national historic site;
- Give direction on heritage messages for marketing plans and programs.

- Establish priorities for conservation and presentation, which will guide any investment, made in a site.

The achievement of commemorative integrity is a goal and it is one which is necessarily site specific. For this reason the three elements of commemorative integrity will be dealt with as they relate to the Britannia Mines and Concentrator National Historic Site and commemorative integrity objectives will be identified for each element.

2.0 DESIGNATION AND CONTEXT

2.1 Designation

"Commemorative intent" is the term used to refer to the intent of the commemoration, or the reasons for the national historic significance of the site. The commemorative intent for Britannia Mines and Concentrator can be established by referring to the ministerially-approved recommendation relating to its commemoration as a national historic site which are based on the recommendation of the Historic Sites and Monuments Board of Canada (HSMBC)

2.2 Commemorative Intent

2.2.1 Definition of Commemorative Intent

Commemorative intent refers specifically to the reasons for a site's national significance, as determined by the Ministerially-approved recommendations of the Historic Sites and Monuments Board of Canada. A site's Commemorative Integrity Statement contains a *Statement of Commemorative Intent (SOCI)* which provides the answer to the question - when and for what reason was this site designated by the Minister responsible for the Historic Sites and Monuments Act as being of national historic significance?

2.2.2 Statement of Commemorative Intent

Drawing from the Minute of the Historic Sites and Monuments Board of Canada in November 1987 and from the approved HSMBC plaque text, the following Statement of Commemorative Intent has been developed:

- The Britannia Mines were an important source of copper ore for almost 70 years and during the 1920s and 1930s and constituted one of the largest mining operations in Canada.
- The present gravity-fed concentrator was highly innovative in its engineering design evident in the use of such features as bulk flotation.

2.3 Designated Place

2.3.1 Definition of Designated Place

Designated place refers to the place designated by the Minister of Canadian Heritage on the recommendation of the Historic Sites and Monuments Board of Canada. Information on what constitutes the designated place for a particular historic site is drawn from the minutes of the Board deliberations.

2.3.2 Description of Designated Place

The definition of designated place for the Britannia Mines Concentrator Complex is as follows:

The designated place for the Britannia Mines Concentrator Complex is defined by the 16-hectare site owned by the Britannia Historical Society and operated as the British Columbia Museum of Mining.

2.4 Historic and Geographic Context

2.4.1 Historic Context

For almost 70 years the Britannia mines and concentrator were a major producer of copper ore in Canada. Although interest in the mineral potential of the area around Mount Sheer on the eastern shore of Howe Sound dated back to the late 19th century, commercial mining operations at the site began in 1903. The company operations centred around two townsites. The community of Mount Sheer, which was located in the mountains 2,000 feet above Howe Sound was the centre of the mining operations. Britannia Beach, which is located on the water, was the centre of refining operations. Here, the first gravity concentrator was built in 1904 and the first shipment of copper concentrate was made in 1905.

Over the next twenty years, opening up new mines, increasing the efficiency of the concentration process and building larger concentrators increased production levels at Britannia. A second timber frame concentrator was built in 1914-15. When this was destroyed by fire in 1921, the third and present concentrator was constructed to replace it. Begun in 1922 and completed within 18 months, this steel and concrete structure incorporated new milling and processing systems designed to process 2,500 tons of ore per day. Operation efficiency was improved by replacing the original aerial tramway, which carried ore from the mines to the concentrator, with an underground tunnel. The operation reached its peak in 1929 when it employed over 1,000 people. In that year the concentrator processed 1,920,339 tons of ore and produced 41,469,339 pounds of copper from concentrate. Between 1925 and 1930 Britannia remained the largest producer of copper concentrate in the British Empire.

During the early years of the Great Depression production fell to 50 per cent of the 1929 peak. By the late 1930s the demand for copper rose and it remained high throughout the Second World War and the Korean War. During this period the plant was in full production. Falling prices and rising costs in late 1950s resulted in reduced operations. By the end of the 1950s, all operations were consolidated at Britannia Beach and the townsite of Mount Sheer was abandoned. The Britannia mines and concentrator remained open through the 1960s and early 1970s but was only producing 13 million pounds of copper in concentrate per year and employing under 400 men. Operations drew to a close at the site in 1974.

2.2.2 Geographic Context

The Britannia Mines and Concentrator National Historic Site of Canada is located on a flat shelf of land jutting out from the steep rock face of the Britannia Range on the eastern shore of Howe Sound, about 52 km. north of Vancouver and 12 km. south of Squamish (Figure 1). The 16-hectare site, which is owned by the Britannia Beach Historical Society and operated as British Columbia Museum of Mining, consists of 35 buildings clustered around the massive concentrator plant which rises up the side of the mountain.

This site represents only a small part of the land and infrastructure holdings of the Britannia Mining and Smelting Company. Originally, mining operations covered hundreds of hectares that extended from shipping docks and concentrator complex on Howe Sound to the mining operations concentrated at the base of Mount Sheer. Separate townsites were developed at both locations, one for the mining workforce (Mount Sheer) and the other for management and the workers employed at the concentrator and associated service facilities (Britannia). Accessible only by boat until the late 1950s, the Britannia operations displayed the distinctive self-contained character of isolated resource communities that dotted the coast of British Columbia. The company was responsible for providing for housing for its workers and their families, schools, community facilities and all buildings and industrial infrastructure required for the mining and ore processing operations.

In the 1950s the nature of the site became to change. By 1961 the Mount Sheer townsite was closed and the buildings demolished. This resulted in the construction of new bunkhouses at the Britannia townsite to accommodate the miners who had previously lived at Mount Sheer. Completion of railway (1956) and highway (1958) links to Vancouver ended the period of isolation and permitted workers to commute to the site by car. The railway and highway also cut the site into two parts consisting of the dock area on one side and the concentrator complex and townsite on the other.

Evidence of the 70 years of mining can be found throughout the entire extent of the Britannia holdings. Although all structures connected with the mining operations near Mount Sheer have been demolished, many archaeological resources survive including building foundations, remains of the railway system, mine and tunnel entrances and an extensive network of underground tunnels. A number of other structures along the waterfront and parts of the old townsite are still standing but are located outside the boundaries of the site. The buildings contained within the National Historic site represent the greatest concentration of extant resources and illustrate the full range of building types associated with a large mining operation and the self-sufficient community that was established to support these activities.

3.0 RESOURCES DIRECTLY RELATED TO THE REASONS FOR NATIONAL SIGNIFICANCE

3.1 Designated Place

3.1.1 Extent of Designated Place

The designated place for the Britannia Mines and Concentrator complex is defined by the 16 hectare site owned by the Britannia Beach Historical Society (1971) and operated as the British Columbia Museum of Mining (Figure 2).

3.1.2 Historic Values

The designated place contains an integrated complex of buildings and structures that served a range of functions associated with the processing of ore, mine administration and community life at Britannia. The concentrator is the key structural resource on the site, defining the spatial organization of a substantial grouping of administrative buildings, service facilities and storage sheds that flank the perimeter of that building. The enormous scale and vertical layering up the steep rock face of the concentrator clearly articulates the inherent functional characteristics of a gravity-fed concentrator system. Collectively, the group of buildings, former transportation corridors, tunnels, and structural remnants of earlier concentrators communicate the range of functions associated with mining, processing, transportation and community life that took place at the site during successive phases of its operational history.

The site and its in-situ resources bear additional associations to the former mine site and mining community at Mount Sheer, and to marine transportation facilities on the Howe Sound foreshore, thereby illustrating the interrelationships between mineral extraction, processing and transportation. These associations are inferred by key sight lines from the designated place up the mountain slope to Mount Sheer and across the rail and highway corridors to docking facilities on the waterfront. (Key sight lines extend from the school yard up to Mount Sheer and from the Ritz bunkhouse to the former customs house and Union Steamship pier.)

The sense of historic place of the Britannia Mine and Concentrator site derives from its setting at the base of a steep rock face which permitted the development of a gravity-fed concentrator system at this location. The survival of numerous structures associated with various aspects of this major industrial site over successive decades of operation also contributes to the value and sense of place.

3.2 Buildings and Structures

The buildings and structures on the designated site document the evolution and complex organization of a large-scale ore mining and concentrating facility. Collectively, the buildings illustrate the infrastructure required for the transportation and processing of ore, and also document the high degree of self-sufficiency required to sustain such operations at a geographically isolated industrial site.

3.2.1 Concentrator (Building No. 12) (Figures 3-6)

Description and Values

Concentrator # 3 is the last remaining example of the gravity-fed concentrator mills that characterised hard rock mining operations in the western cordillera region of Canada. The building's design clearly expresses the inherent functional characteristics of gravity-fed systems, in which the steep slope of the mountain was exploited to move the ore through the successive stages of the concentration process. Gravity-fed systems realized an economic advantage over conventional systems through reductions in fuel and labour costs. At Britannia, a crew of four handled routine operations in Concentrator No. 3.

Structural Elements

The building's physical values reside in its siting, monumental scale and functional design, all of which combine to illustrate the components and stages of the concentration process. The building rises approximately 230 feet up the steep rock face in eight successive levels. The concrete substructure of each level carries the steel outer wall framework of the level above. Thus each level functions as a lean-to, attached to the one above it and anchored to the exposed rock face. The upper-most level is freestanding and braced by anchor cables embedded in the rock face. The spare industrial nature of the building is reflected in its steel and concrete substructure, corrugated metal sheathing and large multi-paned windows that provided natural light on each level. Constructed in less than 18 months, Concentrator No. 3 was a remarkable engineering feat and has remained the dominant symbol and landmark of the site since its completion in 1923.

Industrial Processes

Although much of the equipment was removed in 1974, key components and remnants of industrial machinery enable the viewer to follow the sequence of the concentration process. The visual associations begin with the elevated rail trestle that pierces the top level. Here, raw ore was dumped from ore cars, then descends through coarse bins, crushing apparatus, fine ore bins, grinding mills, flotation tanks, thickeners and final filtration apparatus before leaving the mill by means of a conveyor system on the bottom level.

On the eastern side of the building, the horizontal layering of the eight levels is interrupted by an open vertical corridor containing the rails of an inclined tram system and a parallel staircase extending from the base to the top level. Known as a skipway, this system was used to convey equipment to and from the various levels.

The following is a description of the stages in the concentration process, along with character defining elements on successive levels of the building (ascribed numbers 1 to 8 in descending order; see Figure 6).

Levels 1 and 2

Level 1 contains the substructure of the elevated track system and dumping apparatus associated with the transfer of raw ore from hopper cars into five steel coarse ore bins located directly below. The ore was then reduced in size in jaw crushers and cone crushers and then transferred by a conveyer system to a second series of six fine ore bins situated on Level 2. An open cage steel superstructure, overhead cranes, monorails, ramps, conveyors, six fine ore bins and machinery remnants reflect the preliminary phase in the concentration process that took place on these two levels.

Levels 3-6

The ore passed through a succession of rod mills and ball mills, which broke down the ore into successively smaller particles. The end product of this process was a fine-grained powder. Although much of the associated equipment was removed at the time of the mill's closure in 1974, surviving elements continue to provide a clear indication of the grinding processes that occurred here. These include several intact ball grinders and the platforms of former grinding machinery, chutes, bins, conveyors, catwalks and other industrial remnants. Notable internal structural features on these levels include exposed steel and concrete galleries, staircases, truss systems and girders that clearly reveal the structural characteristics of the building. Of additional note is the exposed bedrock face visible on levels 5 and 6, and the transformer tunnel blasted into the bedrock to the rear of the gallery on level 5.

Levels 7-8

On level 7 the ore was transferred into a series of flotation cells for the separation of copper and other mineral concentrates. Five long flotation cells located on this level are integral elements that illustrate a key aspect of the concentration process that was developed at this site. On level 8, three broad circular wooden platforms indicate the former location of tanks that were employed for the thickening and filtration phase of the process prior to the conveyance of the concentrate to the waterfront for shipment.

3.2.2 Associated Industrial Buildings

The group of industrial facilities located along the northern perimeter of the concentrator illustrates the diverse range of ancillary activities that were essential to the mining and ore processing operations on the site. Their collective value lies in the expression of these activities through their siting, structural forms and appearance, which convey a clear sense of evolution over the operational life of the concentrator complex.

Machine Shop Complex (Building No. 2) (Figures 7-10)

The largest and oldest of these facilities is the machine shop complex. Sections of the building date back to 1908-10 and therefore are associated with the earliest stages of ore concentration at Britannia. The building's heavy timber frame construction and board

and batten walls were characteristic of the first phase of construction at the site. The organic layout of the complex indicates that the current configuration was the result of modifications, additions and the adaptive reuse of three or four separate structures, all of which appear to date from the initial stage of site development. The complex massing, diverse roof configurations and consistency of exterior wall materials convey a sense of age, visual interest and pragmatic evolution.

One of the sections functioned as a blacksmith shop where tools were fabricated, horses shod, and machinery repaired. The machine shop, occupying the largest section of the building, had the capability to manufacture and maintain equipment employed in the concentrator and the rail equipment used to service the mine and concentrator operation. The extensive capabilities of this facility reflect the high degree of self-sufficiency that was required in an isolated industrial site such as Britannia. Attached industrial artifacts such as pulleys, flywheels, and massive overhead trusses, along with original machinery and blacksmith tools illustrate the historical functions that took place in the building.

Welding Shop (Building No 16) (Figures 11-13)

The welding shop also dates from the initial construction phase at Britannia and illustrates an important aspect of the industrial operation. Like the adjacent machine shop, it is an organic structure with a complex plan that reflects a process of pragmatic expansion in response to evolving requirements. The open-ended monitor roof section contains remnants of an overhead crane system used to haul heavy equipment in and out of the building. The heavy timber frame construction, varied roof line and board-and-batten sheathing reflect the building's pre-1920 construction dates and contribute to the overall heritage character of the industrial core of the site. An adjacent freestanding acetylene generator shed that provided fuel for metal cutting in the welding shop has important interpretative value and should be regarded as part of the welding shop complex.

Lime Mixing Tank (Figure 14)

The lime-mixing tank is the last remaining member of a former group of three large open tanks located directly in front of the base of the concentrator building. Dating from the late 1920s or early 1930s, the tank contained the lime required to control the pH level in the flotation process housed within the concentrator building.

The tank is a circular structure with a 30-foot diameter, constructed of vertical wooden staves banded by steel cables and resting on a heavy timber base supported by concrete piers. A wooden shed sitting on steel beams spanning the rim of the tank housed the gear system used to drive an agitator within the tank. The values of this structure lie in its important associations with the concentrator processes and are expressed through the functional characteristics of the surviving structural elements.

Roots Blower Shed, Copper Sulphate Plant (Building No. 4), Lead Plant (Building No. 6) and Pump House (Building No. 7) (Figures 15-17)

A group of four metal-clad industrial sheds clustered near the south-west perimeter of the concentrator is comprised of a Roots blower shed, copper sulphate plant, lead plant and pump house. The collective value of the sheds resides in their expression of important ancillary activities associated with the concentration process during the operational life of the plant.

The physical values of the sheds stem from their site placement, uniform exterior sheathing, and functional designs which reflect both their operational roles and the evolving building practices at the site during the 1923-50 period. Noteworthy industrial features include:

- the intact Roots blower system which generated low pressure compressed air used in the flotation tanks within the concentrator;
- the roof ventilator lantern and internal wood stave mixing tank used for the production of copper sulphate solutions employed in the flotation of zinc minerals;
- and pumping equipment within the pump house that was used to pump slurries and tailings in and out of the concentrator.

Pozzolan Shed (Building No. 8) (Figure 18)

A fifth shed with important associations to the plant operations is the pozzolan shed. Also known as the reagent shed, it is situated on the western perimeter of the site, a short distance from the four sheds described above. The values of this larger structure lie in its former role as a storage facility for chemical reagents used in the plant operation. This role is reflected in a row of vehicle bays facing the waterfront, into which reagent materials were moved from the wharf. A row of storage bins within the building are also associated with its function. The massing, metal –clad exterior walls and heavy timber frame construction of this building contribute positively to the heritage character of the industrial complex and typify construction practices at the site during the 1923-50 period. Further, the shed provides an effective screen between the concentrator complex and the highway corridor.

Conveyor Shed (Building No. 9) (Figures 18,19)

The conveyor shed is located adjacent to the pozzolan shed described above. This is all that remains of the covered conveyor system that formerly transported copper concentrate from the lower level of the concentrator to a loading shed on the waterfront.

The shed has value as an expression of the operational linkage that existed between the concentrator complex and the shipping facility on the waterfront. This linkage is reinforced by the metal-clad wall surfaces, by remnants of the conveyor table located within the shed, and by the site line between the shed and the wharf area.

3.2.3 Administrative, Technical and Service Facilities

Assay Office (Building No. 5) (Figure 20)

The assay office is a key resource for interpreting the science of metallurgy at the site. The current building, constructed in the 1950s, accommodated a function that had continuous associations with the site from 1904 until its final closure. The functional purpose of the building is expressed through its internal configuration, large windows and twin exterior entrances.

One half of the interior contained rooms used for the preparation of mineral samples, while the other section housed a metallurgical laboratory. The functional purpose of the building is reflected in its exterior appearance. While the metal exterior cladding reflects standard construction practice for industrial buildings on the site, the exterior design, massing and hipped roof treatment sustain a visual association with administrative building designs at Britannia. The key values of the building reside in its associations with the metallurgical assessment function and in its visual linkages with administrative design traditions at the site.

Diamond Core Sample Sheds (Building No. 14) (Figure 21)

The significant theme of metallurgical sampling and testing at Britannia is enhanced and clearly expressed through two core sample sheds situated on the north-east side of the concentrator building, in close proximity to the north tunnel portal. The values of the two identical sheds reside in the collection of core samples they continue to house, and in the fascinating open-sided wooden superstructures that house tiers of core sample drawers supported on iron rods.

Britannia Mines Administration Building (Building No. 3) (Figure 22)

The Britannia Mines Administration Building dates from the initial phase of development at Britannia and bears strong associations with the administrative component of the facility throughout its operational history. Originally located on a site facing the Union Steamship wharf, the general office presented the public face of the industry, in addition to serving as its operational headquarters. These roles were clearly expressed through its exterior design, which was domestic rather than industrial in appearance.

Despite its relocation to a site within the industrial core, the building's exterior continues to express the architectural image the company wished to project through its administrative facilities. This associative value is embodied in the original exterior wall surfaces, window and door openings, roof profile and decorative eyebrow dormers.

First Aid Building/Firemen's Lounge (Building No. 19) (Figure 23)

The first aid building/firemen's lounge is a contemporary of the general office building and reinforces the image projected by administrative facilities dating from the initial phase

of development at the site. This building possibly served as the original assay office at Britannia, and remains on its original site in the initial administrative area, oriented towards the original road leading from Union Steamship pier rather than towards the concentrator. Despite modifications, the building continues to reflect functional and design practices at Britannia during the early stages of its development through its exterior wall surfaces, massing and roof profile. Its value lies in these associations, and in its siting.

Firehall and Service Garage (Buildings 17 and 18) (Figure 24, 25)

The combination firehall and service garage is a flat-roofed concrete block structure dating from the 1960s. The service garage section is oriented towards the concentrator complex and reflects the transition from rail transportation to wheeled vehicles that accompanied the completion of the highway in the late 1950s.

The firehall reflects a variation on this theme, as wheeled fire engines and ambulances replaced specialized rail units in the provision of public safety for the town site. The values of the building lie in its associations with this transition during the final stages of site development at Britannia.

3.3 Level 1 Landscape Features – Description and Values

The designated site retains vestiges of structures, transportation systems and other non-moveable artifacts that illustrate important aspects of the operational history at Britannia. The following elements convey significant associative values:

Foundations of Earlier Concentrator Buildings
The concrete footings and physical remains of the two earlier concentrators located on opposite sides of the most recent concentrator are evidence of the successive phases of development at Britannia

Timber Trestle
Remnants of the timber trestle leading into and out of the upper level of the concentrator and including the tail track extension on the south side of the building are evidence of the rail system used to transport raw ore from the underground mine workings to the concentrator.

Vestiges of the Tram Rail System
The tram rail system was the principal method of transportation throughout the industrial site and adjacent townsite and it provided a direct rail link up to the mine site. The value of surviving rails and former tram corridors rests in their ability to convey a sense of the extensive railway system that was an integral component of the Britannia townsite during most of its operational history.

Service Tunnel and Tunnel Portals
The tunnel portals and the service tunnel, which cuts through the rock behind the Concentrator, are associated with the early phases of mine development at Britannia. The

values of these elements reside in their links to mining during the first developmental phase, and with their linkages to emergency shelter during WW 2 when Britannia was considered to be a potential target for enemy attack.

Vestiges of Pipelines
Vestiges of pipelines are associated with the former powerhouse site and linked to the concentrator and other buildings in the industrial zone. The value of these elements rests in their ability to convey a sense of the operational infrastructure that supplied water and power to the concentrator complex;

Archaeological Resources
Archaeological remains on the site range from former building pads and footings to industrial machinery. Their collective value resides in their ability to convey aspects of the operational history of the site, and of the physical evolution that took place there during its operational history.

3.4 Moveable Cultural Resources

Description and Values

Moveable resources with Level 1 value consist of those artifacts and documents that relate directly to the operational history of the Britannia Mines and Concentrator between 1904 and 1974.

3.4.1 Curatorial Collection

The curatorial collections of moveable cultural resources includes a wide range of items directly associated with the Concentrator and other industrial operations at the site, including mining, machining, assaying, exploration, foundry and blacksmithing. The majority of artifacts are from the mid 20th century, but some social artifacts and unique Britannia mining equipment dates to the 1920's and 1930's. Large artifacts include tanks, drill presses, locomotives, wood planers, ambulance, miners' skip, and ore cars.

The Museum has recently automated its artifact collection records which helps define the extent of the collection:

- Forged metal items (pieces of equipment, gears etc.), 214 items
- Various Drills, 89 items
- Tram buckets and carts, 10 items
- Signs from Britannia operation, 52 item
- Tools (hand and used in blacksmith), 450 items
- Social items including trophies, personal gear, 200 items
- Underground respirators and gear used by miners, approximately 200 items
- Scientific equipment, approximately 100 items
- Assay equipment and glassware (1950's), approximately 1000 items
- Foundry Pattern Dyes, 1314 items

3.4.2 Archival Collections

The site archival collections include mine and mill records and reports, payroll records, mine plans, geological plans, site plans, engineering and building plans.

The archival collections have been accessioned, and some basic cataloguing has been done, but finding aids are difficult to use and are incomplete. The value of these resources lies in their ability to convey diverse and vital aspects about the Site's history and multinational workforce.

- Photographs, approximately 2500 relating to Britannia;
- Mill records, 10 linear feet;
- Personal correspondence from key Britannia workers, 5 linear feet;
- Payroll records, 60 linear feet, (1930's – 1970's). This is incomplete at the Museum as UBC Special Collections has an extensive collection of Britannia payroll records;
- Mine plans, approximately 200;
- Geological plans, approximately 100;
- Engineering and building plans, approximately 2000 with some indexing.

3.5 Objectives

The Level 1 Cultural Resources of the Britannia Mines and Concentrator National Historic Site of Canada will not be impaired or under threat when:

- The cultural resources and their associated values are respected.
- Management decisions are based on adequate information and are made in accordance with the principles of the CRM policy.
- The cultural resources and their associated values are not lost, impaired or threatened by human actions within or outside of the site.
- The historic values of the resources are communicated to visitors and the general public.

4.0 MESSAGES OF NATIONAL SIGNFICANCE

4.1 Messages of National Significance

4.1.1 Definition of Messages of National Significance

Messages of national significance are those messages, which convey the reasons for the site's designation, that is, for its national significance. They devolve directly from the statement of commemorative intent.

4.1.2 Messages of National Significance

The Britannia Mines were an important source of copper ore for almost 70 years and during the 1920s and 1930s constituted one of the largest mining operations in Canada.

The present gravity-fed concentrator was highly innovative in its engineering design evident in the use of such features as bulk flotation.

4.1.3 Context Messages

The Britannia Mines were an important source of copper ore for almost 70 years and during the 1920s and 1930s constituted one of the largest mining operations in Canada.

- During peak productions tears the concentrator processed 7,000 tons of copper ore per day, one of the largest outputs of any Canadian underground mining operation.

- Britannia Mines comprised an enormous infrastructure that included 150 miles of tunnels, numerous work camps, hydroelectric plants and dams, rail transportation systems, sawmills, and shipping facilities.
- Britannia utilized a wide variety of mining techniques, including the use of induced block caving, square set mining, shrinkage stoping, blast hole stoping, cut and fill, and open pit mining (glory holing).
- Britannia was an innovative operation that demonstrated an ability to adjust to changing market conditions through technological change and through the diversification of its product lines.
- Britannia's success and longevity was attributable to dynamic management (e.g. C.P. Browning) and technological innovation (eg. early research into precipitation of copper metal from acidic mine discharge water; leading edge technology in mineral processing).
- Britannia's success was also attributable to the contributions of a skilled labour force that totalled 60,000 over the operational life of the mines.

The present gravity-fed concentrator was highly innovative in its engineering design evident in the use of such features as bulk flotation.

- The actual construction of the present Concentrator, in less than 18 months, was an engineering feat.
- The building was noteworthy for its sheer scale and structural complexity at the time of its completion.
- The Britannia concentrator pioneered the application of bulk flotation technology for the extraction of copper. The Britannia "deep cell" system was unique to this facility, and was distinguished by the absence of moving parts
- The Britannia Concentrator demonstrated processes of technological innovation and modification through the incorporation of new technologies. Cone crushers later replaced roll crushers initially installed in the upper levels of the building. The flotation systems in the lower section of the building were modified over time.
- Much of the machinery used in the mill (e.g. Ball mill liners) and on the rail systems on the site was fabricated in the foundry and machine shop. This self-sufficiency contributed to increased efficiency through the reduction of shutdown time in the concentrator system.
- Britannia's copper recovery rates from the raw ore averaged 95% and better—this was an exceptionally high rate of efficiency by standards of the industry.

4.2 Objectives

The reasons for the site's national historic significance will be effectively communicated when:

- The overall heritage presentation experience conveys the reasons for the national significance of the site;
- Visitors and non-visitors who experience the heritage presentation, and the site stewards understand the reasons for the national significance of this site;
- Management decisions are based on adequate and sound information and are made in accordance with the principles and practice of the CRM Policy;
- The effective communication of messages and their understanding is monitored;
- The full story of the Britannia Mine and Concentrator site is conveyed: notably, that it is much larger than the extant cultural resources and the designated place and includes the full range of sites and stories associated with the mining and processing operation between 1904 and 1974.

5.0 OTHER HERITAGE VALUES

The third component of Commemorative Integrity is concerned with ensuring that the site's heritage values will be respected by all those whose decisions or actions affect the site. Values other than those of national significance include: i) cultural resources which are of value but not of national historic significance, known as level II resources; ii) messages not related to national significance, known as level II messages; and iii.) Other values not related to national significance, such as the role of the local community in the protection/presentation of the site.

5.1 Level 2 Buildings: Buildings Not Related to Reasons for Designation as a National Historic Site

All buildings located within the boundaries of the designated site that are not directly related to the industrial processes but date from the operational period (1904-74) will be regarded as level II resources. This group includes various forms of staff accommodation (bunkhouses, four-plexes, single-family dwellings), staff service buildings (cookhouse, changing and washing shed) and community service buildings (school). All bear significant associations with the social, service and residential history of the Britannia site.

The values of these buildings reside in their associations with the social, service and residential history of the site, and in their collective architectural characteristics. The latter are embodied in the massing, exterior wall surfaces, exterior veranda treatments, window and door openings, roof configurations and gable details. These features demonstrate the architectural distinctions between residential and industrial facilities at Britannia from the mid-1930s to the mid-1950s.

5.1.1 Staff Accommodation

The Met, The Ritz and the York Bunkhouses, (Buildings 1, 22, 26) (Figures 26-28)

The "Ritz" and "York" bunkhouses illustrate accommodation for unmarried members of the workforce at Britannia. The "Met" offers a variation in which the lower floor accommodated the labour union, the legion, library, police office and lockup, while the upper floor functioned as a conventional bunkhouse.

Malm House (Mount Sheer House) (Figure 29)

The Malm House, a modest vernacular miner's residence removed from the Mount Sheer townsite at the time of its closure and demolition. Dating from the pre-1920 era, the building is a typical example of the standard plan workers' housing that existed at the upper mine site. It was relocated to a temporary site in the Britannia townsite ca. 1980.

House No. 122 (Building No. 30) (Figure 30)

House # 122 on the northeastern perimeter of the site. This structure is a surviving remnant of the residential district built at Britannia before 1916 but largely destroyed by floods in the early 1920s.

Honeymoon Cottages (Building No. 31) (Figure 31)

The Honeymoon cottages (originally named the Pyrite Plaza Apartments). This group is comprised of a row of three identical fourplexes built in the mid-1950s to accommodate members of the workforce. Located on a section of the floodplain that ravaged earlier housing at Britannia, the buildings reflect changing responses to staff accommodation at the site following completion of the highway.

Three Frame Houses (Buildings 44,45,46) (Figure 32)

Three frame houses located on the southern perimeter of the designated site. Dating from the 1920s and 30s, the three buildings provided accommodation for company employees at Britannia. The current Britannia House Restaurant accommodated W.A. Matheson, the long-time secretary-treasurer of the company who moved there in 1921.

5.1.2 Staff Service Buildings

The "Dry" (Building 23) (Figure 33)

The "Dry" located adjacent to the "Ritz" bunkhouse, contained showers and changing facilities for workers in the concentrator and adjacent industrial buildings.

Cookhouse/Teacherage (Building 29) (Figure 34)

The cookhouse/teacherage is a composite structure dating from the mid-1930s that bears historical associations with cooking and dining facilities for the workforce at Britannia, as well as bunkhouse and teacher accommodation.

5.1.3 Elementary School (Building No. 33) (Figure 35)

This is a composite structure, with an initial company-built three-room section dating from the 1920s and successive flat-roof additions dating from the 1950s and 60s. The building relates to community life at the townsite.

5.2 Related Resources Located Outside the Designated Place

There are a number of buildings and other resources directly related to the operations of the Britannia Mines but are located outside the Designated Place. These include the following elements:

- The 4100 level tunnel portal located on the north-east side of concentrator no. 3's upper level, and linked to the timber trestle described above. This portal marked the entrance to a 20,000 foot-long transportation tunnel linking the concentrator complex to the underground mining operations in the mountain to the east. The values of the portal lie in its ability to sustain the linkage between the concentration facility at Britannia and the vast mining operation located in the mountain above, and in its role as the entrance to a remarkable underground rail transportation system;
- The wharf and storage shed on the waterfront, which bear direct associations with the shipping of concentrate from the site (Figure 36);
- The former Union Steamship dock and customs house, which comprised the primary access point to the site before the completion of the highway and railroad;
- The church, community hall, former movie theatre building and staff residences located on the north side of the site's boundary;
- Mine tunnel portals, archaeological remains and vestiges of structures associated with the mining, hydropower system, transportation system on the mountain slope above the site's eastern boundary.

5.3 Objectives for Other Heritage Resources

The resources will not be impaired or under threat when:

- The resources and their associated values are respected;
- Management decisions are based on adequate and sound information and are made in accordance with the principles and practice of CRM Policy;
- The resources and their associated values are not lost, impaired or threatened from natural processes within or outside the site;
- The cultural resources and their associated values are not lost, impaired or threatened from human actions within or outside the site;
- The historic values of the resources are communicated to visitors and the general public;
- New and evolving uses respect the heritage-defining values;
- The designated place is not threatened by flooding of Britannia Creek.

5.4 Messages Not Related to the Reasons for Designation as a National Historic Site.

The Other Heritage Values include a number of important messages not directly related to commemorative intent of the site. These include:

- This site is a member of the family of national historic sites located across Canada.
- The geological history of the coastal mountain ranges of British Columbia.
- The name "Britannia" was assigned by Captain Richards in honour of a British warship in 1859.
- Mining played an important role in the establishment and development of British Columbia.

- Britannia is a representative example of an isolated resource community on the B.C. coast.
- The Britannia site bears associations with coastal maritime transportation and the history of shipping on the B.C. coast.
- The development of the Britannia mines and concentrator was part of a major wave of resource development in B.C. in late 19th-early 20th centuries.
- The Britannia site retains the ability to convey the story of mining: past, present and future.
- The Britannia site offers the opportunity to convey the story of environmental responsibility in resource development.
- The site has the ability to illustrate the issue of acid rock drainage and its impact on the environment.
- The history of the site is enhanced by the contributions of individuals such as C.P. Browning.
- The site bears opportunities to convey significant aspects of social and labour history.
- The B.C. Museum of Mining maintains linkages to the educational programs of the Mining Association of B.C. and the Pacific Mineral Museum in Vancouver.

5.3 Objectives for Other Heritage Messages

Effective communication of Other Heritage Messages for the Britannia Mine and Concentrator will be achieved when:

- Part of the heritage presentation conveys these other heritage messages;
- The other heritage messages and their presentation do not overwhelm or detract from the presentation and understanding of the site's national significance;
- The public, both visitors and non-visitors, understand these messages;
- The effectiveness of communication of these messages is monitored.

APPENDIX 1

Recommendations of the Historic Sites and Monuments Board of Canada relating to Britannia Mines and Concentrator National Historic Site

HSMBC Minutes, November 1987

Britannia Mines and Concentrator

Following discussion the Board recommended that

"the Gravity-fed Concentrator Complex at Britannia mines is of national historic and architectural significance; however, in light of the on-going research into Hard Rock Mining in the Canadian Shield, the area of its most concentrated and sustained activity, Program involvement with the structure should be limited to commemoration by means of a plaque."

HSMBC Minutes, February 1989

THE BRITANNIA MINES AND CONCENTRATOR

LES MINES BRITANNIA ET LEUR CONCENTRATEUR

For almost 70 years the Britannia mines were an important producer of copper ore and during the 1920s and 1930s they constituted one of the largest mining operations in Canada. Britannia began producing ore in 1905 but did not become a significant operation until after 1912 when a second concentrator was built. The present gravity-fed concentrator, completed in 1923, was highly innovative, as, for example, in the use of bulk flotation. By 1912 both mill and mine towns had been established to house men and families of a permanent racially-mixed work force that numbered over 1,000 in 1929. The mines closed in 1974.

(624 spaces)

HSMBC Minutes, November 1989

Britannia Mines Concentrating Mill Complex, Britannia Beach, British Columbia

The Board first reaffirmed its 1987 recommendation respecting the national historic and architectural significance of the Gravity-Fed Concentrator Complex, at Britannia Beach.

Further the Board recommended that

"if the Program is convinced of the long-term viability of the proposed Concentrator Mill Building restoration project, at Britannia mines, it should, as a priority, enter into discussions with other interested parties with a view to providing funding assistance through the National Cost-Sharing Program to aid in the exterior restoration of the structure."

APPENDIX 2: LIST OF PARTICIPANTS

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