

TO: Planning and Budget Committee

SPONSOR: Elizabeth Sisam, Assistant Vice-President, Campus and Facilities Planning

CONTACT INFORMATION: 416-978-5515; avp.space@utoronto.ca

DATE: February 19, 2010 for March 3, 2010

AGENDA ITEM: 6

ITEM IDENTIFICATION:

Project Planning Report for the expansion of the Biozone: Bioengineering Research Facility for Energy, Environmental, and Economic Sustainability.

JURISDICTIONAL INFORMATION:

Under the Policy on Capital Planning and Capital Projects, the Planning & Budget Committee reviews Project Planning Reports prepared for a capital project and recommends to the Academic Board approval in principle of the project.

BACKGROUND:

The Department of Chemical Engineering and Applied Chemistry's Biozone interdisciplinary research community has recently received funding for an expansion of its facilities from the Canadian Foundation for Innovation (CFI) and Ontario Research Fund (ORF). The goal of this project is to build upon the initial success of the current Biozone group and provide added research functionality and capacity. A key element of this expansion will be the phased incorporation of the University's world-class protein production and characterization facility, the Structural Proteomics in Toronto (SPiT) group, currently located at the Best Building in the Faculty of Medicine's Banting and Best Department of Medical Research.

HIGHLIGHTS

The funding award will allow for creation of new space (a rooftop addition) and renovation of existing departmental space in the Wallberg Building to accommodate the augmented Biozone activities and personnel, as well as the purchasing of new equipment for its research initiatives.

The project scope includes a rooftop addition on the fourth floor level of the Wallberg Building, adjacent to the Pulp and Paper Centre, as well as the repurposing of an existing Faculty of Applied Science and Engineering ECF undergraduate computing laboratory (WB316) in order to create new wet laboratory space. General work for the renovations includes: interior demolition (including asbestos abatement), interior laboratory fit-out, installation of new partitions, lighting, HVAC distribution, power, data, telephone, built-in furniture, benching and some new finishes. The ECF computer lab will be relocated to space on the second floor of the Wallberg Building.

This proposal results in an overall net increase of Department of Chemical Engineering and Applied Chemistry space of 279 NASM and will boost the Biozone's inventory of high-quality, interdisciplinary research facilities from 774 NASM to a total of 1,409 NASM.

The construction of the project is planned to begin by December 2010 with occupancy by January 2012.

FINANCIAL AND PLANNING IMPLICATIONS

The estimated Total Project Cost for the project is \$4,429,000.

The incremental increase in operating costs for the 4th floor addition (351 GSM) will be \$21,060 per annum for Operations and Maintenance and \$22,200 per annum for utilities increasing the Faculty's operating costs by approximately \$43,260 in total annually. There will also be OTO costs of \$2,000 to outfit the new space with recycling receptacles, which will be funded by the Faculty of Applied Science and Engineering.

FUNDING SOURCES

Funding sources for the construction of the project include \$3,543,358 from the CFI/ORF grant award, a contribution from the Department of Chemical Engineering and Applied Chemistry of \$485,642 and a contribution from the Faculty of Applied Science and Engineering of \$400,000.

SCHEDULE

The primary construction is projected to begin in December 2010 with occupancy by January 2012.

- Planning and Budget approval March 3, 2010
- Business Board Approval March 22, 2010
- Architect appointed by end of March, 2010
- Construction start December 2010
- Occupancy January 2012

RECOMMENDATIONS

It is recommended that the Planning and Budget Committee recommend to the Academic Board:

1. That the Project Planning Report for the Biozone: Bioengineering Research Facility for Energy, Environmental, and Economic Sustainability be approved in principle.
2. That the project scope as identified in the Project Planning Report be approved in principle at a Total Project Cost of \$ 4,429,000 with funding as follows:

Canada Foundation for Innovation	\$ 1,771,679
Ontario Research Fund	\$ 1,771,679
Department of Chemical Engineering and Applied Chemistry	\$ 485,642
<u>Faculty of Applied Science and Engineering</u>	<u>\$ 400,000</u>
 Total	 \$ 4,429,000

**Project Planning Report for the
Biozone: Bioengineering Research Facility for Energy,
Environmental, and Economic Sustainability**

Campus and Facilities Planning

February 4, 2010

Table of Contents

- I. Executive Summary
- II. Project Background

 - a. Membership.....
 - b. Terms of Reference.....
 - c. Background Information
 - d. Statement of Academic Plan
 - e. Space Requirements

- III. Project Description

 - a. Vision Statement
 - b. Space Program and Functional Plan.....
 - c. Building Considerations.....
 - d. Site Considerations
 - e. Campus Infrastructure Considerations.....
 - f. Secondary Effects

- IV. Resource Implications

 - a. Total Project Cost Estimate
 - b. Schedule
 - c. Operating Costs
 - d. Funding Sources and Cash Flow Analysis.....

- V. Recommendations

Appendices:

- 1. Existing Space Inventory
- 2. Equipment / Furnishings Schedule (available on request)
- 3. Room Specification Sheets (available on request)
- 4. Summary of Asbestos Containing Materials – Wallberg Bldg. (available on request)
- 5. Total Project Cost Estimate

I. EXECUTIVE SUMMARY

The Department of Chemical Engineering and Applied Chemistry proposes the expansion of its Biozone interdisciplinary research community, based in the Wallberg Building at the University of Toronto. With bioengineering as their common ground, researchers from Chemical Engineering and Applied Chemistry, Cell and Systems Biology, Geology, and Civil Engineering collaborate to produce findings that address the urgent challenges in sustainable energy and environmental protection.

Since its beginning in 2007, Biozone users have produced a series of highly successful peer-reviewed studies focusing on: groundwater bioremediation, pulp and paper bioprocesses, development of bio-products, genome and metagenome sequencing and computational analyses, enzyme discovery and characterization, and technology transfer and policy.

The goal of this project is to build upon the initial success of the current Biozone group and provide added research functionality and capacity. A key element of this expansion will be the phased incorporation of the University's world-class protein production and characterization facility, the Structural Proteomics in Toronto (SPiT) group, currently located at the Best Building in the Faculty of Medicine's Banting and Best Department of Medical Research.

The proposed Biozone expansion has recently received funding from the Canadian Foundation for Innovation (CFI) and Ontario Research Fund (ORF). This funding will allow for creation of new space (a rooftop addition) and renovation of existing departmental space to accommodate the augmented Biozone activities and personnel, as well as the purchasing of new equipment for its research initiatives.

The project scope includes a rooftop addition on the fourth floor level of the Wallberg Building, adjacent to the Pulp and Paper Centre, as well as the repurposing of an existing Faculty of Applied Science and Engineering, Engineering Computing Facility (ECF) undergraduate computing laboratory (WB316) to create new wet laboratory space. General work for the renovations includes: interior demolition (including asbestos abatement), interior laboratory fit-out, installation of new partitions, lighting, HVAC distribution, power, data, telephone, built-in furniture, benching and some new finishes. The ECF computer lab will be relocated to space on the second floor of the Wallberg Building.

This proposal generates an overall net increase of Department of Chemical Engineering and Applied Chemistry space of 279 NASM and will boost the Biozone's inventory of high-quality, interdisciplinary research facilities from 774 NASM to a total of 1,409 NASM.

The construction of the project is planned to begin by December 2010 with occupancy by January 2012.

Short term secondary effects of the project include disruptions to the rooms being renovated as well as some potential disturbances to neighbouring third floor spaces within the same department. Any required staging space will be coordinated by the Department of Chemical Engineering and Applied Chemistry. Long term secondary effects include the relocation of the ECF computer lab.

The incremental increase in operating costs for the 4th floor addition (351 GSM) will be \$21,060 per annum for Operations and Maintenance and \$22,200 per annum for utilities increasing the Faculty's operating costs by approximately \$43,260 in total annually. There will also be OTO

costs of \$2,000 to outfit the new space with recycling receptacles, which will be funded by the Faculty of Applied Science and Engineering.

The estimated Total Project Cost for the project is \$4,429,000. Funding sources for the construction of the project include \$3,543,358 from the CFI/ORF grant award, a contribution from the Department of Chemical Engineering and Applied Chemistry of \$485,642 and a contribution from the Faculty of Applied Science and Engineering of \$400,000.

II. PROJECT BACKGROUND

a. Membership

Elizabeth Edwards, (Co-Chair) Principal Investigator, Professor, Department of Chemical Engineering & Applied Chemistry, Faculty of Applied Science & Engineering

Doug Reeve, Professor and Chair, Department of Chemical Engineering & Applied Chemistry, Faculty of Applied Science & Engineering

Tim Bender, Professor, Department of Chemical Engineering & Applied Chemistry, Faculty of Applied Science & Engineering

Kathy Weishar, Technical Services Coordinator, Department of Chemical Engineering & Applied Chemistry, Faculty of Applied Science & Engineering

Steve Miszuk (Chair) Director, Planning and Infrastructure, Faculty of Applied Science & Engineering

Nikolaos Anesiadis, Graduate Student, Department of Chemical Engineering & Applied Chemistry, Faculty of Applied Science & Engineering

Adrienne De Francesco Assistant Dean and Director, Office of Infrastructure Planning, Faculty of Arts and Science

Julian Binks Manager, Capital Projects Planning, Real Estate Operations

Bruce Dodds Director, Utilities & Building Operations, Facilities & Services

Angelika Duffy Biozone Lab Manager, Department of Chemical Engineering & Applied Chemistry, Faculty of Applied Science & Engineering

Alan Webb (Secretary) Planning Officer, Campus & Facilities Planning

b. Terms of Reference

- 1 Make recommendations for a detailed space program and functional layout to accommodate the proposed Biozone expansion.
- 2 Demonstrate that the proposed space program will take into account the Council of Ontario Universities' (COU) space standards and the University's own best practice guidelines for research space.
- 3 Determine the secondary effects of the project, including any necessary space reallocation, and the impact on the delivery of academic programs and activities in the building during construction.
- 4 Review the capacity of existing site services and infrastructure at the Wallberg Building and determine the extent of upgrades, if required.
- 5 Identify all existing equipment and moveable furnishings to be relocated and reused,

- and new equipment and moveable furnishings necessary to the project and their related costs.
- 6 Identify all data and communications requirements and their related costs.
 - 7 Identify a phasing plan and implementation plan for the project, if required.
 - 8 Identify all security and occupational health and safety requirements and their related costs.
 - 9 Determine a total project cost (TPC) estimate for the capital project, including costs associated with secondary effects.
 - 10 Identify all sources of funding for the capital project and increased operating costs once the project is complete.
 - 11 Report by March, 2010.

c. Background Information

Biozone was conceived to address urgent challenges in sustainable energy and environmental protection by creating an interdisciplinary research community, based in the Department of Chemical Engineering and Applied Chemistry at the University of Toronto. The Biozone infrastructure will support a portfolio of research projects to create sustainable biological processes and products addressing Canada's most urgent societal needs, including environmental health and sustainable supply of energy and materials.

The Biozone's mission is to advance and capitalize on the dramatic progress in genomic research. To achieve this mission, the strategy will be to focus on two broad and inextricably connected areas of application: bio-products and biological waste treatment, utilizing exceptional expertise that exists already at U of T in these areas. To tap into biological diversity with a focused mandate to create viable applications requires complete immersion of genome scientists with engineering, such that an iterative process of idea to application to scale-up and back can be achieved. Moreover, while discovery and technological innovation are indispensable, they must also be guided by economic and public policy issues and realities.

The idea of dedicating common space for interdisciplinary research has resulted from a series of highly successful peer-reviewed and well-funded research efforts led by the ten principal users, focusing on: groundwater bioremediation (Edwards, Sherwood Lollar and Major); pulp and paper bioprocesses (Allen, Edwards, Reeve, Master); development of valuable bio-products (Diosady, Master); genome and metagenome sequencing and computational analyses (Edwards, Mahadevan, Master and the US DOE Joint Genome Institute); enzyme discovery and characterization (Edwards, Yakunin, Savchenko, Major and Master); and technology transfer and policy (Major, Diosady, Reeve, and Edwards). In total, these core investigators bring substantial international funding to Canada - approximately \$2 million per year for basic research - from American agencies, and have recently joined a European network for environmental enzyme discovery.

In 2009, Genome Canada, through the Ontario Genomics Institute, awarded the group over \$5 million over 4 years for the Bioproducts and Enzymes from Environmental Metagenomes

(BEEM) project. BEEM formally unites virtually all of these researchers and their international collaborators towards the common goal of developing bioproducts to address existing and new wastes that will arise as Canada's bioeconomy increases in scope and scale.

Edwards, Mahadevan and Master secured a CFI LOF in 2007 to begin Wallberg building renovations in order to create a common research space for Biozone. Renovations to Wallberg rooms 301, 302, 303, 305, 307, 308, 311, 315, and 319 were completed in 2008, providing create state-of-the-art laboratory space, dedicated equipment rooms, and student workspaces.

In 2009, over \$4 million in CFI NIF/MRI funds were awarded for Biozone "Phase II", which will incorporate a world-class protein production and characterization facility, the Structural Proteomics in Toronto (SPiT) group, currently located in the Faculty of Medicine at the University of Toronto, into new space in the Wallberg building to bring these groups under the same roof.

SPiT leaders Savchenko and Yakunin and their team of researchers bring excellent science, international repute, state-of-the art equipment and an established high throughput enzyme discovery pipeline that is primed to feed into the scale-up and engineering capabilities in the Faculty of Applied Science and Engineering. Bringing SPiT into Engineering will enable unparalleled synergies and training opportunities in biocatalysis, enzymology and protein characterization. SPiT equipment is already considerable and complementary to other research infrastructure in the Wallberg building. Consequently, a significant component of Biozone Phase II is renovation and new construction to partially accommodate the relocation of SPiT. This relocation will involve the move of approximately 20 research personnel (including Savchenko and Yakunin) and the move of a substantial amount of equipment from an isolated environment in the Best Building, a building slated for demolition, into a vibrant research environment, rich with students, and where multiple collaborations already exist.

The SPiT merger represents a unique opportunity for the University of Toronto, for the province of Ontario and for Canada to create a new model for integrated research, development and technology transfer. Biozone Phase II will also involve the renovation and modernization of several existing laboratory spaces on the third floor of Wallberg that are currently occupied by collaborators Allen, Saville, and Diosady.

Renovations to third floor laboratory spaces at Wallberg, as well as renovating space in the basement for SPiT's X-ray diffractometer instruments, is anticipated to begin in spring 2010. To comply with the timelines of SPiT's previous CFI/MRI award through which the X-ray diffractometer was purchased, this room must be completed in July 2010. Remaining renovations will begin in winter 2010.

The SPiT group anticipates the need for an additional project to accommodate its full complement of equipment and research. That project will be brought forward at a later date and coordinated by the Department of Chemical Engineering and Applied Chemistry.

d. Statement of Academic Plan

The University of Toronto has committed to the success of Biozone, recently establishing collaborative graduate and undergraduate programs in Bioengineering, and recruiting three new professors (Mahadevan, Master, and McGuigan) to this area. Each of these professors have growing research groups expected to reach 15-20 members (up to 60 for all three) over the next

2-4 years. Professor Allen is also likely to grow his research group once his administrative term as Vice-Dean, Undergraduate Studies for the Faculty of Applied Science and Engineering ends in 2010. The above numbers include many of the students and research staff that will be hired specifically for the Bioproducts and Enzymes from Environmental Metagenomes (BEEM) project, although space for additional 5-10 full-time equivalents (FTEs) is likely to be required over the next 2-4 years. If the BEEM co-funding proposal submitted to the Ontario Research Fund – Global Leadership Round in Genomics and Life Sciences (ORF-GL2) in 2009 is awarded in 2010, this will add a further 5-10 FTEs.

e. Space Requirements

Overview of Existing Space

The Department of Chemical Engineering and Applied Chemistry is based in the Wallberg Building on the St. George campus, where they occupy 8,013 NASM. The department also occupies 181 NASM in the Haultain Building, 51 NASM in the Gage Building and 520 NASM in the CCBR Building for a total of 8,765 NASM.

The Faculty of Applied Science and Engineering conducted an overall analysis of its space in 2009. The analysis identified that, based on COU guidelines, the Department of Chemical Engineering and Applied Chemistry's would have an allocation of 9,227 NASM.

This project will provide an additional net increase 279 NASM of departmental space, which will bring the Chemical Engineering and Applied Chemistry's total inventory to 9,044 NASM.

The current Biozone group is located on the third floor of the Wallberg Building in several rooms totalling 774 NASM. This project proposal calls for renovating 24 NASM of current Biozone space, reallocating/renovating 274 NASM of departmental space and reallocating/renovating the 134 NASM Engineering Computing Facility (ECF) computer laboratory in room 316 to Chemical Engineering and Applied Chemistry Biozone space. In return for its acquisition of room 316, the department will provide and renovate rooms 255A and 255B to serve as the new ECF computer lab. An additional 258 NASM of Biozone space will be created through the construction of a new 351 GSM (gross square metres) addition on the roof/fourth floor level of the Wallberg Building.

Following project completion, the Biozone group will have a total of 1,409 NASM dedicated to its research needs.

Occupant Profile

In addition to the current and future professors' research groups in Wallberg, Biozone already serves researchers in cognate Departments in engineering disciplines (Chemical, Civil, Biomedical, Materials and Mechanical), the sciences (Cell and Systems Biology, Biochemistry and Bioinformatics, Geology, Forestry, Medical Sciences, Pharmacy and Chemistry) and social sciences (Public Policy, Management). Biozone researchers have and will collaborate and coordinate applications for equipment with applied biotechnology initiatives on campus, including the Centre for the Analysis of Genome Evolution and Function (CAGEF) associated with Cell and Systems Biology (CSB), the ANALEST analytical facility in Chemistry, SI-Ontario, and the Institute for Biomaterials and Biomedical Engineering (IBBME).

For reference, the overall Department of Chemical Engineering and Applied Chemistry profile is included below with the Biozone occupant profile for both current and projected (2011) users:

Department of Chemical Engineering and Applied Chemistry	Current Department	Current Biozone Group	Projected Biozone Group
Academic			
FTE Faculty	39.55	4.65	8.50
FTE Research Associates	15.00	1.00	7.00
FTE Postdoctoral Fellows	11.50	3.00	14.00
Subtotal FTE Admin Staff	66.05	8.65	29.50
Non-Academic Staff			
FTE Admin Staff – Not Req. Offices - Clin/Tch	0.25	0.25	10.00
FTE Admin Staff Requiring Offices	13.95	1.00	10.30
Subtotal FTE Admin Staff	14.20	1.25	20.30
Visiting Researchers	0.00	0.00	0.00
FTE Undergraduate Students	443.00	4.00	8.00
Graduate Students			
FTE Doctoral - PHD	79.00	20.00	24.00
FTE Masters- MSc	86.00	6.50	18.00
FTE Masters- MEng	37.00	3.00	4.00
Subtotal FTE Graduate Students	202.00	29.50	46.00

For further reference, see below a summary of current departmental space and total areas following construction of the new Biozone Phase II. Note that there will be a net increase of 279 NASM of departmental space created by the project:

Department of Chemical Engineering and Applied Chemistry	Existing Area (NASM)	Proposed Biozone area increase
Classrooms	44.8	-18.5
Teaching Labs & Support	1,699.9	0
Research Facilities	4,398.0	+48.3
Faculty Offices & PdF offices	737.5	0
Research Offices	54.8	+65.0
Graduate Student Spaces	693.4	+100.5
Non-Academic Staff Offices	250.8	0
Departmental Support Space	635.9	+83.5
Non-Institutional Agencies	63.7	0
Student Activity & Lounge Space	186.6	0
Sub-Total	8,765.4	278.8

Total Departmental NASM	8,765.4	9,044.2
--------------------------------	----------------	----------------

III. PROJECT DESCRIPTION

a. Vision Statement

The vision for Biozone Phase II is to create a leading edge interdisciplinary research centre in the Department of Chemical Engineering and Applied Chemistry at the University of Toronto that will bring biotechnology innovation to urgent challenges in sustainable energy and environmental protection. This centre will earn international recognition for research excellence and technology transfer, and as a training ground for science, technology, and policy leaders.

b. Space Program and Functional Plan

Biozone II renovations and construction will create collaborative, integrated, modernized research space, primarily on the west end of the 3rd and 4th floors of the Wallberg building. This space is required for the following:

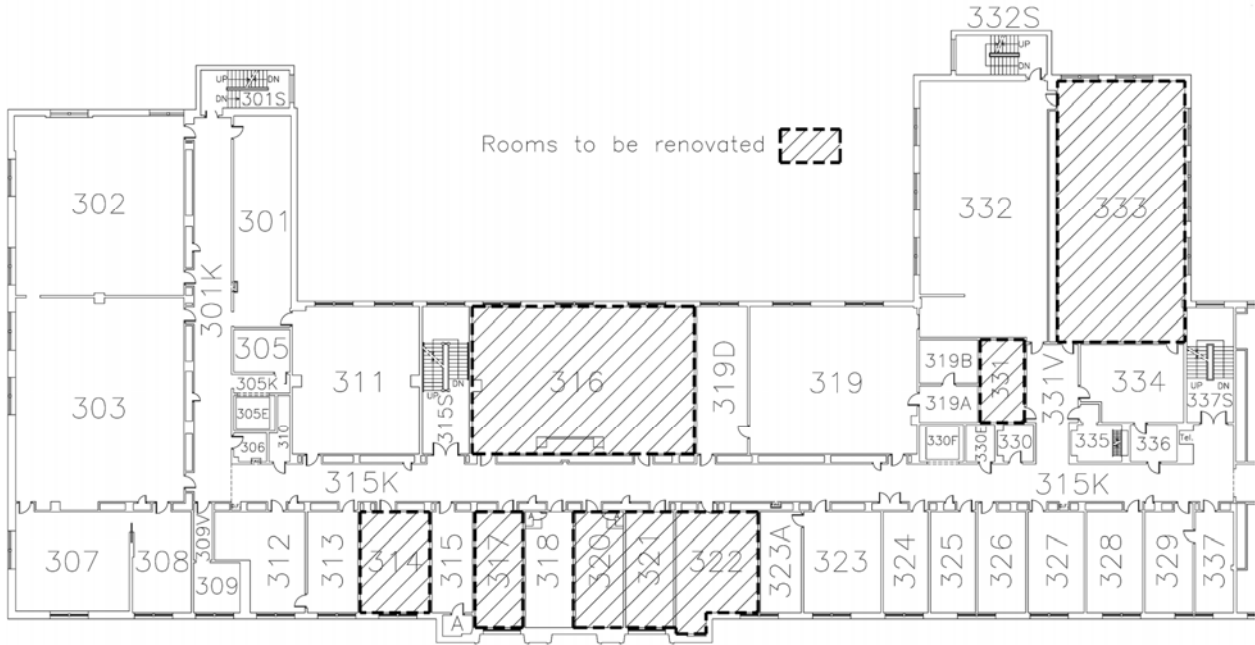
- Modernizing the space currently occupied by Biozone research groups that were not served by the Phase I renovations (Allen, Saville, Diosady – 3rd floor centre and west laboratories and workspaces);
- Accommodate growth of all Biozone research groups in response to the University's priorities and major external grant awards.

Rm #		New/ Reno	Quantity	Stns	Room Size NASM	NASM
Laboratory Space						
316	Functional Assays Room	Reno	1		134.0	134.0
333	Protein Biochemistry Lab / Cold Room	Reno	1		144.3	144.3
H	Mass Spectrometer	New	1		28.0	28.0
G	Wet Research Lab	New	1		100.0	100.0
						406.3
Research Offices						
314	Graduate Student Office Multi-occupancy	Reno	1	6	30.6	30.6
317	Graduate Student Office Multi-occupancy	Reno	1	6	23.2	23.2
320	Graduate Student Office Multi-occupancy	Reno	1	6	22.8	22.8
321	Graduate Student Office Multi-occupancy	Reno	1	6	23.9	23.9
B-F	Research Office Single-occupancy	New	5	1	13.0	65.0
						165.5
Support Space						
322	Staff Room	Reno	1		37.1	37.1
331	Server Room*	Reno	1		4.6	4.6
A	Conference Room	New	1		65.0	65.0

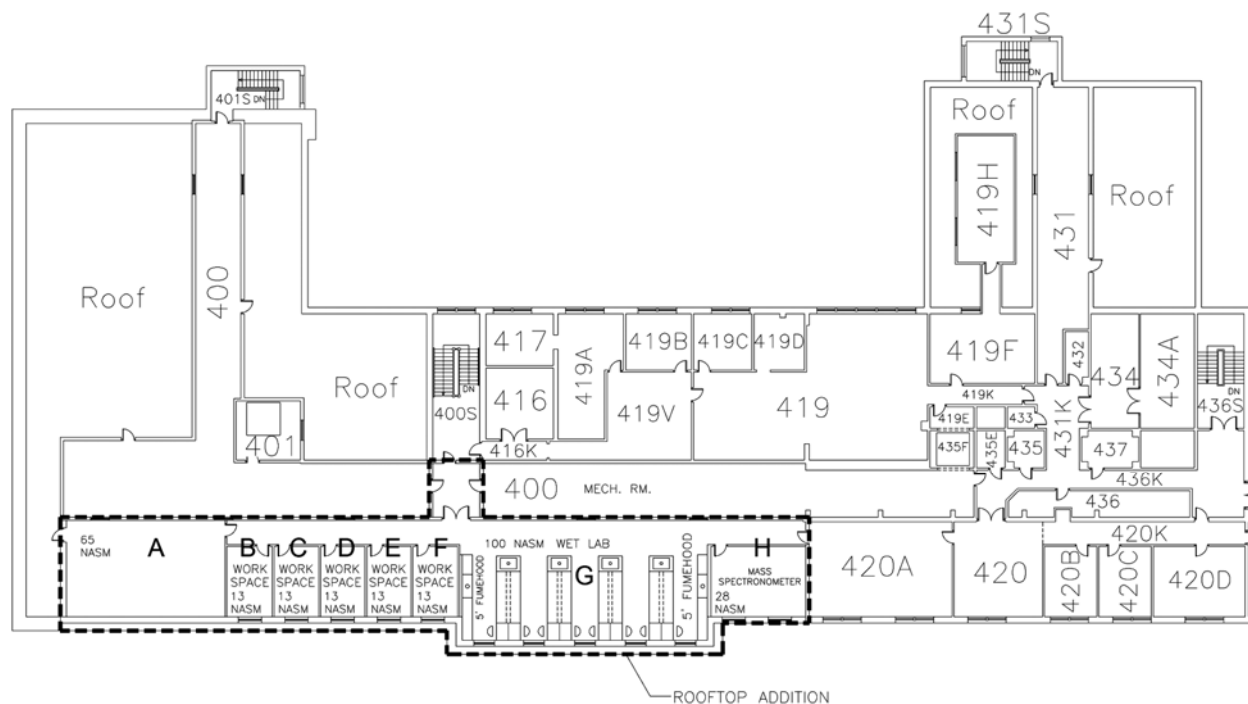
			106.7
Total Additional Biozone Space	16	25	678.5

*Note: Server Room WB331 is 18.4 NASM prorated to 25% Biozone usage.

Third floor partial plan



Fourth floor partial plan



b. Space Program and Functional Plan (continued)

Functional Assays Room

A biochemistry primary research wet laboratory and functional module for the Biozone. This laboratory will have workstations for ten researchers and will house equipment such as -20°C freezers, protein and extractive mass spectrometers, and spectrophotometers. Two fumehoods are also to be included in the room's fit out.

Protein Biochemistry Lab / Cold Room

A biochemistry research wet laboratory to be used primarily by the SPiT group that will incorporate a stand-alone cold room. These facilities will be used for high-throughput recombinant proteins purification for their further crystallization as well as structural and functional characterization. This room will be divided into two main sections, a Protein Biochemistry Lab, which will be subdivided into four blocks (Storage Space, Centrifugation Space, FLPC Space, 20°C , 40°C Space), and a Cold Room.

Mass Spectrometer

This will be a dedicated room in the fourth floor addition that will house the capillary electrophoresis time-of-flight mass spectrometer.

Wet Research Lab

A biochemistry primary research wet laboratory that will be located in the fourth floor addition. Emphasis may be analytical or metabolomics.

Graduate Student Offices

A series of four rooms will be renovated on the third floor to provide multi-workstation graduate student research offices. This will provided dedicated computer workstation space separate from the research laboratories. These rooms will typically accommodate six stations each.

Research Offices

Five rooms will be assigned in the fourth floor addition to serve as general research offices for the Biozone group. These offices will be fitted out to accommodate one or multiple users. Senior research scientists, technicians and a lab manager will occupy these spaces.

Staff Room

A third floor room will be renovated to provide a multi-purpose staff room for the Biozone group. This room will be able to accommodate informal meetings and seminars as well as provide a space separate from the research laboratories to consume food and beverages.

Server Room

A room on the third floor to house the computer servers that form the backbone of the research infrastructure for the Biozone facility, this space will have specific power and ventilation needs. The room will be shared with other Chemical Engineering and Applied Chemistry research groups, with approximately 25% of the space dedicated to Biozone servers.

Conference Room

A space at the west end of the fourth floor addition will be designated as a general conference and meeting room. This room will be able to accommodate up to 30 people for research presentations as well as full Biozone group meetings. The level of audio-visual fit-out will be dependent on available budget.

Please refer to Appendix 3 – Room Data Sheets for further detail on the rooms listed above.

c. Building Considerations

The project's initial structural assumptions regarding a rooftop addition were based on the success of the Wallberg Building's previous rooftop addition, the Pulp and Paper Centre. Detailed structural investigations must be carried out as due diligence during the design process to confirm that the bearing capacity of the existing roof structure is sufficient to support the proposed addition, however there is limited contingency budget available if structural reinforcement were to be required.

Work must be done to make the existing freight elevator 435F accessible from corridor 419K. Materials to service the new wet laboratory will pass through the laboratory in room 419 or possibly through rooms 420/420A, via corridors 431K/436K.

A connection must be provided from Stair 400S to serve the new fourth floor addition. A detailed building code review during the design phase will indicate whether a means of egress must be provided through room 420A. If so, further renovation work must provide the requisite corridors and doors through this space.

The new rooftop addition should be complimentary to the existing rooftop addition and Wallberg Building, particularly from the exterior and public views. Additional fume stacks and venting must not disturb existing rooftop vents and stacks.

Where possible and given the functional requirements, existing partitions, finishes (carpet flooring, ceiling tiles) and lighting should be retained or reused. In other instances, where existing finishes will be disturbed by the renovations, it is possible that asbestos abatement will be required. See Site Considerations for more information.

At the detailed design stage, the architect must work with the Biozone group to determine specific security needs (placement of secure doors and upgrade to fob system, etc.).

Facility Condition Assessment

The Wallberg Building is included in a group of buildings that are scheduled for reassessment to be consistent with buildings audited more recently. As such, the detailed report cannot be provided at this time. However, the deferred renewal and maintenance issues that are relevant to this project as identified by Facilities & Services follow.

Deferred Renewal and Maintenance Issues / Building System Improvements

HVAC – It is assumed that the interiors of the third floor rooms will be renovated but that the existing HVAC equipment and their controls will continue to serve the space. Therefore, the design team must confirm that any additional cooling loads from freezers or other research equipment can be accommodated by this equipment including re-balancing of the distribution system. The air handlers are old but have been and continue to be maintained and repaired as necessary - they are not scheduled for replacement at this time.

It should be noted that the main chilled water supply to the building from Medical Sciences is not available during the winter months.

The project documents must include instructions to protect and/or clean both the perimeter heating units and the pneumatic control system. The building systems must continue to supply the other areas of the building throughout the period of construction.

d. Site Considerations

Hazardous Materials Disposal

A summary of asbestos-containing materials will be available to the design team. During the design process more detailed information including floor plans can be provided. A cost estimate

for abatement requirements has already been provided for inclusion in the Total Project Cost estimate.

Decontamination of existing laboratory equipment (e.g. fume hoods) and benching must be coordinated by the University's Office of Environmental Health and Safety. A cost estimate for this work has been included in the Total Project Cost estimate.

e. Campus Infrastructure Considerations

Electrical Power - The Wallberg has recently been provided with a new feed from Toronto Hydro so this project will not cause overall supply issues. However, the design team must provide the total load requirements for this project; then Facilities and Services can determine if the local transformer has adequate capacity to feed the load. Otherwise, the existing 13.8kV switchboard in the Wallberg substation will have to be extended and a new transformer will have to be provided to feed this project.

When planning the layout of rooms, the design team must allow a minimum of 1 metre clearance (1.5 metres if in the corridor) from all electrical equipment, including electrical panels and disconnect switches.

All data communication racks and telephone equipment shall be installed in a room separate from the electrical room.

Emergency power - It should be noted that the existing emergency supply (from generators at the Medical Sciences Building) is dedicated to life safety systems. If continuous emergency power is required, the addition of a generator for this purpose at the Wallberg would have to be considered.

f. Secondary Effects

Temporary effects (during construction)

The most direct secondary effect of the project will be the loss of use of the rooms being renovated on the third floor of the Wallberg Building. This includes room 333 (a fully equipped wet laboratory), room 331 (storage), and rooms 314-322 (various small graduate student offices and laboratory support spaces). Room 316 will be relocated from an Engineering Computing Facility computer laboratory to permanent space in Biozone, described below.

Construction is anticipated to occur from December 2010 through January 2012. The Department of Chemical Engineering and Applied Chemistry has determined that it can operate satisfactorily in the interim without having to use additional temporary space to accommodate activities displaced by the renovations.

Additional secondary effects during construction may include disruption of the fourth floor laboratory space in room 419 depending on how construction materials are routed from the freight elevator 435F. Rooms 420 and 420A, directly adjacent to the roof top addition, may also be affected by construction activity and it could be required to add a corridor to provide fire-separated access to the new addition.

While it should be possible to construct hoarding for the renovation that will segregate dust and other construction debris from the rest of the Wallberg Building spaces, there will be construction noise to varying degrees of amplitude throughout the course of the project. Arrangements should be made, where feasible and within budget, to schedule the most disruptive aspects of the work outside of normal class hours.

Long term effects

The Engineering Computing Facility (ECF) computer laboratory in room 316 will be displaced and re-accommodated in renovated space provided by Chemical Engineering and Applied Chemistry, Wallberg room 255 (rooms 255A & B). This new room will be fitted-out to match as much as possible the specifications of the displaced computer laboratory, however these costs are not part of this project. Funding for this work anticipated to be in the range of \$75,000 will be borne by the Faculty of Applied Science and Engineering. Approvals will be according to the policy on Capital Planning and Capital Projects for projects under \$2 million, through the Accommodation Facilities Directorate.

There is a broader Departmental evaluation of space underway that will see some reallocations and reconfigurations of existing spaces. As such, the activities that were previously accommodated in room 333 (Prof. Diosady's Food Engineering research laboratory) will be relocated to existing Chemical Engineering and Applied Chemistry space in the Haultain Building.

The activities from room 317 and room 320 will be accommodated within existing Chemical Engineering and Applied space in the Wallberg Building.

IV. RESOURCE IMPLICATIONS

a. Total Project Cost Estimate

The Total Project Cost, including all taxes, contingencies, secondary effects (with the exception of room WB255 fit-out), permits and professional fees, miscellaneous costs and general furnishings, but not including equipment, is estimated to be \$ 4,429,000.

See Appendix 5 for Total Project Cost estimate.

b. Schedule

- Planning and Budget approval March 3, 2010
- Business Board Approval March 22, 2010
- Architect appointed by end of March, 2010
- Construction start December 2010
- Occupancy January 2012

c. Operating Costs

The incremental increase in operating costs for the 4th floor addition (351 GSM) will be \$21,060 per annum for Operations and Maintenance and \$22,200 per annum for utilities increasing the Faculty's operating costs by approximately 43,260 in total annually. There will also be OTO costs of \$2,000 to outfit the new space with recycling receptacles, which will be funded by the Faculty of Applied Science and Engineering.

d. Funding Sources and Cash Flow Analysis

Funding sources for the construction of the project include \$ 3,543,358 from the CFI/ORF grant award, a contribution from the Department of Chemical Engineering and Applied Chemistry of \$ 485,642 and a contribution from the Faculty of Applied Science and Engineering of \$ 400,000.

V. RECOMMENDATIONS

THAT the Planning and Budget Committee recommend to the Academic Board:

- (i) the Biozone: Bioengineering Research Facility for Energy, Environmental, and Economic Sustainability Project Planning Report be approved in principle,
- (ii) the project scope as identified in the Project Planning Report be approved in principle at a Total Project Cost of \$ 4,429,000 with funding as follows:

Canada Foundation for Innovation	\$ 1,771,679
Ontario Research Fund	\$ 1,771,679
Department of Chemical Engineering and Applied Chemistry	\$ 485,642
<u>Faculty of Applied Science and Engineering</u>	<u>\$ 400,000</u>
 Total	 \$ 4,429,000

Appendix 1

Existing areas to be renovated or reconfigured in the Wallberg Building

Flr	Room	Department	Ctgy	Category	Pro. Type	Pro. %	Room Use Description	Stns	Square Metres
3	314	Chemical Eng	3.1	Research Lab			Research Lab	0	30.64
3	316	Dean FASE	2.1	Sched Class Lab			Computer Lab (ECF)	50	134.00
3	317	Chemical Eng	3.1	Research Lab			Research Lab	2	23.15
3	320	Chemical Eng	3.1	Research Lab			Research Lab-Grad Student	0	22.79
3	321	Chemical Eng	3.1	Research Lab			Research Lab-Grad Student	0	23.90
3	322	Chemical Eng	1.2	Non-Tiered Clas	Time	50	Seminar Room	5	18.54
3	322	Chemical Eng	4.5	Office Support	Time	50	Conference Room	5	18.54
3	331	Chemical Eng	3.2	Res Lab Support			Lab Storage and Supply	0	18.36
3	333	Chemical Eng	3.1	Research Lab			Research Lab	4	144.32
Total Area to Renovate								434.24	

* Note that rooms 420A and 400 may need minor renovations to accommodate the fourth floor addition.

Appendix 2 Equipment / Furnishings Schedule (available on request)

Appendix 3 Room Specification Sheets (available on request)

Appendix 4 Summary of Asbestos Containing Materials – Wallberg Building
(available on request)

Appendix 5 Total Project Cost Estimate

Biozone, Wallberg.

Items		
GSM	788	1
Construction amount fall 2010	\$2,942,000	2
decontamination & abatement	\$68,250	3
subtotal	\$3,010,250	
Construction Contingency	\$361,230	
Applicable HST	\$114,967	
Total construction, including HST	\$3,486,447	
Infrastructure Upgrades in Sector	\$0	
Demolition	\$0	
Secondary effects	\$0	
Permits & Insurance	\$17,000	
Professional Fees	\$529,862	
Computing Infrastructure	\$40,000	
Telephone set & install	\$10,000	
Audio/Visual	\$0	
Moving	\$40,000	
Staging	\$0	
Furnishings	\$83,000	
Equipment	\$2,000	
Security & access systems	\$0	
Signage: Interior & Exterior	\$7,000	
Miscellaneous incl trades	\$15,000	
Project Contingency	\$198,690	
Finance Costs, allow	\$0	4
Total Project Cost Estimate	\$4,429,000	

prepared job Feb 03 10

notes

- 1 scope consists of 370 GSM new construction and renovations to 418 GSM on the 3rd floor of the Wallberg building.
- 2 The firm of CM2R prepared a detailed construction budget estimate in the amount of \$3,435,000. This was reviewed by the committee and scope reductions amounting to \$493,000 were made
- 3 estimates provided by F&S and EH&S.
- 4 assumes project fully funded to avoid interest charges.