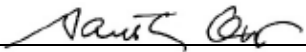


SUBJECT	UBC FIVE-YEAR CAPITAL PLAN - 2020-2021 to 2024-2025
MEETING DATE	JUNE 13, 2019

Forwarded on the Recommendation of the President

**APPROVED FOR
SUBMISSION**



 Santa J. Ono, President and Vice-Chancellor

DECISION REQUESTED	IT IS HEREBY REQUESTED that, <i>at the recommendation of the Property Committee, the Board of Governors grant approval for the submission of the UBC Five-Year Capital Plan (2020-2021 to 2024-2025) to the Ministry of Advanced Education, Skills and Training.</i>
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Report Date	May 15, 2019
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Presented By Peter Smalles, Vice-President Finance & Operations
 Andrew Szeri, Provost and Vice-President Academic, UBC Vancouver
 Robin Ciceri, Vice-President External Relations
 Gail Murphy, Vice-President Research & Innovation
 Deborah Buszard, Deputy Vice-Chancellor and Principal, UBC Okanagan
 Ananya Mukherjee-Reed, Provost and Vice-President Academic, UBC Okanagan
 Pam Ratner, Vice-Provost and AVP Enrolment & Academic Facilities
 John Metras, Associate Vice-President Facilities
 Jennifer Sanguinetti, Managing Director, Infrastructure Development
 Michael White, Associate Vice-President, Campus & Community Planning

EXECUTIVE SUMMARY

To develop capital priorities for future consideration, the Ministry of Advanced Education, Skills & Training (AEST) requests five-year capital plan submissions from all public post-secondary institutions in June of each year. A recommended UBC Five-Year Capital Plan has been developed in accordance with the University's established Capital Planning Principles and in alignment with Provincial priorities. The proposed projects, which are outlined in this report, were selected by the UBC Executive based on their potential to contribute to the University's strategic priorities and operational performance and risk mitigation priorities. These projects were prioritized from a longer list of Academic Facilities projects identified through ongoing consultation with Faculties and Departments.

The Five-Year Capital Plan submission provides an opportunity to highlight UBC's capital priorities to government for potential funding. Board approval of the Plan does not commit the University to undertake any specific project(s) nor does it commit any UBC resources. Any project that the government may choose to support would be subject to the standard UBC capital approval process.

The Seismic Plan is proposed to be addressed separately from the Five-Year Capital Plan through targeted discussions with the Ministry of Advanced Education, Skills & Training (AEST).

The Board is asked to consider the proposed Five-Year Capital Plan projects within the context of the University's long range priorities and current goals and to approve the Five-Year Capital Plan for submission to AEST.

Attachments:

1. UBC Five Year Capital Plan Academic Facilities Priorities Project Descriptions
2. Seismic Impact of Five-Year Capital Plan
3. Academic Facilities Priorities
4. Student Experience and Campus Operations Facilities Priorities

STRATEGIC CORE AREAS SUPPORTED

- a People and Places a Research Excellence a Transformative Learning a Local / Global Engagement

DESCRIPTION & RATIONALE **Five-Year Capital Plan**

To develop capital priorities for future consideration, the Ministry of Advanced Education, Skills & Training (AEST) requests five-year capital plan submissions from all public post-secondary institutions in June of each year. Board of Governors' approval is required for the submission. The Five-Year Capital Plan will provide AEST with a high-level understanding of UBC's capital requirements for new priority expansion projects, replacement/renewal projects and capital innovation projects.

UBC has developed a jointly funded Capital Plan which addresses core academic needs and aligns with Provincial priorities. The proposed projects were identified through an extensive assessment and consultation process that considered how proposed projects contribute to the University's strategic objectives and operational performance & risk mitigation objectives. The prioritization criteria, within two dimensions, are as follows:

- 1) University Strategic Priorities (100%)**
 - People & Places – 15% weighting
 - Research Excellence – 35%
 - Transformative Learning – 35%
 - Local & Global Engagement – 15%
- 2) Operational Performance and Risk Mitigation (100%)**
 - Health & Safety (e.g. seismic risk) – 25%
 - Performance & Reliability (e.g. deferred maintenance) – 25%
 - Legal / Regulatory / Reputation – 25%
 - Business Case – 25%

The criteria weighting under the Strategic Priorities areas has been changed since 2018, reflecting feedback from the UBC community through the course of consultation. Greater weighting has been assigned to research excellence and transformative learning.

The proposed UBC Five-Year Capital Plan includes priority academic projects totalling \$682 million with a request to the Provincial Government for \$366 million in funding. Demolitions or renovations associated with the new construction would reduce UBC's deferred maintenance by \$123 million and improve seismic ratings on specific buildings.

Approval of this plan does not commit the University to undertake any specific project(s) nor does it commit any UBC resources. Any project that the government may fund would be subject to the standard UBC capital approval process.

The Seismic Plan is proposed to be addressed separately from the Five-Year Capital Plan through targeted discussions with the Ministry of Advanced Education, Skills & Training (AEST).

UBC Five-Year Capital Plan: Priority Academic Projects

The UBC Five-Year Capital Plan includes strategic academic projects which support UBC priorities and focus on transformative learning and research excellence. The proposed projects are intended to align with Provincial government priorities, in particular health, economic development and facility asset renewal. These projects are shown in the context of UBC’s current list of Facilities Priorities (Academic, Student Experience, Campus Operations) which is presented at each Board meeting in the Capital Projects Update report.

As careful prioritization of proposed capital projects is critical to ensure that limited capital is directed to help UBC achieve its goals, these projects have been ranked to align with UBC’s strategic and operational objectives.

The projects proposed are shown in Table 1: UBC Five Year Capital Plan: Academic Facilities Priorities and are described in more detail in Attachment 1: UBC Five Year Capital Plan Academic Facilities Priorities Project Descriptions. The seismic mitigation impact of the proposed projects is provided in Attachment 2.

Table 1: UBC Five Year Capital Plan: Academic Facilities Priorities

UBC Campus	Project	Delivery ¹	Cost in \$Ms	Funding	Request to AEST in \$Ms	Reduced Deferred Maintenance in \$Ms
Vancouver	School of Biomedical Engineering Building	Sep-23	\$76	Government \$38M UBC \$38M	\$38	NA
Vancouver	Nursing & Kinesiology Building	Sep-24	\$134	Government \$67M UBC \$67M	\$67	\$46
Vancouver	Chemistry Laboratory Complex	Sep-24	\$224	Government \$112M UBC \$112M	\$112	\$39
Okanagan	Interdisciplinary Collaboration & Innovation Building	Sep-24	\$130	Government \$90M UBC \$40M	\$90	NA
Vancouver	Mathematics Building	Sep-24	\$118	Government \$59M UBC \$59M	\$59	\$38
	Total		\$682		\$366	\$123

1 - These target completion dates assume project funding approval by March 31, 2020.

<p>BENEFITS Learning, Research, Financial, Sustainability & Reputational</p>	<p>See Attachment 1: UBC Five Year Capital Plan Academic Priorities Project Descriptions</p>
<p>RISKS Financial, Operational & Reputational</p>	<p>See Financial section</p>
<p>COSTS Capital & Lifecycle Operating</p>	<p>See table above.</p>
<p>FINANCIAL Funding Sources, Impact on Liquidity</p>	<p>The University currently has sufficient working capital liquidity to provide internal financing for the UBC funding contribution for several of the projects.</p>
<p>SCHEDULE Implementation Timeline</p>	<p>The proposed dates of project delivery are shown for each project in Table 1: UBC Five-Year Capital Plan: Academic Facilities Priorities. These dates assume project funding approval by March 31, 2020.</p>
<p>CONSULTATION Relevant Units, Internal & External Constituencies</p>	<p>UBC Capital Priorities are developed in accordance with the University’s established Capital Planning Principles. Input on the capital priorities and prioritization process is sought and received from a range of different groups including:</p> <ul style="list-style-type: none"> • Committee of Deans/Deans’ Council (Vancouver and Okanagan) • Property & Planning Advisory Committee • Senate Academic Building Needs Committee • Vancouver Subcommittee of the Council of Senates Budget Committee • Building Operations and Energy & Water Services / UBC Okanagan Campus Operations • Alma Mater Society / UBC Students’ Union Okanagan • <i>alumni UBC</i> • Graduate Student Society • UBC Properties Trust (for information) <p>The Executive approved the final proposed Five-Year Capital Plan on May 7, 2019. A larger set of capital priorities, from which the Five-Year Capital Plan projects are drawn, is provided in Attachments 3 and 4.</p>

<p>Previous Report Date</p>	<p>June 14, 2018</p>
<p>Decision</p>	<p>The UBC Board of Governors approved the UBC Five-Year Capital Plan (2019/20 – 2023/24) for submission to the Ministry of Advanced Education.</p>
<p>Action / Follow Up</p>	

Attachment 1: UBC Five Year Capital Plan Academic Priorities Project Descriptions

Note that some minor edits may be made to these project descriptions prior to final submission to AEST. The project descriptions below are laid out in the format prescribed by AEST. As part of that format, each project is categorized according to the following:

Project Categories:

Category #	Category Description	Definition	Examples
1	New Priority Projects	<ul style="list-style-type: none"> • New system capacity • Accommodates growth 	<ul style="list-style-type: none"> • New academic building with classrooms and labs • Additions to existing academic buildings
2	Whole Asset Replacement & Renewal Projects	<ul style="list-style-type: none"> • Major renovations where 50% or more of the asset is replaced (as a percentage of replacement value; (FCI > 0.5)) • Improves the condition of the physical asset • Reduces deferred maintenance backlog 	<ul style="list-style-type: none"> • Major renovation of an academic building due to poor physical condition e.g. aged mechanical and electrical systems and/or functional obsolescence e.g. classrooms and labs no long serve the current academic programs • Complete replacement of a building envelope e.g., wall and window systems

Institution/ Campus	Project Title:	Category	Estimate	Priority
UBC Vancouver	School of Biomedical Engineering Building	1 + 2	\$76 m	1 of 5

1.0 Current Situation

The School of Biomedical Engineering (SBME), a partnership between the Faculties of Medicine and Applied Science, is a new flagship entity at UBC, and a top strategic priority for the University and both Faculties. The vision is to create a facility that supports the learning, research and innovation goals of the SBME and leverages the unique opportunity for UBC leadership in biomedical engineering.

The proposed School of Biomedical Engineering building will support the expansion of the undergraduate and graduate programs, as well as research activities. The functional program includes classrooms, teaching laboratories, research laboratories, office space, meeting space and informal learning/student community space. The 10,050 GSM (108,200 GSF) facility is proposed to be located between the Applied Science and Medicine precincts on the UBC Vancouver campus. Several sites are being evaluated.

The Biomedical Research Centre (FCI 0.51) is the interim physical location of the SBME and renovations to this space are part of the project and will improve the condition of that facility. While this facility can accommodate current graduate student enrolment and the start up of the undergraduate program with 60 students, a larger, new facility will be required to address planned program growth over the next 5 years to 500 undergraduate and 220 graduate students.

2.0 Project Description

The School's vision is focused on building health from biology through a robust pipeline of efforts across scales from engineering the molecular structures to implementing novel community based healthcare solutions. The SBME faculty will conduct research that advances our fundamental understanding of human biology and that yields technologies and therapies that advance health and wellbeing.

Significant investments have been made in creating the SBME and many activities are ramping up, including hiring new faculty and staff, launching new programs and building new partnerships. For SBME to fulfil its potential and be a central hub for human health research, training and entrepreneurship on campus, a dedicated building for research, teaching and learning, and innovation is required. More than that, the program ramp-up, and its near-term hiring and education goals, requires the development and refurbishment of current space allocations in the Biomedical Research Centre (BRC) over the next 18 months, and designation of new (interim) BME space while the building is being constructed. Over the longer term, the proximity of key stakeholders within one space, with substantive activities at hospital partner sites (hub and spoke model), is envisioned. This will provide a nexus for infrastructure and equipment consolidation, and the coordinated delivery of education, research and (clinical and commercialization) innovation programs.

Undergraduate Students: The Ministry committed new funding for 355 domestic student FTEs, which will be fully enrolled by 2022-2023, as students progress through the four-year undergraduate program (BASc in Biomedical Engineering). It is expected that the new program will have an international student component of about 30 percent of total enrolment. This is similar to other BASc programs and will result in a total complement of 500 undergraduates.

Graduate Students: UBC has had an interdisciplinary graduate program in Biomedical Engineering for many years. Going forward, graduate students in Biomedical Engineering will be affiliated with the SBME. The current number of students is over 90. It is expected that with new faculty recruits, joint appointments and associate memberships in SBME, an additional 50-70 graduate students will emerge. The total number of graduate students, research fellows and staff is thus projected to be about 220 individuals.

Faculty & Staff: The School is projected over the next 3-4 years to employ, wholly or jointly, between 12 and 15 new faculty members (about 9-12 research stream faculty and 3 educational leadership stream faculty). In addition, there are projected to be seven staff members supporting the School. Furthermore, there will be over 25 joint faculty and associate members in the School. Supplementing these seed positions are additional resources including faculty lines from the Biomedical Research Centre (now part of the School), new positions from the FoM's Faculty Renewal and Translational Clinical Faculty initiatives, and partnerships with other departments and research organizations (including the Michael Smith Laboratories).

3.0 Project Objectives

- Provide sufficient space for expansion of SBME undergraduate and graduate programs.
- Provide high capacity, flexible and efficient purpose-built facilities for SBME research activities.

4.0 Options considered

Applied Science fully occupies 14 buildings at UBC Vancouver, with a significant presence in four additional buildings, and specific functions in another six buildings. Several of these facilities are small or special purpose, designed to accommodate one or more of the specialized processes critical to engineering research or the hands-on learning experience. Medicine similarly occupies space in multiple buildings at UBC Vancouver, including the UBC Hospital.

Infrastructure Development confirms that all of these core facilities are fully functional and intensively used. There is no existing space available to accommodate the planned SBME expansion. New expansion is required and detailed planning is underway to determine project scope costing, site analysis, funding/financing strategy.

5.0 Project Outcomes

- **Infrastructure Improvements**

The project will include renovations to the Biomedical Research Centre which will improve the condition of that facility.

- **Innovation/Cost Effectiveness**

Students will learn to apply quantitative analyses and engineering design principles across biological scales and to develop innovative solutions that impact clinical practice and lead to innovation in the life sciences. The SBME, as the first comprehensive inter-faculty School of BME in Canada, will play a central role in BC’s and Canada’s leadership in biomedical entrepreneurship. SBME will serve as an innovation hub for education and research across both the Faculties of Applied Science and Medicine, working with industry and health partners, to accelerate discoveries and improve health outcomes for BC and around the world.

- **Quality Education/ Innovation/ Strategic Alignment**

The School of Biomedical Engineering offers both undergraduate and graduate program options that emphasize a balance of biomedical engineering and life science study with a focus on clinical and industrial application. This interdisciplinary program uses engineering techniques and technologies to address needs within the medical and healthcare sectors. Opportunities for education and research exist in areas such as biomechanics, biomaterials, biochemical processing, cellular engineering, imaging, medical devices, micro-electro-mechanical implantable systems, physiological modeling, simulation, monitoring and control, as well as medical robotics.

- **Energy & Emission Reduction:** This project will target LEED Gold certification.

6.0 Project Cost/ Funding for the School of Biomedical Engineering Building

Estimate	Total
Planning and Design	\$6,800,000
Construction	\$53,200,000
Contingencies	\$3,900,000
Completion Cost	\$10,860,000
Taxes	\$1,240,000
Total	\$76,000,000

Proposed Funding	Amount
UBC (including donor funding)	\$38,000,000
Government	\$38,000,000
Total	\$76,000,000

Annual Operating + Maintenance	Amount
10,050 GSM @ \$92.57/GSM	\$930,500
Total	\$930,500

Recapitalization	Amount
Cyclical Maintenance	\$379,800
Modernization/ Upgrade	\$100,600
Total	\$480,400

7.0 Key Risks

- Unusual construction cost escalation is currently being experienced due to a high level of market activity that has reduced contractor availability and bid coverage. An escalation contingency has been included in the cost estimate to mitigate this risk.
- Project costs and schedule overruns are mitigated by UBC’s retained risk contingency policy and project risk management practices (e.g. risk registry).
- UBC will apply the experience gained from recently completed capital projects.
- Provincial Funding is anticipated but yet to be confirmed.

8.0 Project Schedule

This project can be completed in 42 months from date of funding approval.

Institution/ Campus	Project Title:	Category	Estimate	Priority
UBC Vancouver	Nursing & Kinesiology Building	1 + 2	\$134m	2 of 5

1.0 Current Situation

The Nursing & Kinesiology Building (NKB) is envisioned as a leading knowledge centre in the field of sustainable health, disease prevention, and chronic disease management. A model of cross-professional collaboration, the planning for the NKB is being undertaken by the School of Kinesiology (Faculty of Education) and the School of Nursing (Faculty of Applied Sciences), well known for their innovative work in community based health programs. This project proposes a new world class facility which will provide a unique integration of interdisciplinary research, teaching, clinical training and community outreach focusing on healthy living and aging, chronic illness prevention and management, and risk reduction for vulnerable populations.

The academic units intended to occupy this space are currently housed in 11 different UBC facilities. The current space is dispersed, outmoded and inadequate and all the units have well-identified facilities needs including outdated laboratories and teaching facilities, deficiencies in accessibility, aging and unreliable infrastructure and current space targeted for demolition or alternate use. Governments have recognized that the health professions are facing significant shortages if several factors persist, including the number of educational seats available, the number of projected retirements, and demands on the system. UBC is limited in its potential to expand the related programs because of the limitations of the facilities that currently house these programs. Consolidation in a new facility will improve program delivery, operations and provide opportunities for synergistic inter-professional education.

2.0 Project Description

NKB is proposed as a new 17,115 GSM (184,225 GSF) building on the Gateway South site at the NW corner of University Boulevard and Wesbrook Mall. This new facility will address individual and collective teaching, learning, community engagement and research mandates in the fields of community health, healthcare and science.

NKB will accommodate the School of Kinesiology (Faculty of Education) and School of Nursing (Faculty of Applied Sciences) which are currently housed in dispersed, outmoded and inadequate space. These groups are committed to inter-professional interaction that will contribute to each School’s continued leadership nationally and globally.

Using highly connected teaching with virtual and simulation models, they will focus on flexible learning delivered through inter-professional education and practice and play an important provincial role in health policy development, health service delivery planning, education of health service providers and knowledge translation in health care.

This facility will provide a unique integration of research, teaching, clinical training and community outreach focusing on healthy living and aging, chronic illness prevention and management, and risk reduction for vulnerable populations.

Key concepts for NKB are:

- Community contexts and social determinants of health
- Design of healthful, sustainable living environments
- Role of active, healthy living in disease prevention and recovery
- Health behaviour change
- Home, community, and healthcare systems
- Vulnerable populations and health across the lifespan
- Knowledge capture, translation, and implementation.

Nursing enrolls about 250 baccalaureate degree students annually, in a 20-month program, and 200 graduate students. The Ministry approved a doubling of the nurse practitioner program this year. The Kinesiology program has grown substantially over the past decade with 1,350 students in the baccalaureate degree program (58% more than in 2008) and 125 graduate students. The QS World University Rankings by Subject ranked the UBC School of Nursing 20th in the world and 4th in Canada, and UBC Kinesiology was ranked 4th in the world and 1st in Canada.

The two academic units will be co-located to facilitate inter-program interaction that contributes to each unit's continued leadership nationally and globally. Using highly connected teaching with virtual and simulation models, they will focus on flexible learning delivered through inter-professional education and practice. The facilities needs for both the School of Kinesiology and School of Nursing are well understood and have been documented and updated in Master Programs, Functional Programs and Executive Reports by Resource Planning Group (RPG) and Infrastructure Development - Facilities Planning a total of six times since 2006. The recent functional program updated by RPG (May 2017) calls for: School of Kinesiology: 9,280 BGSM; School of Nursing: 7,835 BGSM.

3.0 Project Objectives

- Innovative knowledge centre in sustainable community health that will contribute directly to improved health and wellness in BC, Canada and the world
- Unique integration of research, teaching, clinical training and community outreach focusing on health living and aging, chronic illness prevention and management, and risk reduction for vulnerable populations.
- Emphasis on disease prevention and community-based approaches to health, and
- Inter-disciplinary, cross-professional learning, research and collaboration among complementary disciplines

4.0 Options considered

Status Quo: Given the dispersed and inadequate nature of their existing facilities, these groups can no longer be accommodated in their current facilities.

Lease, Sublease, Use/rental of vacant or underutilized public assets: No adequate space in these categories is available at the UBC Vancouver campus.

Phased approach: Phasing has been reviewed and is a possibility that can also work for UBC. The logistics must be reviewed further.

Build New: The optimal solution is to build a new facility in a single phase as proposed.

5.0 Project Outcomes

- **Infrastructure Improvements**

Relocating from 11 different buildings to one will provide the most benefit for improved space utilization and opportunities for inter-professional experience and program expansion. Much needed learning space will be provided. Existing space will be demolished or re-used and reallocated. Nursing can relinquish inadequate space in UBC Hospital, which was occupied almost 40 years ago as a temporary solution.

- **Cost Effectiveness**

Combining Nursing and Kinesiology in the NKB offers economies of scale, academic support and other opportunities for synergies through shared use of space. NKB will meet LEED Gold certification standard as per UBC and Provincial government policy. The design team will be encouraged to look for efficiencies in the shared common area spaces (washrooms, changerooms, lobbies, stair systems, service areas) that would otherwise require duplication.

- **Strategic Alignment and Innovation**

NKB will contribute directly to the BC government's goals to ensure BC's position as a global destination of choice for students to learn, stay to live, work and invest. These programs support the provincial goals of improved health and wellness for British Columbians, the City of Vancouver's plans for healthy, active communities, and the Federal government's initiatives to increase health, wellness and well-being of Canadians.

- **Quality Education**

The UBC Schools of Nursing and Kinesiology are currently faced with space shortages and rising demands for teaching and research capacity. These units are expecting further significant enrolment increases in both undergraduate and graduate student cohorts. The new NKB facility will address these demands for quality learning and research space.

The most effective means of ensuring sustainable health care is through the promotion of healthy living and healthful environments, prevention and management of chronic illnesses, provision of accessible primary health care, and the reduction of inequities and risks for marginalized populations. NKB is committed to moving health care 'upstream' to support prevention and community-based approaches.

NKB offers programs in community health, health care and science that can:

- Increase student participation in learning and service.
- Increase support for international collaborations by faculty, staff, and alumni.

- Expand recruitment of outstanding students and faculty from around the world.
- Increase the number of substantial strategic partnerships in regions of priority to UBC.
- Enhance UBC’s scholarly communications on global issues, including on the web.
- Strengthen UBC’s role in international development

• **Energy & Emission Reduction**

This project will target LEED Gold certification. Integrated programs have an opportunity to share previously duplicated core space resources

6.0 Project Cost/Funding

Estimate	Total
Planning and Design	\$12,000,000
Construction	\$94,000,000
Contingencies	\$6,800,000
Completion Costs	\$19,000,000
Taxes	\$2,200,000
Total	\$134,000,000

Proposed Funding	Amount
UBC (including donor funding)	\$67,000,000
Government	\$67,000,000
Total	\$134,000,000

Annual Operating + Maintenance	Amount
17,115 GSM @ \$92.57/GSM	\$1,584,500
Total	\$1,584,500

Recapitalization	Amount
Cyclical Maintenance	\$655,000
Modernization/ Upgrade	\$174,000
Total	\$829,000

7.0 Key Risks

- Unusual construction cost escalation is currently being experienced due to a high level of market activity that has reduced contractor availability and bid coverage. An escalation contingency has been included in the cost estimate to mitigate this risk.
- Project costs and schedule overruns are mitigated by UBC’s retained risk contingency policy and project risk management practices (e.g. risk registry).
- UBC will apply the experience gained from recently completed capital projects.

8.0 Project Schedule

This project can be completed in 48 months from date of funding approval.

Institution/ Campus	Project Title:	Category	Estimate	Priority
UBC Vancouver	Chemistry Laboratory Complex	1 + 2	\$224m	3 of 5

1.0 Current Situation

Undergraduate demand for Chemistry courses has grown significantly over the years and will continue to grow, especially with the expansion of engineering and the introduction of new areas of engineering, including biomedical engineering. Every UBC science and UBC engineering student’s education includes chemistry courses and this requirement has increased with the introduction of UBC’s Vantage One program. However, the layout, age, condition, and inadequate infrastructure of the existing teaching laboratory facilities restrict pedagogical development and growth in student numbers, and is strained in its ability to support planned international student

enrolment. The next generations of scientists, engineers and health personnel must be trained in sophisticated, state of the art techniques that relate to analytical chemistry, nanomaterials, new drug discovery, and industrial catalysis. Existing chemistry research space is also insufficient and the poor infrastructure in the Chemistry Physics Building laboratories both limits the kind of research that can be pursued and is a barrier to recruitment and retention of outstanding faculty. Updated and expanded research space is critical to support the Department’s growth and advancement. The chemistry teaching laboratory of the future calls for designs that support the pedagogical needs of the university while creating high quality lab environments. Facilities built decades ago supported the use of lab benches, a feature prominent in modern teaching labs; however the standards for safety equipment and practices have changed markedly. New facilities will provide modern infrastructure, including electrical systems and fume hoods, which will enable students to work with volatile chemicals and to safely develop competence in synthetic methods.

2.0 Project Description

UBC proposes to build a 23,485 GSM expanded replacement facility for undergraduate Chemistry teaching and Chemistry Physics research activities which will fulfill capacity requirements and provide up to date, flexible space with full infrastructure capability.

3.0 Project Objectives

This replacement facility will:

- Provide the opportunity for transformative student learning through enhanced laboratory experiences in a facility with appropriate infrastructure to meet today’s and tomorrow’s standards
- Create flexible learning facilities that can adapt to evolving pedagogies
- Provide capacity for increased demand for Chemistry teaching
- Provide opportunities for group work and collaboration through informal learning spaces and innovative classrooms
- Aid in the recruitment and retention of exceptional students and faculty.

4.0 Options considered

Renewal of the Chemistry teaching buildings and the Chemistry Physics building was considered instead of replacement, however, the existing buildings are insufficient in area to accommodate the expanding teaching and research needs, and to provide facilities that meet current safety standards. The existing buildings total 16,430 GSM, while the planned expansion brings the area to 23,645 GSM.

Building Size

	Date Built	Exist GSM	Program GSM
Chemistry B or Chemistry South (Bldg 148)	1959	5,240	
Chemistry C or Chemistry East (Bldg 144)	1963	3,560	
Subtotal Chem B, C		8,800	12,705
Chemistry A or Chemistry Physics (Bldg 447)	1989	7,630	10,940
TOTAL		16,430	23,645

GSM = gross square metres

Based on these analyses, replacement of the existing buildings is recommended. Infrastructure Development developed three potential siting and phasing options:

- Option A: Single phase teaching/research building constructed on the Wesbrook/Cunningham site after current swing space use of these old buildings is concluded in 2019.
- **Option B: Phase One:** Construct a teaching building on the Wesbrook site and vacate Chemistry B and C. **Phase Two:** Construct a research building on the Chemistry B site.
- Option C: Phase One: Swing out Chemistry B functions and construct a teaching/research building on the Chemistry B site; relocate Chemistry A research to the new building. Phase Two: Construct a teaching/research building on the Chemistry A site.

Option B is the preferred option for several reasons:

- Operational advantage to consolidating research activities on the current Chemistry complex site
- Greater fundraising opportunity for a building that is research oriented
- Wesbrook/Cunningham site will have capacity for additional non-Chemistry teaching facilities (new classrooms and other learning spaces)

5.0 Project Outcomes

- **Infrastructure Improvements**

Replacement facilities will correct the problem of limited servicing in the Chemistry research buildings which is caused by the current location and configuration of Chemistry Stores. It will eliminate the outdated buildings' deferred maintenance issues which include envelope, electrical and mechanical systems and seismic upgrades, sprinklers and Code upgrades.

The project will demolish and replace Chemistry East/C (built in 1963), Chemistry South/B (1959) and Chemistry Physics/A (1989). These deteriorating buildings have reached the end of their service life and are rated Tier V seismic risk (very high risk). Demolition or retrofit of these buildings should result in reduced life safety risk on campus. If the Wesbrook/Cunningham site is selected for all or part of the Chemistry Laboratory Complex (Options A & B), 4 additional buildings would be removed from the very high seismic risk category and deferred maintenance would be reduced by an additional \$51.94 m.

Associated Deferred Maintenance	Deferred Maintenance in \$Ms	FCI	Built
Chemistry A Chemistry Physics (Bldg 447)	18.58	0.57	1989
Chemistry B Chemistry South(Bldg 148)	13.02	0.57	1959
Chemistry C Chemistry East (Bldg 144)	7.41	0.54	1963
Subtotal	\$ 39.01		
If Wesbrook site selected:			
Wesbrook (Bldg 864)	31.06	0.79	1949
Wesbrook Addition (Bldg 867)	2.5	0.57	198
Cunningham (Bldg 625)	10.12	0.74	1960
Cunningham Addition (Bldg 624)	8.26	0.75	1971
Subtotal	\$ 51.94		
Total	\$ 90.95		

- **Cost Effectiveness**

With the noted FCIs, the Chem B and C buildings are marginal but could be considered as candidates for building renewal. Their size, however is insufficient and renewal would perpetuate the inefficiency of a teaching program split between two buildings. There is also a challenge with insufficient fumehoods in these building. Chemistry A, however, is suffering from failed envelope and mechanical systems and the projected costs to repair are beyond consideration. Consolidation will encourage operational efficiencies, e.g. equipment and space sharing. A larger replacement building on the proposed site of Wesbrook /Cunningham site will intensify land use on a prominent central campus site.

- **Quality Education/ Innovation/ Strategic Alignment**

Laboratory experiences enhance learning by providing the opportunity to explore practical problems and research questions. Faculty have been exemplary in adapting desired lab experiences to suit existing conditions, but the physical space and infrastructure hamper their efforts to be innovative. New, flexible, up-to-date facilities to support today’s trends in collaborative learning will lead to transformative student learning.

- **Energy & Emission Reduction:** This project will target LEED Gold certification.

6.0 Project Cost/Funding for Chemistry Laboratory Complex

Estimate	Total
Planning and Design	\$20,200,000
Construction	\$149,800,000
Contingencies	\$11,500,000
Completion Costs	\$32,000,000
Demolition Costs	\$7,000,000
Taxes	\$3,500,000
Total	\$224,000,000

Proposed Funding	Amount
UBC (including donor funding)	\$112,000,000
Government	\$112,000,000
Total	\$224,000,000

Annual Operating + Maintenance	Amount
23,485 GSM @ \$92.57/GSM	\$2,174,000
Total	\$2,174,000

Recapitalization Costs	Amount
Cyclical Maintenance	\$887,300
Modernization/ Upgrade	\$230,000
Total	\$1,117,300

7.0 Key Risks

- Unusual construction cost escalation is currently being experienced due to a high level of market activity that has reduced contractor availability and bid coverage. An escalation contingency has been included in the cost estimate to mitigate this risk.
- Project costs and schedule overruns are mitigated by UBC’s retained risk contingency policy and project risk management practices (e.g. risk registry).
- UBC will apply the experience gained from recently completed capital projects.

8.0 Project Schedule

This project can be completed in 48 months from date of funding approval.

Institution/ Campus	Project Title:	Category	Estimate	Priority
UBC Okanagan	Interdisciplinary Collaboration & Innovation Building	1	\$130 m	4 of 5

1.0 Current Situation

The Okanagan Campus is proposing a new academic building to facilitate worldleading, inter/transdisciplinary teaching and research, to advance its commitment to TRC Calls to Action, and to address critical space capacity needs. The Okanagan campus not only faces an acute shortage of academic and student space, there is also a near-total absence of spaces that can facilitate interdisciplinary, collaborative learning and engagement. The proposed building is expected to be at least 15,330 GSM (165,000 GSF) and will open up opportunities for the entire campus (as opposed to being discipline-specific). The current title is a place-holder. The Dean’s Council has recommended that we ask UBCO’s Indigenous Advisory Council to propose a name for the building.

2.0 Project Description

Space for Teaching and Student Support: 56% (107,000 gsf) of the 165,000 gsf will be dedicated to teaching, student support, and purpose-built spaces to facilitate interactive learning and community engagement. At steady state, the programs housed in the building will have an enrolment of approximately 400. We envisage this building to provide a fully digitally enabled active learning space for a wide range of interdisciplinary programs: such as the Indigenous language fluency and revitalization initiatives, programs in high-value agriculture and indigenization of agroecology; health technology and health management; cannabis research and management; interdisciplinary programs in 4D and 5D design etc. The building is intended to serve a much broader group of students through the facilities it will provide, addressing the following critical gaps in our current facilities:

- The campus currently has only 3-4 classrooms that are fully digitally enabled for delivering curriculum across UBC’s two campuses or to connect to other relevant community partners who can participate in our programs.
- The campus currently has extremely few classrooms to accommodate large numbers of students (over 100); this is a serious constraint for delivering innovative curricular approaches
- The campus currently has no buildings that include particular design features that help us advance the goals of inclusion (in particular indigenization of the campus). The Okanagan School of Education, Faculty of Education UBC, is very keen to foster such potential. Our Canada Research Chair in Okanagan Nation Philosophy, our relationship with the Okanagan Nation Alliance, and the Indigenous Advisory Council will be key to achieving these aspirations.

Research Space: 44% of the space in the building will be dedicated to research. Four main areas of interdisciplinary research will be housed in this facility. These areas have been chosen carefully taking into consideration several factors: alignment with UBC’s strategic plan; relevance for the region, and potential for significant social impact; current research strengths of UBCO faculty; potential for indigenization and indigenous engagement; potential for synergy between the two campuses of UBC; and potential for translating the knowledge generated by this research into unique interdisciplinary academic programs.

Researchers to be housed in the ICI	New faculty	Existing faculty	Graduate & post-doctoral
<i>New frontiers in Health Technologies and social innovations in health care management, delivery and governance</i>	10	47	160
<i>High Value Agriculture</i>	10	26	120
<i>Cannabis in Health and Society</i>	5	9	60
<i>Digital Media and Creative Industries</i>	5	12	60
Total	30	94	400

3.0 Project Objectives

The proposed building will help UBC Okanagan advance its three key goals: accelerate research in key areas local and global impact; advance indigenous engagement; and free up space for critical student service which we are currently unable to offer due to our acute space shortage.

Over the next decade, the initiatives contemplated here will create a community of approximately 125 faculty (including 30 new faculty to be recruited in the next 10 years), 400 graduate students and post- doctoral researchers, and house up to 6 new graduate and undergraduate programs.

4.0 Options considered

New expansion is required and detailed planning is underway to determine project scope costing, site analysis, funding/financing strategy.

5.0 Project Outcomes

- **Quality Education/ Innovation/ Strategic Alignment**

The teaching and research areas defined in 2.0 Project Description have been chosen carefully taking into consideration several factors: alignment with UBC’s strategic plan; relevance for the region, and potential for significant social impact; current research strengths of UBCO faculty; potential for indigenization and indigenous engagement; potential for synergy between the two campuses of UBC; and potential for translating the knowledge generated by this research into unique interdisciplinary academic programs.

- **Energy & Emission Reduction** This project will target LEED Gold certification.

6.0 Project Cost/ Funding

Estimate	Total
Planning and Design	\$11,700,000
Construction	\$91,000,000
Contingencies	\$6,680,000
Completion Costs	\$18,500,000
Taxes	\$2,120,000
Total	\$130,000,000

Proposed Funding	Amount
UBC (including donor funding)	\$40,000,000
Government	\$90,000,000
Total	\$130,000,000

Annual Operating + Maintenance	Amount
15,330 GSM @ \$92.57/GSM	\$1,419,000
Total	\$1,419,000

Recapitalization Costs	Amount
Cyclical Maintenance	\$580,000
Modernization/ Upgrade	\$150,000
Total	\$730,000

7.0 Key Risks

- Unusual construction cost escalation is currently being experienced due to a high level of market activity that has reduced contractor availability and bid coverage. An escalation contingency has been included in the cost estimate to mitigate this risk.
- Project costs and schedule overruns are mitigated by UBC’s retained risk contingency policy and project risk management practices (e.g. risk registry).
- UBC will apply the experience gained from recently completed capital projects.

8.0 Project Schedule

This project can be completed in 48 months from date of funding approval.

Institution/ Campus	Project Title:	Category	Estimate	Priority
UBC Vancouver	Mathematics Building	1 + 2	\$118 m	5 of 5

1.0 Current Situation

The Department of Mathematics at UBC is one of the strongest mathematics departments in Canada. It is ranked 26th in world and 2nd in Canada, according to the QS World University Rankings. The Department has strong connections with other departments and institutes at UBC, and has a major role in the cross-disciplinary Institute of Applied Mathematics (IAM), with members from Science, Applied Science and other UBC faculties. The Department teaches about 2,000 undergraduate course FTEs annually, 34% more than a decade ago.

The layout, age, condition, and inadequate infrastructure of Mathematics, Mathematics Annex and LS Klinck restrict pedagogical development, and will not support program growth and cohesion. This project proposes to replace the Mathematics Building and the Mathematics Annex, 2-storey wood frame structures with exterior stucco and interior plaster finishes constructed in 1924-25 which have now reached the end of their service life. The LS Klinck Building and addition have limited accessibility, lack a sprinkler system, and have been identified as Tier IV (very high) seismic risk. Although building systems have been partially upgraded over time as needs have arisen or as renovations occurred, these buildings have large amounts of deferred maintenance.

2.0 Project Description

Faculty/Department: Science – Mathematics including PIMS, and Integrated Sciences; Provost’s Office – UBC IT

This project proposes a 16,877 GSM facility to replace deteriorating buildings which have reached the end of their service life. The proposed plan is to build an expansion and replacement facility to address teaching and research needs, fulfill capacity requirements and provide up to date, flexible space with full infrastructure capability. The project will include replacement of lecture theatres and classrooms that serve the wider precinct. A new structure will provide a more pleasant learning environment that will be designed to facilitate collaboration. A complicated scenario of swing space and consequential moves must accompany this project. The proposed site is on or near the site of the existing Math and Klinck buildings on West Mall.

Program: A 2012 Mathematics Master Program was updated in 2017.

	GSM	GSF
Math Program	10,417	112,087
Klinck	5,800	62,408
Ponderosa A	660	7,102
Total area	16,877	181,597
\$650/GSF		\$118,000,000

3.0 Project Objectives

- Provide higher capacity, more flexible and efficient facilities.

4.0 Options considered

Consideration of renewal and replacement options are underway. New expansion is required and detailed planning is underway to determine project scope costing, site analysis, funding/financing strategy.

5.0 Project Outcomes

- **Infrastructure Improvements**

Demolition of these three buildings will eliminate \$37.7 million in deferred maintenance.

Associated Deferred Maintenance	Deferred Maintenance in \$Ms	FCI	Built
Mathematics (Bldg 518)	8.05	0.78	1924
Mathematics Annex (Bldg 519)	2.71	0.69	1925
LS Klinck & Addition (Bldg 308, 308-1)	26.95	0.75	1947
Total	\$ 37.7		

- **Cost Effectiveness**

Consideration of renewal and replacement options are underway.

- **Energy & Emission Reduction** This project will target LEED Gold certification.

6.0 Project Cost/ Funding for Mathematics & Annex and LS Klinck Building Replacement

Estimate	Total
Planning and Design	\$10,600,000
Construction	\$82,600,000
Contingencies	\$6,050,000
Completion Costs	\$16,810,000
Taxes	\$1,940,000
Total	\$118,000,000

Proposed Funding	Amount
UBC (including donor funding)	\$59,000,000
Government	\$59,000,000
Total	\$118,000,000

Annual Operating + Maintenance	Amount
16,877 GSM @ \$92.57/GSM	\$1,562,000
Total	\$1,562,000

Recapitalization Costs	Amount
Cyclical Maintenance	\$637,400
Modernization/ Upgrade	\$165,300
Total	\$802,700

7.0 Key Risks

- Unusual construction cost escalation is currently being experienced due to a high level of market activity that has reduced contractor availability and bid coverage. An escalation contingency has been included in the cost estimate to mitigate this risk.
- Project costs and schedule overruns are mitigated by UBC’s retained risk contingency policy and project risk management practices (e.g. risk registry).
- UBC will apply the experience gained from recently completed capital projects.

8.0 Project Schedule

This project can be completed in 48 months from date of funding approval.

Attachment 2: Seismic Mitigation Impact of Five-Year Capital Plan

	UBC Campus	Project	Seismic impact (Demolition or Renewal)
1	Vancouver	School of Biomedical Engineering	None
2	Vancouver	Nursing & Kinesiology Building	War Memorial Gym (Bldg 428) Robert F Osborne Centre Unit 1 (Bldg 430) Robert F Osborne Centre Unit 2 (Bldg 431)
3	Vancouver	Chemistry Laboratory Complex	Chemistry A (Chem Physics) (Bldg 447) Chemistry B (Chem South-Bldg 148) Chemistry C (Chem East -Bldg 144) * Wesbrook Building & Annex (Bldg 864,867) and George Cunningham & Annex (Bldg 625, 624)
4	Okanagan	Interdisciplinary Collaboration & Innovation Building	None
5	Vancouver	Mathematics Building	Mathematics & Annex (Bldg 518, 519) LS Klinck (Bldg 408, 408-1)

* If the Wesbrook/Cunningham site is selected, these buildings would be demolished.

Attachment 3: Academic Facilities Priorities

Academic Projects	Faculty / Department	Capital Cost (\$000s)
School of Biomedical Engineering	Applied Science/Medicine	\$76,000
Nursing & Kinesiology Building	Applied Science/Education	\$134,000
Chemistry Lab Complex	Science	\$224,000
Interdisciplinary Collaboration & Innovation Building – UBC Okanagan	UBCO Multi-Faculty	\$130,000
Mathematics Building	Science	\$118,000
Seismic Upgrade Projects (not covered for upgrade through other capital plan projects)	Central Administration	\$867,000
Academic Building Expansion UBC Okanagan	UBCO Multi-Faculty	\$53,000
Applied One	Applied Science	TBD
Asian Centre	Arts / Library	\$30,000
Belkin Expansion	Arts	\$8,000
Biodiversity Expansion	Science	TBD
Bridging Projects – UBC Okanagan	UBCO Multi-Faculty	\$25,000
Centre for Interactive Research on Children's Learning Environments (CIRCLE)	Medicine/Applied Science	\$26,000
Classroom Facility	Provost	\$70,000
Computer Science Expansion	Science	\$154,000
Digital Learning Factory – UBC Okanagan	UBCO Applied Science	\$78,000
Downtown Presence	VP External	\$7,000
Forestry Expansion	Forestry	\$30,000
Future Academic Building – UBC Okanagan	UBCO Multi-Faculty	\$104,000
Geography Building	Arts	\$50,000
Hotel & Academic Conference Centre	SHHS / St John's College	TBD
Innovation Hub (integrated with student housing at Copp site)	VP Research	\$45,000
JB MacDonald Building Expansion (Dentistry)	Dentistry	\$65,000
Learning Exchange	VP External	\$1,925
Medicine One	Medicine	TBD
Music Replacement & Expansion	Arts	\$81,000
Sauder Graduate School Expansion	Sauder	\$106,000
School of Public Policy & Global Affairs	Arts	\$30,000
The Hive @ UBC Farm	Land & Food Systems	\$33,000
TEF 4 – UBCPT Commercial Development	Central Admin/Research	TBD*
Total Academic		\$2,545,925

Academic facilities projects are potentially funded through government contributions, donors, Faculty operating budgets and/or Academic Building Fund (Central operating budget). **Projects highlighted in red are proposed for the UBC Five-Year Capital Plan** submitted annually to the Ministry of Advanced Education, Skills and Training for potential government funding. A separate priority funding request for Seismic Upgrade Projects will be made to the Province outside the Five-Year Capital Plan.

Attachment 4: Student Experience and Campus Operations Facilities Priorities

Student Experience Projects	Faculty / Department	Cost (\$000s)
Student Housing at Copp Site (with Innovation Hub) (500 beds, 2023)	SHHS/VPRI	\$76,000
Armoury Commons (1,000 beds, 2024)	SHHS/Arts	\$120,000
Totem Park East / Totem Field (700 beds, 2024/25)	SHHS	\$119,000
Orchard Commons In-Fill (200 beds)	SHHS	\$30,000
St. John's College Graduate Residence Expansion (100-150 beds)	St. John's College/ SHHS	TBD
Integrated Health Centre / UBC Life Building (Phase 2)	VP Students	\$23,000
Recreation Facility	Athletics & Rec	\$55,000
Baseball Stadium (Phase 2)	Athletics & Rec	\$5,000
Thunderbird Stadium redevelopment	Athletics & Rec	\$35,000
UBCO Gymnasium Expansion	UBCO Athletics	\$30,000
Total Student Experience		\$493,000

Student Experience facilities projects are funded through a variety of sources including internal revenue generation (e.g. student housing rents), donors, student fees, and savings related to designation of SHHS as a government business enterprise (GBE)

Campus Operations Projects	Faculty / Department	Cost (\$000s)
Administration Consolidation	Finance/HR/ External Relations	TBD
Cogeneration Plant	Energy + Water Services	\$56,000
Diesel Fuel Storage Facility	Energy + Water Services	\$5,000
Total Campus Operations		\$61,000

Campus Operations facilities projects are funded through a variety of sources including government contributions, Central operating budget, operational savings and Infrastructure Impact Charges (IICs).