BCIT™

> Trades & Technology Centre

OPPORTUNITY ASSESSMENT REPORT >

April 2016

Stantec CITY SPACES


BCIT

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EXECUTIVE SUMMARY

Introduction

Established in 1964, the British Columbia Institute of Technology (BCIT) comprises six Schools of study operating at five campus locations. With 47,320 full and part-time students, BCIT is one of the largest post-secondary education institutions in the province. More specifically, BCIT is the largest provider of trades education in BC, and has the demonstrated the necessary capabilities to meet BC's objectives for providing *the right skills in the right place at the right time*.

The BCIT Trades & Technology Centre Project will play a major role in maintaining the Institute's leadership role in trades education. It will rejuvenate the trades precinct, which is the oldest part of the Burnaby Campus. The average age of the buildings in this area is 50 years, with the newest built in 1983.

Project Description

The BCIT Trades & Technology Centre project is an integrated, multi-phase project that will enhance and expand the Institute's trades and technology teaching pace, with specific focus on the in-demand trades and industries identified in the *BC Skills for Jobs Blueprint*. The project is a mix of:

- A new 66,480 sf (6,176 m^2) integrated trades & technology building;
- Four new cost-effective covered workshops;
- A simulated shipyard, including gantry crane;
- A reconfigured works yard;
- Complete upgrade and renewal of the 31,215 sf (2,900 m^2) NE12 Steel Trades building; and
- Demolition of one obsolete building that contains asbestos.

The project is in direct response to growing demand for trades training to address industry-driven labour demand, including the emerging liquefied natural gas industry, and the growing shipbuilding sector. New and enhanced learning environments will showcase advanced technologies and innovations (including simulation) in the design of labs and workshops, and provide flexible space programming that can adapt to changing education and industry requirements.

The new Centre will strengthen trades training, and contribute to a new trades and technology identity on the campus by creating a centralized hub. This hub will include a student commons and trades and technology showcase atrium that will enhance the Institute's recruitment opportunities.

This project is proposed to be completed over three major phases. The first sees construction of the outdoor workshops, the second includes construction of the new Centre, and the third is renewal of NE12. The total estimated capital cost is $73.93 million. If approval is granted in April 2016, the table below illustrates the proposed schedule, and the three occupancy timeframes.

Proposed Schedule for Trades & Technology Centre, Works Yard & NE12 Steel Trades Renewal

PROJECT PHASES	2016				2017				2018				2019				2020			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. CARG Approval Process																				
2. Design Development																				
3. Working Drawings																				
4. Staged Procurement																				
5. Construction with Phased Occupancy																				

Background Information

NE12, which houses the Iron Worker Foundation, Iron Worker Generalist, Boilermaker, and Metal Fabrication programs, is an aging building with structural and functional deficiencies. Many systems and components are reaching their end-of-life usefulness with a VFA FCI value of 0.53. Combined with the building containing asbestos, there is a total of $9 million in deferred maintenance and seismic mitigation. Not only will upgrading and modernizing NE12's workshop, equipment, teaching spaces, and works yard address these structural and seismic issues, but it will also resolve functional challenges of the building and works yard. Renewal of NE12 will provide students with an improved learning experience that will better prepare them for a highly-skilled workplace environment.

Currently, BCIT is experiencing long waitlists for in-demand trade programs. Specifically, BCIT's Enrollment Planning Office has noted that the School of Construction and Environment has **512** students on waitlists for trades foundation programs, while trades foundation and technician programs offered by the School of Energy have **518** students on waitlists. In addition to these waitlists, the respective Schools face challenges with apprenticeship intake capacities. Each year, the number of intakes are filled prior to fulfilling the demand of prospective students, causing them to defer enrollment to another year. The additional space delivered by this project will permit growth in the areas in highest demand by students and industry. Without program expansion capabilities, trades employment needs of the province will be impeded.

Strategic Alignment

The project is strongly aligned with the *BC Skills for Jobs Blueprint*. Given this context, there are a number of potential stakeholders who would be interested in this project, including: the Province of British Columbia, the Ministry of Advanced Education, the Industry Training Authority, employers of trades practitioners, and students.

Options Identification

Three options are identified in this assessment:

- Capital Option – New Trades & Technology Centre, Works Yard & NE12 Steel Trades Renewal;
- Status Quo Option; and
- Non-Capital Option – Off-site Lease Option.

The **Status Quo Option** is deemed not viable because of its shortfalls in meeting BCIT's training objectives, and the Province's growing labour market projections for in-demand trade professions.

The **Non-Capital Option – Off-site Lease Option** is also deemed not viable, because of the functional deficiencies it presents within the larger trades and technology complex on campus. Students need to be in proximity to adjacent spaces, and be able to easily access various shops, structures, and classrooms within the larger trades training complex.

Conclusions & Recommendations

Based on the options identification and analysis in this report, the **Capital Option – New Trades & Technology Centre, Works Yard & NE12 Steel Trades Renewal** is the preferred option. Considered to best meet BCIT's trades and technology training objectives, this option best serves the emerging and growing industry labour market demands in British Columbia.

It is recommended that the preferred option undergo further concept and design development, in accordance with the Ministry of Advanced Education's *Capital Asset Reference Guide Concept Plan* framework.


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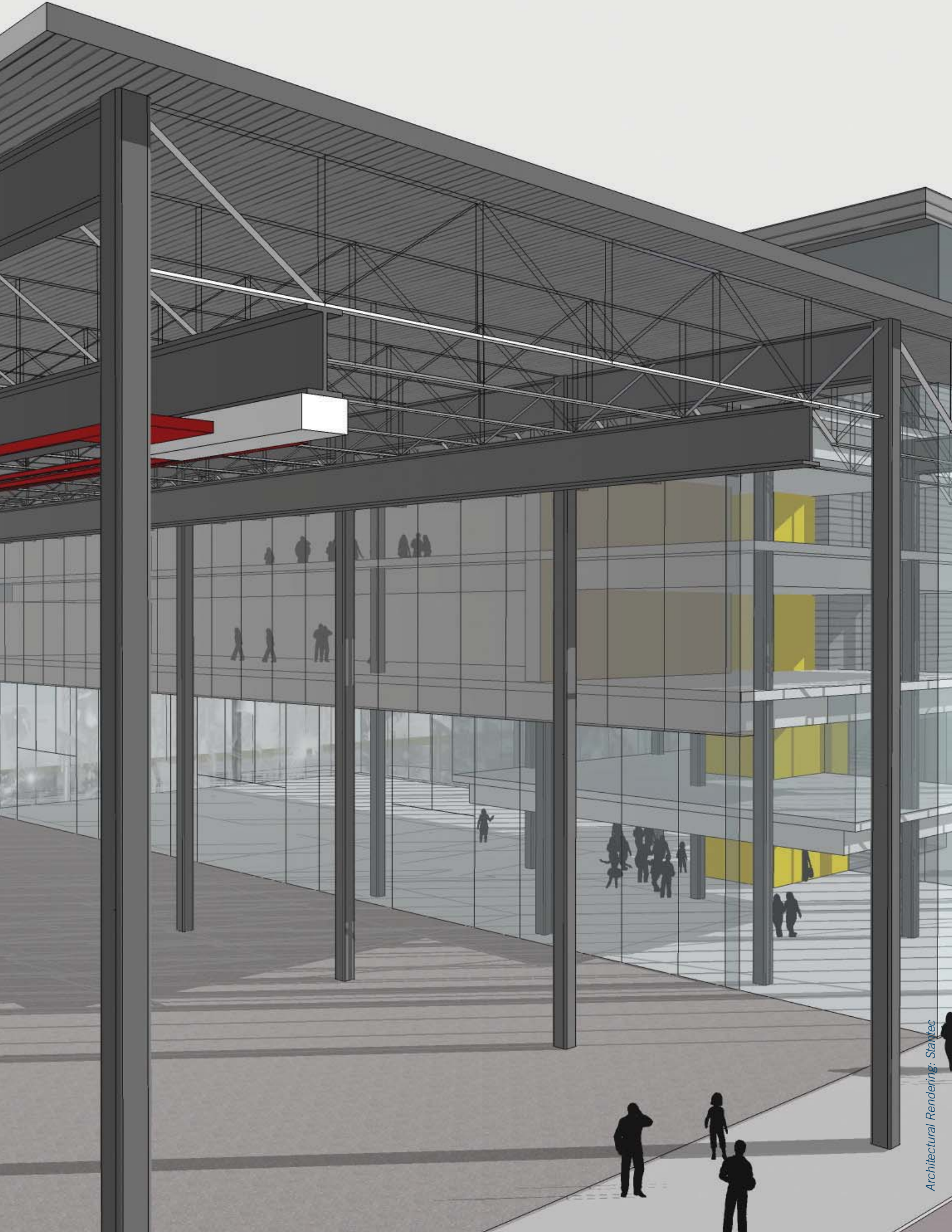
INTRODUCTION

This report recommends the construction of a new Trades & Technology Centre, a reconfigured works yard, the addition of outdoor covered workshops, a new simulated shipyard (including gantry crane), renovation of the Steel Trades building (NE12), and the demolition of one obsolete building that contain asbestos at BCIT's Burnaby Campus. This report has been prepared in accordance with the Opportunity Assessment template, as set out in the Ministry of Advanced Education's *Capital Asset Reference Guidelines (CARG)*, and follows completion of the Institute's *Five-Year Capital Plan*, for which the Centre was categorized as the number one priority. As envisaged in the *CARG* documents, the Opportunity Assessment involves exploration of the different options available to meet the service delivery needs of the BCIT, and accommodate labour demands of the province.

This *Opportunity Assessment* includes:

- The results of extensive consultation with faculty and staff;
- A high-level program;
- An illustrated, preferred concept design;
- An options analysis;
- A high-level costing;
- A projected operating budget;
- A scan of similar initiatives;
- A stakeholder identification and strategic alignment analysis;
- An identification of potential risks; and
- Project conclusions and recommendations.



Architectural Rendering: Stantec

01 PROJECT DESCRIPTION

1.1 Context

As the province's largest provider of trades education, BCIT has the demonstrated capability to meet BC's objectives for *the right skills in the right place at the right time*, and the new Trades & Technology Centre will ensure the Institute continues to play that central role.

Presently, BCIT's Trades Training Complex is concentrated in the northeastern portion of the campus in buildings averaging 50 years old – the newest building was constructed in 1983. The systems and components of many of the buildings are reaching end-of-life, and need to be renewed. By addressing these deficiencies and providing infrastructure improvements, the Trades & Technology Centre project will meet program needs, address functional and physical deficiencies, and enhance the Institute's program image and boost recruitment opportunities. This rejuvenation is critical for BCIT to maintain its profile as the leading provider of trades training in the province. Furthermore, improved facilities will contribute to BCIT's student satisfaction and educational quality KPIs, thereby contributing to *AVED's Accountability Framework Objective 3: Quality*.

An important distinction of this proposed project is the inclusion of outdoor covered work areas. The Institute has had success with the outdoor instruction covered area used by BCIT's Carpentry Foundation and Carpentry Apprentice programs. These cost effective spaces are flexible, and allow for multiple configurations based on program needs. They also improve student outcomes by offering some protection from the elements, which in turn lets students and faculty focus more attention on the learning at hand.

1.2 Summary

The Trades & Technology Centre project will provide teaching spaces that are critical for construction-related trades' education in priority areas identified in the *BC Skills for Jobs Blueprint*. The project involves two main phases, and includes a combination of existing building upgrades, a new building, and cost-effective covered outdoor workshop spaces, which will quickly increase capacity. Specifically, the project comprises:

- A new 66,480 sf (6,176 m^2), five-level building, with a works yard, and simulated shipyard (including overhead gantry crane);
- Four covered outdoor teaching spaces constructed as a cost-effective strategy to provide all-weather work areas (See Appendices E and F for full reports outlining workshop programs and design elements);
- A complete upgrade and renewal of the 31,215 sf (2,900 m^2) NE12 Steel Trades Building; and
- The subsequent decanting of programs, allowing demolition of an obsolete asbestos-containing building (NE28).

The new building and yard combinations will provide teaching space that focuses on in-demand trades programs, including the growing shipbuilding sector and the emerging LNG industry. The Centre will also provide:

- Facilities that include simulation technologies;
- Integration of trade and technology programs;
- Distance education online delivery/"narrowcasting" capabilities that allow the Institute to pursue pre-training, and other innovative delivery methods, designed to foster stronger outcomes for First Nations students, and other remote learners; and
- Visitor viewing opportunities to showcase job training, and assist in K-12 trades' recruitment.

The new Centre will accommodate the program growth necessary to fulfill employment needs in critical trades areas, while providing adaptable and flexible 21st century learning environments that respond to changes in trades education, particularly with the utilization of simulation technologies. As a complement to these state-of-the-art trades learning environments, the Centre will also focus on growing technology-based programs that support the high-tech function of the building, creating a completely integrated and collaborative Trades & Technology Centre. The renewal of NE12, and the newly constructed outdoor workshops will contribute to the Centre's distinct trades identity on the campus, and within BCIT.

The phased scope of work for this project includes:

Phase 1: New Trades & Technology Centre, Works Yard & Simulated Shipyard (including Gantry Crane)

- **Construction of a new building with flexible and adaptable simulation labs/workshops, observation galleries, and broadcast media capabilities. The new building will include:**
  - Cross-disciplinary Lab – trades and technology collaboration;
  - Marine Trade Simulation – simulated shipyard and teaching space;
  - Power Engineering Lab – Kongsberg system;
  - Welding Simulation Lab;
  - Industrial Network Simulation Lab – industry partnership space;
  - LTC Gas Simulation – gasfitting software simulation;
  - Industry Partnership space;
  - Media Centre Lab;
  - Maker Space – self-directed and collaborative learning studio;
  - Additional supporting classrooms in close proximity to workshops/labs;
  - Student commons, demonstration and atrium space; and
  - Ancillary space – First aid facility.

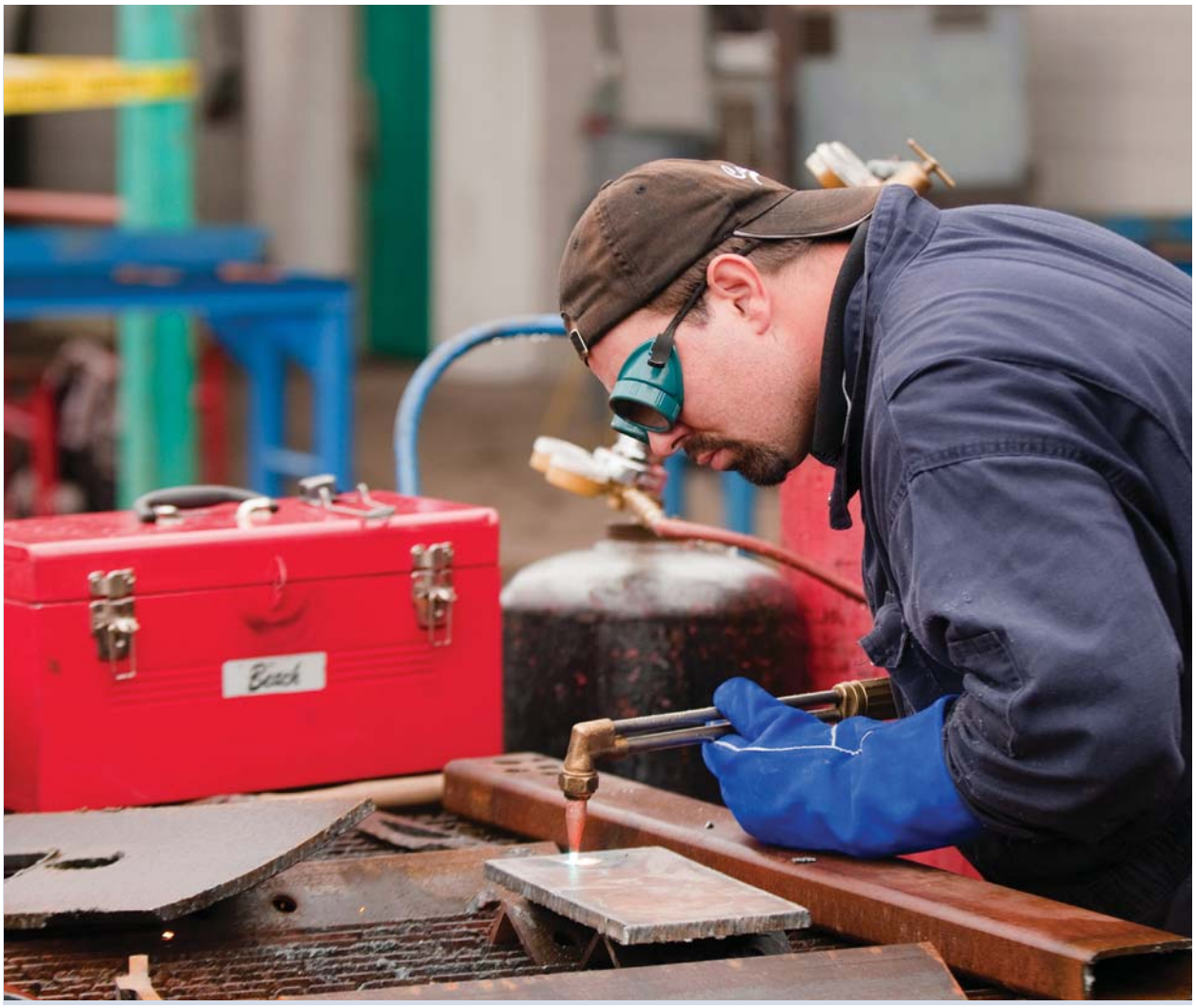
- **New works yard complex:**
  - Simulated shipyard and covered works yard, including a gantry crane, immediately adjacent to the new Centre;
  - Reconfiguration of the existing works yard outside NE12 for increased student safety, improved teaching areas, and efficient materials storage – includes the covered two-storey steel structure;
  - Covered working canopy immediately adjacent to NE 12;
  - Loading and staging areas – lay-by capable of accommodating 30' delivery trucks; and
  - Fuel storage.

- **Other new improvements:**
  - Covered workshops (between NE4 and NE6, and between NE8 and NE10);
  - Strengthened pedestrian pathways with landscaping around site (including Goard Way and internal student pathways within the northeast portion of campus between buildings); and
  - Relocation of the existing NE12 substation and tie-in to the new Goard Way Receiving Station.

Phase 2: NE12 Steel Trades Renewal

- **Layout upgrades that include renewed and modernized instructional workshops, equipment, classrooms, washrooms, and administration area:**
  - Reconfigured rigging loft (second level mezzanine).
  - Improved safety and workflows to align with current industry practice;
  - Welding booths;
  - Grinding stations;
  - Gantry crane over north half of the workshop; and
  - Gouging facility.

- **Structural upgrades:**
  - Seismic upgrades; and
  - Building envelope upgrades – rain-screened walls with metal cladding, double glazed aluminum windows, and energy efficient overhead doors.



- **Mechanical & electrical upgrades:**
  - Conversion of electrical distribution to a more efficient 575/3/60 system, panel boards, and lighting;
  - Rooftop "make up" air units, exhaust fans, and duct work (HVAC);
  - Lighting replacement;
  - Fire alarm and sprinkler upgrades and renewals;
  - Improved energy efficiency;
  - Plumbing distribution piping; and
  - Natural gas and compressed air piping.

Phase 3: Demolition

- Demolition of an asbestos-containing building (NE28); and
- Removal of deferred maintenance backlog totaling $2 million over the next 5 years.

Proposed Schedule for Trades & Technology Centre, Works Yard & NE12 Steel Trades Renewal

PROJECT PHASES	2016				2017				2018				2019				2020			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. CARG Approval Process																				
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Supported Programs

- The following programs are located within NE12:
  - Iron Worker Foundation;
  - Heat and Frost Insulators;
  - Boilermaker; and
  - Metal Fabrication.
- Programs to be accommodated in the new Trades & Technology Centre include:
  - Ironworker;
  - Boilermaker;
  - Metal Fabrication;
  - Marine Fitter;
  - Millwright and Refrigeration;
  - Piping Trades – Plumbing, Steam and Gas;
  - Power Engineering/Instrumentation;
  - Industrial Network Simulation; and
  - Electrical Trades – Lighting Lab.

1.3 Project Objectives

HIGH-LEVEL

- Implement the priorities outlined in the *BC Skills for Jobs Blueprint*.
- Increase student intake, and reduce waitlists for in-demand trades programs.
- Support programs that align with emerging opportunities for skilled trades and technology personnel presented by the LNG and shipbuilding sectors, as well as other high-tech industries, such as renewable energy, pipelines, mines, and transportation infrastructure.
- Improve the campus' profile – specifically the trades' program image and recruitment opportunities.
- Provide industry partnership and journeyman upgrading opportunities.
- Reduce energy use and operating costs.
- Enable the renewal or replacement of physically obsolete buildings.
- Support the implementation of the Campus Plan.

PROJECT SPECIFIC

Phase 1: Trades & Technology Centre

- Modernization to meet new technology requirements – create a flexible 21st century teaching environment for trades and technology programs, especially those associated with the LNG, shipbuilding, and other growth industries.
- Develop integrated and collaborative Trades-Technology programming space.
- Enable narrowcast media capabilities to stream or playback demonstrations, lectures, and simulations to distance education students, as well as to industry partners in the field.
- Provide cost-effective covered workshops and a simulated shipyard (See Appendices E and F).
- Create a formal demonstration space and student commons area to showcase BCIT Trades & Technology programs.
- Provide a safer works yard that is more functional and uses space more efficiently, including controlled access for delivery trucks.

Phase 2: NE12 Steel Trades Renewal

- Renew this key facility that is situated in the core of the Trades precinct.
- Create more efficient and functional space design.
- Provide modern, flexible learning and research facilities that respond to future changes in teaching and workplace requirements.
- Upgrade critical deferred maintenance conditions identified by VFA.
- Complete seismic safety and structural upgrades.

Phase 3: Demolition

- Reduce deferred maintenance backlog.
- Eliminates potential liability from asbestos-containing materials (ACM).
- Supports long term implementation of BCIT Campus Master Plan.

1.4 Project Scope

PROJECT SIZE

This project includes a combination of a new building, four new covered workshop areas, renewal of an existing facility, and the demolition of an existing building. The new and renewed space totals 128,690 sf (11,956 m^2). The demolition of the end-of-life building totals -7,020 sf (650 m^2). The total project area (new and demolished) is 135,690 sf (12,606 m^2), and is broken down as follows:

- The new Trades & Technology Centre: 66,480 sf (6,176 m^2).
- Covered exterior workshop: 8,115 sf (754 m^2).
- Renewal of existing facility – NE12: 31,215 sf (2,900 m^2).
- Covered exterior workshop – NE12: 3,120 sf (290 m^2).
- Covered exterior workshop – NE4/NE6: 15,450 sf (1,435 m^2).
- Covered exterior workshop – NE8/NE10: 4,300 sf (400 m^2).
- Demolition of existing building – NE28: -7,020 sf (650 m^2) reduction.

FTES

- The NE12 Steel Trades building supports 313 FTEs.
- The new Trades & Technology Centre will support approximately 700 FTEs.

LABOUR MARKET OUTLOOK

WorkBC's *British Columbia Labour Market Outlook* notes that more than one million total job openings are expected in BC by 2022. Of these, 985,000 jobs are from economic activity already planned or confirmed, and 44% (431,100) will require post-secondary education or apprenticeship training.

- The trade programs accommodated in the Trades & Technology Centre, and in NE12 are related to six of the 60 top in-demand occupations, and total approximately future 21,300 jobs:
  - Electricians and industrial electricians;
  - Welders, steamfitters, and pipefitters;
  - Construction millwrights;
  - Plumbers; and
  - Gas fitters.
- Two-thirds of the projected job openings are expected to be located in the Mainland/Southwest region.
- Demand in this region is expected to surpass supply by approximately 20,300 jobs by 2022.
- Between 2015 and 2023, the emerging LNG industry is anticipated to generate up to 100,000 jobs beyond the activity already planned or confirmed.

1.5 Project Outcomes

INFRASTRUCTURE IMPROVEMENTS

Infrastructure improvements to NE12 will significantly improve the FCI and address code compliance issues. Indoor air quality will be markedly improved with new HVAC equipment and controls.

The new Centre will provide adaptable 21st century teaching spaces that are built to modern design and materials standards, and correct infrastructure deficiencies. Once completed, the facility will enable integration of the trade and technology programs, as well as consolidation by creating necessary swing space and program expansion opportunities for in-demand trades and technology programs.

Improvements to the works yard will create a safer teaching and learning environment, with the covered workshops shielding students, teachers, and equipment from the natural elements. Within the yard, the new simulated shipyard area will allow for marine fitting program simulation. The new gantry crane will accommodate a diverse range of programs.

COST-EFFECTIVENESS

- The cost of renewing NE12 is less than the cost of replacement.
- Renewed mechanical and electrical systems in NE12, as well as exterior window upgrades will reduce energy consumption.
- Provision of flexible spaces will allow for adaptation to changes in labour market demands, and subsequent program delivery options; this will lower risks and potential financial liabilities associated with more rigid learning spaces.
- Provision of covered workshop space allows for capacity to increase quickly.
- More building and teaching technologies will be cost efficient.
- The project delivery schedule creates swing space in the new Centre that will expedite the renewal of NE12.

INNOVATION

The new Centre will showcase a student-centred learning environment with new technologies and innovations, like simulation, showcased in the design of its labs and workshops, and the provision of flexible space programming that is adaptable to changes in teaching and labour market trends.

The inclusion of observation galleries and a demonstration/atrium space allows BCIT to highlight trades and technology education to students and visitors alike. Distance education online delivery/“narrowcasting” capabilities will allow pre-training, and other innovative delivery methods, designed to foster stronger outcomes for First Nations students and other remote learners. Pre-training allows learners from rural or remote areas to start coursework prior to attending classes, thereby reducing the time away from their communities and support networks. The media centre lab will provide a “green room” type environment to allow for varying workplace simulations.

Other innovations of this project include:

- Best practice design elements from the recently completed NE8 Welding Shop upgrade will be integrated into the renewal of NE12.
- Potential heat recovery from the exhaust and plumbing systems will be explored and utilized if feasible.
- Micro-grid technology will enable demand side control of electrical usage.

STRATEGIC ALIGNMENT

This project is aligned with the following BCIT and Government of BC priorities and strategies:

- *BC Skills for Jobs Blueprint*.
- Supports *Ministry of Jobs Tourism and Skills Training Goal #4* by providing facilities that support a highly skilled and competitive labour force.
- *Supports Ministry of Advanced Education Goal #1* by providing flexible facilities that support high quality education skills and trades training, and produce job ready graduates that align with labour market demand.
- Supports *BCIT Institute Strategic Initiative 4 – Stewardship and Resource Development* by ensuring physical facilities and campus infrastructure needs are met through an integrated plan that accounts for teaching space, research facilities, equipment, and information and education technologies.
- Consistent with BC's sustainability objectives (*BC Climate Action Plan*).

QUALITY EDUCATION

NE12 has antiquated ventilation and lighting systems, and does not meet modern teaching environment standards. Renewal of these systems will greatly enhance the learning environment, and enable an increase in student intake.

The incorporation of simulation into trades and technology training provides improved learning environments, in which students can experience and practice a diverse range of situations and experiences. These replicated situations may not be as readily available in real-life training experiences because of lab, workshop, and work yard limitations. Simulators can replicate real life scenarios in a safe and controlled environment, preparing students to comfortably attempt the scenarios in real life. Simulation also provides more cost-effective training – expensive materials are used less frequently than traditional hands-on training. Together, these education and infrastructure improvements greatly enhance the trades education experience.

ENERGY & EMISSION REDUCTIONS

Based on the achieved results of a recent energy retrofit of Building NE08, the renewal of NE12 is targeted to achieve a 50% reduction in energy and subsequent green house gas emissions. The new building will be designed to meet (or exceed) LEED® Gold design standards.

- Energy efficient HVAC, lighting, welding systems, and an insulated building envelop will increase energy efficiency, and reduce GHG emissions.

1.6 Initial Development Concept Plan

An initial Development Concept Plan has been prepared for the project, and is shown in Appendix C. The initial phase shows construction of four exterior covered workshops that provide year-round weather protection, and provide quick and cost-effective expansion of potential program areas. Totaling 31,000 sf (2,880 m^2), these workshops will vary in size, and improve sections of the yards that are currently functioning ineffectively.

Construction of the new Centre, along with the accompanying works yard improvements, will follow the initial phase, and include a mix of workshops, simulation labs, a media broadcast centre, maker space, classrooms, student commons, cafe, loading/staging area, lay-by, and covered works yard with simulated shipyard and gantry crane. This state-of-the-art building is set to establish a new trades hub on the campus, and transform the identity of the larger trades training complex at BCIT.

BCIT Trades & Technology Centre & NE12 Renewal: Project Site & Phase Components

NEW CENTRE LEVELS ONE & TWO

The first floor acts as a demonstration space, and welcoming entrance to the Trades & Technology community at BCIT for students, visitors, and industry partners. The spacious and transparent atrium allows visitors to observe activity within the workshops on this floor, as well as out in the works yard. The multi-purpose and student commons areas provide more functional active learning areas within the space itself. This level also contains a media centre and lab, along with a small cafe and first aid room.

Beyond the atrium and showcase areas are cross-disciplinary labs and traditional steel trade workshop areas. These are the spaces where active education is on display, and can be observed from other program areas on this level. Sized for roughly 50 students, this workshop is approximately 8,770 sf (815 m^2), and programming space for these areas includes the new Marine Trade Program and Industry Partnership Labs.

On the second level mezzanine is a maker/living lab resource space to accommodate approximately 20 students. This transparent area allows for observation into the workshops below and out into the works yard.

Rendering of new Trades & Technology Centre Building (Architectural Rendering: Stantec)

NEW CENTRE LEVELS THREE TO FIVE

These levels house simulation lab space, including the necessary trades classrooms to support workshop programming and cross disciplinary lab space. These levels will also provide replacement space for programs currently located in NE28, allowing for demolition of this asbestos-containing building.

Facing challenges due to a limited number intakes, the School of Energy's in-demand apprenticeship programs will also have opportunity to expand in these new areas. Students will no longer have to defer their intake year and prolong their entrance into the workforce.

Detailed programming has not been undertaken, but will occur in the Concept Plan and Business Case stages. For this stage of planning, it is assumed that levels two to four will have a mix of six simulation labs, eighteen classrooms of varying sizes, and three seminar rooms.

Each of the simulation labs on these floors are estimated at approximately 1,180 sf (110 m^2). The Power Engineering Lab, Welding Simulation Lab, Network Simulation Lab, and the LTC Gas Simulation Lab are proposed for these labs.

Support classrooms and seminar spaces are provided in three different sizes. Twelve of the mid-sized classrooms are approximately 1,076 sf (100 m^2). Another six mid-sized classrooms are approximately 969 sf (90 m^2) each. Lastly, three seminar rooms of approximately 646 sf (60 m^2) will each accommodate about 20 students.

WORKS YARD & WORKSHOPS

The Trade's works yard (southside of NE12) will have improved safety and flow with the reconfiguration of pedestrian connections and vehicle access, including maneuvering space. Site works, landscaping around the new building, and a new paved pedestrian walkway will provide a safe, dedicated north-south route for students and visitors through the site.

Another improvement to the works yard is the covered outdoor workshop immediately adjacent to the new Centre that will provide workspace for the new simulated shipyard, enabling simulation activities for the Marine Technology program, and other programs. With 8,120 sf (754 m^2) of covered workspace, the simulated shipyard provides flexible 10' x 10' workstations. Flat bar studs flush with the finished grade run the length (24 m) of the marine fitting program layout, and provide a stable surface for attaching a variety of projects. Two overhead gantry crane bridges will be phased into the construction, and accommodate a diverse range of program training requirements. The structure's height and crane assembly will give the mobile cranes access to the covered areas, providing further flexibility. A delivery truck lay-by that can accommodate 30' trucks is planned adjacent to the east wall of the new Centre. A report detailing the covered shipyard workshop project can be found in Appendix E.

Having had success with the outdoor covered instruction area used by the Carpentry Foundation and Carpentry Apprentice programs BCIT is proposing three additional covered outdoor workshops – one between NE04 and NE06 (15,460 sf/1,436 m^2), one between NE08 and NE10 (4,306 sf/400 m^2), and a small covered work area adjacent to NE12 (3,121 sf/290 m^2). These workspaces take advantage of the area's mild climate by offering students protection from some of the elements, while also providing similar conditions to those that could be experienced in the workplace.

These cost effective learning spaces are flexible, and allow for multiple configurations based on program needs. More specifically, the covered workshop between NE4 and NE6 will expand workspace capacity for the pipefitting program. The space will also provide three working modules, each with 32 working bays split between two levels. A full report detailing this covered workshop can be found in Appendix F.

02 BACKGROUND INFORMATION

2.1 Current Situation

NE12 is an aging building (built in 1972) with many systems and components reaching the end of their life cycle with an VFA FCI value of 0.53. Both the VFA report and the seismic assessment confirm that a renewal and upgrade of life safety, seismic, electrical, mechanical, communications and interior spaces should be completed. NE12 has been categorized as having a medium seismic risk (M). Based on VFA building assessments for the next five years, an estimated $4.6 million of deferred maintenance and $1.8 million for seismic mitigation is required to maintain NE12. The table below illustrates NE12's conditions, as well as NE28's, which will be demolished as part of this project, eliminating a backlog of deferred maintenance and seismic mitigation totaling $14.46 million.

Table 2.1: FCI Rating, Deferred Maintenance Costs & Seismic Ratings and Costs

BUILDING	PROJECT SCOPE	SIZE	FCI RATING	DEFERRED MAINTENANCE COSTS	SEISMIC RATINGS & COSTS	
NE12	Renewal	31,215 sf / 2,900m^2	0.53	$4.6 M	M	$1.8 M
NE28	Demolition	7,020 sf / 652 m^2	0.80	$2.0 M	H1	$0.6 M
TOTALS				**$6.6 M**	**$2.4 M**	

In addition to these structural and seismic issues, NE12 has size and functional inadequacies in some of its teaching spaces. Right now, the works yard is very congested and functionally challenging. Upgrading and modernizing NE12's workshop, equipment, and teaching spaces will address these inadequacies, and provide students with an improved education experience to better prepare them for the demands of a highly-skilled labour market.

Lack of teaching spaces for programs associated with the emerging marine and LNG sectors will also be addressed through this project. The new Centre will house new teaching spaces, as well as provide opportunities for integration of trades and technology education.

Currently, BCIT is experiencing long waitlists for in-demand trade programs. Specifically, the School of Construction and the Environment has **512** students on waitlists for trades foundation programs, while the School of Energy's trades foundation and technician programs have **518** students on waitlists. The additional space delivered by this project will allow for growth in those areas in highest demand by students and industry. Without program expansion capabilities, the trades employment needs of the province will be impeded.

There are further challenges for each of the Schools' apprenticeship capacity. Each year, the available apprenticeship program seats are filled prior to meeting the demand. While this does not result in the creation of a waitlist, students must defer program entry until the following year.

The provision of a new building, plus renewal of the NE12, will enable expansion of trades and technology programming at BCIT. This project will also support programs identified in the *BC Skills for Jobs Blueprint*, particularly aligning with the expanding shipbuilding and LNG sectors.

2.2 Similar Initiatives

A number of similar trades training initiatives have been undertaken throughout the province over the last decade or so. The following table summarizes each project's notable details.

Table 2.2: Relevant Post-Secondary Trades Projects

POST-SECONDARY INSTITUTION & LOCATION	DESCRIPTION/TYPE OF PROJECT	AREA	BUDGET	# OF STUDENTS SUPPORTED
Kwantlen Polytechnic University, Cloverdale	New Build: includes 21 shops & 27 classrooms, largest LEED® Gold trades training facility in North America.	183,000 sf /17,000 m^2	$42.3 M	900
Okanagan College, Penticton	New Build: includes 14 classrooms & labs, 5 trades shops, 300 student study spaces, gymnasium, fitness room, offices, 7 meeting rooms, & innovation incubation space.	76,263 sf /7,085 m^2	$27.6 M	800
Thompson Rivers University, Kamloops	New Build: houses full auto shop, carpentry, welding & plumbing workshops & computerized manufacturing, electronics & robotics labs.	113,022 sf /10,500 m^2	$16.8 M	1,450
North Island College, Courtenay	New Build: Trades Training Centre at the Comox Valley campus, LEED® Gold registered building.	29,000 sf /2,694 m^2	$8.2 M	160
Camosun College, Saanich	New Build: Centre for Trades Education & Innovation; includes renewal & renovation of existing trades facilities.	80,000 sf /7,432 m^2	$29 M	2,800

03 STRATEGIC ALIGNMENT

3.1 Overview

As indicated in its *Institutional Accountability Plan*, BCIT is committed to real-world industry needs, and is strongly aligned with the *BC Skills for Jobs Blueprint*. Within this context, the scope of the Trades & Technology Centre project could attract the interest of a range of potential stakeholders.

3.2 Stakeholder Identification

Table 3.1: Project Stakeholders

STAKEHOLDER	WHY?
1. Province of British Columbia	With one million new job openings expected by 2022, the Province is keenly interested in how institutions are responding to the *BC Skills for Jobs Blueprint* in terms of providing a growing skilled workforce, and to the opportunities presented by new and expanding industries.
2. Ministry of Advanced Education	Providing an innovative and collaborative approach to trades education, this project offers a student-centred learning environment. By using modern technologies and practices, graduates are positioned to succeed in the labour market.
3. Industry Training Authority	Expansion of in-demand trades programs provides increased opportunities for students (including those traditionally underrepresented in the labour force) to access relevant training that responds to industry needs.
4. Employers of Trades Practitioners	Faced with a potential shortfall in the local skilled labour supply in the coming years, employers will be seeking well-trained graduates to replace large amounts of retiring personnel, and to enable increased expansion of trades projects, particularly in the LNG and shipbuilding sectors.
5. Students	Through this project, BCIT will enhance its reputation as both the leading provider of trades trained graduates in BC, and as a post-secondary institution that offers leading edge learning experiences.

3.3 Stakeholder Alignment

Table 3.2: Province of British Columbia

GOAL	SUPPORT FOR PROVINCIAL GOALS	IMPACT
1. *BC Skills for Jobs Blueprint* > *A headstart to hands-on learning in our schools.* > *A shift in education and training to better match with jobs in demand.* > *A stronger partnership with industry and labour to deliver training and apprenticeships.*	> Increasing apprenticeship enrollment capacity for skilled trades. > Provides an advanced learning environment that supports students in Accelerated Credit Enrollment in Industry Training (ACE-IT) programs for high-demand skilled labour markets. > Introduction of new trades programs to serve LNG and marine sectors.	HIGH
2. *BC Climate Change Action Plan*	> LEED® Gold Building standard. > Renovation focused on energy savings. > Estimated 50% reduction in energy consumption for NE12.	MEDIUM
3. *BC Wood First Policy*	> New building construction will feature wood products.	MEDIUM

Table 3.3: Ministry of Advanced Education

GOAL	SUPPORT FOR MINISTRY GOALS	IMPACT
1. *High quality trades training that stimulates innovation and meets economic needs.*	> A new centre that provides for new teaching equipment and practices that enhance students' learning experiences, such as simulation technologies. > New programs focused on the emerging needs of BC's economy, e.g. LNG & shipbuilding sectors.	HIGH
2. *A collaborative, innovative, and dynamic education sector, built on a common vision and strong partnerships.*	> BCIT's record of success is built on a clear vision & strong, ongoing partnerships.	HIGH
3. *An education system that works with families, business, and communities to support a student-centred experience, positioning students for success.*	> BCIT's vision, mission & values align with this Ministry goal.	HIGH
4. *International Education Strategy*	> One of BCIT's strategic goals is to optimize international student enrolment while meeting government commitments to British Columbians. The additional capacity in the new facility will the Institute to advance this goal.	HIGH

Table 3.4: Industry Training Authority

GOAL	SUPPORT FOR INDUSTRY GOALS	IMPACT
1. *E-pprentice Initiative*	> The new facility's advanced technology will allow BCIT to deliver trades and technical programs throughout the province, country and world. Spaces will also be available for applied, lab-related, and hands-on, activity-based learning. The new e-learning strategy will enable the delivery of the supporting course materials anywhere at any time.	MEDIUM
2. *Expand access to training for groups who are traditionally underrepresented, or face barriers to labour force participation.*	> Enhanced access for underrepresented populations, such as Aboriginal and female students.	HIGH
3. *Through innovation & collaboration, develop relevant training, responsive to industry, community & labour market needs.*	> BCIT's strong, continued relationships with industry employers bring relevance & responsiveness to its programs.	HIGH

Table 3.5: Employers of Trades Practitioners

GOAL	SUPPORT FOR PARTNER GOALS	IMPACT
1. *Well-trained, job-ready graduates transitioning easily and readily into workplace.*	> New facilities for continuation & enhancement of BCIT's reputation for highly employable graduates.	HIGH
2. *Replacement of trades' retirees by young graduates with good understanding of, and commitment to, trades careers.*	> Enhanced programs focused on youth & underrepresented populations with positive, exciting, and interdisciplinary learning environment.	HIGH
3. *Innovative & collaborative trades practitioner training that is relevant & responsive to industry, community & labour market needs.*	> BCIT's strong, continued relationships with industry employers bring relevance and responsiveness to its programs.	MEDIUM

Table 3.6: Students

GOAL	SUPPORT FOR STUDENT GOALS	IMPACT
1. *Optimal learning environment with high quality training facilities & instructors supporting excellence & innovation in trades training.*	> Commitment to modern facilities and equipment, and 21st century learning environment to attract excellence in instructors and learners.	HIGH
2. *Strong employment opportunities based on BCIT's reputation for highly employable & capable graduates.*	> New and expanded facilities enable BCIT to build on reputation for highly employable graduates.	MEDIUM
3. *Opportunity for future-focused, interdisciplinary learning, & pride in the role of trades practitioners in BC's growing economy.*	> Integration of trades' disciplines in a modern trades complex with a shared learning commons.	HIGH

04 OPTIONS IDENTIFICATION

4.1 Options Identification

CAPITAL OPTION: NEW TRADES & TECHNOLOGY CENTRE, WORKS YARD & NE12 STEEL TRADES RENEWAL – Preferred

This project involves a phased approach to increasing the capacity of in-demand trades programs, and enhancing learning conditions that respond to the growing demands of a high-skilled labour market. This integrated project includes construction of a collaborative Trades & Technology Centre, and renewal of the Steel Trades training building. Together, these components provide necessary program expansion space, and improved learning environments for BCIT's trade training complex.

The ability to expand programs will also allow BCIT to address the physical and functional inadequacies of other trades buildings and the works yard. Once the new Centre is completed, obsolete and inadequate buildings within the trades training complex can be demolished. The Centre will also provide swing space to permit the renovation of NE12.

STATUS QUO OPTION – Not Preferred

This option does not allow for any expansion or renewal of trades programming at BCIT, impeding the Institute's ability to provide modern teaching environments and new technologies to support emerging and expanding trade and technology industries. In addition, this option does not allow BCIT to expand programs for in-demand trades to meet growing industry demand.

NON-CAPITAL OPTION: OFF-SITE LEASE – Not Preferred

A non-capital option was not deemed viable because of the unique functional characteristics of the larger trades training complex at BCIT. Expanding in-demand trades programs to an off-site leased location would create programming and operational inefficiencies. Students need to have convenient access to various shops, structures, and classrooms within the larger complex. As configured, the components of the trades training complex at BCIT need to be in close proximity to one another.

4.2 Initial Capital/Operating Budgets

ASSUMPTIONS

The following is a list of assumptions used in the preliminary cost estimate:

- This costing is at the conceptual stage, so no unit rates were applied;
- Costs were developed through measurement of materials, labour, equipment, and items of work in as much detail as conceptual stage documents would provide;
- The new Centre is a five-level steel frame building, with base construction typical to trades programming requirements;
- Building size and scope respond to program expansion of in-demand trades and programs in alignment the *BC Skills for Jobs Blueprint*;
- Provided space is flexible and adaptable to changing technologies and industry practice;
- An allowance for hazardous material removal is included without any findings from a report;
- The structure is based on good soil conditions and standard substructure – no geotechnical information issues; and
- Allowances for FF&E and escalation were included.

INITIAL COST ESTIMATE

The following table shows the preliminary cost estimate for the project using the *Capital Budget Model*. The detailed *Cost Estimate* can be found in Appendix A.

Table 4.1: Capital Budget Model

POST-SECONDARY INSTITUTIONS - CATEGORY 1: TRADES & TECHNOLOGY CENTRE PROJECT BUDGET (Opportunity Assessment Report)

PROJECT NAME:	Trades & Technology Centre
CAMPUS:	
FACILITY NAME:	British Columbia Institute of Technology
FACILITY TYPE:	Polytechnic
FACILITY LOCATION:	Burnaby
LOCATION FACTOR:	
ANTICIPATED END DATE:	
ANTICIPATED COMPLETION DATE:	
NET ASSIGNABLE AREA:	
GROSS AREA:	12,606m^2
NET TO GROSS:	

DATE PREPARED:	
PREPARED BY:	
DATE UPDATED:	
UPDATED BY:	
DATE UPDATED:	01-Apr-16
UPDATED BY:	LEC

CATEGORY	BUDGET
PLANNING & DESIGN:	
PRE-PLANNING	$500,000
PLANNING & DESIGN FEES	$4,593,000
PROJECT MANAGEMENT (CM)	$2,122,000
OTHER (CONSTRUCTION MANAGEMENT)	$6,111,400
CONSTRUCTION:	
BUILDING	$36,415,500
RENOVATIONS	$5,547,200
SUPPLEMENTARY BUILDING COSTS	$477,600
SITE DEVELOPMENT	$0
SUPPLEMENTARY SITE COSTS	$0
OFF-SITE COSTS	$0
RESERVES:	
CONSTRUCTION (FIELD) CONTINGENCY	$3,183,000
PROJECT & SOFT COSTS CONTINGENCY	$2,122,100
COMPLETION COSTS:	
FURNITURE & EQUIPMENT	$3,134,400
PERMITS, DCC's	$622,900
LEGAL	$0
INSURANCE	$424,000
COMMISSIONING	$0
OTHER (TEMP. ACCOMMODATION & MOVING)	$637,000
SITE ACQUISITION	$0
PAYABLE GST (excluding land)	$1,214,400
CURRENT DOLLAR PROJECT BUDGET:	$67,104,500
ESCALATION ALLOWANCE:	
CONSTRUCTION ESCALATION	$2,631,700
SPECIALIZED SIMULATION EQUIPMENT	$4,194,600
END COST PROJECT BUDGET:	$73,930,800

SUPPLEMENTARY COSTS (PROVIDE DETAILS IN NOTES BOX BELOW)	
SUPPLEMENTARY BUILDING:	
UNSTABLE SOIL/BEARING CAPACITY	
STEEPLY SLOPING SITE	
DEMOLITION OF EXISTING STRUCTURES	$227,600
HAZARDOUS MATERIALS	$250,000
OTHER	
TOTAL COSTS	$477,600
SUPPLEMENTARY SITE:	
UNSTABLE SOIL CONDITIONS	
STEEPLY SLOPING SITE	
MAJOR SERVICE RELOCATION	
ADDITIONAL MUNICIPAL REQUIREMENTS	
ADDITIONAL LEED PREMIUMS	
OTHER	
OTHER	
TOTAL COSTS	$0

per m^2

per m^2

per m^2

Operating Budget

The following table only shows the annual operating budget to maintain and operate the new Trades & Technology Centre, with expected current dollar value operating costs and escalated costs to occupancy date 2019. There are no new net operating costs expected for the renewed NE12 Steel Trades building.

Table 4.2: Projected Operating Budget – Trades & Technology Centre

SERVICE	TOTAL 2015	ESCALATED TOTAL 2019
School Simulation Staff	$110,000	$119,068
Electricity	$212,503	$230,020
Natural Gas	$42,228	$45,709
Custodial	$158,015	$171,041
Maintenance	$294,235	$318,490
Security	$29,968	$32,439
IT Support	$100,000	$108,243
AV Support	$25,000	$27,061
TOTAL	**$971,950**	**$1,052,070**

4.3 Financing

CAPITAL FUNDING

The total required capital financing for this project is estimated at $73.9 million. The majority of this figure is proposed to come from the Province of British Columbia. However, BCIT has set a fundraising target of 15%, or $11,085,000 of the capital budget.

OPERATING FUNDING

The proposed project is designed to support increased intakes to programs that provide training for in-demand jobs, and respond to labour market trends. The project will require new operating funding from the Province to support the operation of the new building that provides expansion capacity of approximately 700 FTE student spaces.

4.4 Risk Identification

The following table identifies the risks associated with the preferred project option.

Table 4.3: Risk Register

RISK ID	LIFE CYCLE	RISK EVENT	TRIGGER/ ROOT CAUSE	CONSEQUENCE	NOTES
1	Strategic Options	Funding to proceed to the next phase is not granted.	Funding withheld	Project does not continue; trades expansion opportunities to address labour market needs limited; continued teaching within inadequate facilities.	
2	Business Case	Capital funding not forthcoming.	Funding withheld.	Project does not continue; trades expansion opportunities to address labour market needs limited; continued teaching within inadequate facilities.	
3	Design	Scope creep.	Design changes & evolving technologies, such as simulation.	Project delays impact phasing. Budget would be exceeded	BCIT has experienced renovation project managers & will adopt mitigating procedures.
4	Design	Cost estimates exceed pre-tendering budgets.	Design changes & evolving technologies, such as simulation.	Potential project delays; change designs to meet budgets. Scope prioritization & reduction.	BCIT has experienced renovation project managers & will adopt mitigating procedures.
5	Design	Municipal approvals not forthcoming.	Delays in municipal processing.	Project delay.	BCIT has experienced renovation project managers & will adopt mitigating procedures.
6	Design	Design does not meet functional requirements.	Lack of input from stakeholders.	Functionally inadequate design. Possible post occupancy changes.	BCIT has experienced renovation project managers & will adopt mitigating procedures
7	Construction/ Commissioning	Soil conditions problematic.	Cost impacts to foundation designs; possible delays to projects.	Project delay & additional costs.	BCIT has experienced renovation project managers & will adopt mitigating procedures.

RISK ID	LIFE CYCLE	RISK EVENT	TRIGGER/ ROOT CAUSE	CONSEQUENCE	NOTES
8	Construction/ Commissioning	Construction market inflated.	External economic factors.	Cost & timeline impacts.	BCIT has engaged QS consultants to develop conservative construction cost estimates & construction contingencies.
9	Construction/ Commissioning	Tenders exceed budget.	Delays in construction.	Project delay & extended timelines. Value engineering or increase in capital budget.	BCIT has experienced renovation project managers & will adopt mitigating procedures.
10	Construction/ Commissioning	Building permit requires design changes.	Municipal requirements.	Project delay & extended timelines may increase capital budget.	BCIT schedules pre-permit scoping meetings with municipal approving authorities to streamline the permit approval process.
11	Construction/ Commissioning	Post-tender changes by the client.	Inadequate time or process for functional programming, Building permit generates changes post-tender.	Project delay & extended timelines; capital budget exceeded.	BCIT has experienced renovation project managers & will adopt mitigating procedures.
12	Construction/ Commissioning	Unanticipated hazmat in NE12.	Increased costs & possible delays.	Project delay & additional capital costs.	BCIT will adopt mitigating procedures & has commissioned a detailed hazmat survey of the building.
13	Construction/ Commissioning	Moving costs to new building more than anticipated.	Impacts budget and/or contingency.	Additional costs to capital budget.	Move cost contingencies have been incorporated into the baseline project estimate.