PROJECT PLANNING REPORT

DEPARTMENT OF CHEMISTRY
PHASE II PRACTICAL LABORATORY RENOVATIONS

REVISED January 15, 2007

Prepared By:
Department of Chemistry, Chair

Coordinated By:
Office of Planning and Information Technology, Office of the Dean
Faculty of Arts & Science, University of Toronto

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EXECUTIVE SUMMARY

In 1998 the Department of Chemistry undertook a MasterPlan process whereby a series of projects were identified, including proposed renovations to practical laboratories supporting the undergraduate teaching academic mission. The report was approved in May, 1998 and 32 individual projects were successfully completed including construction of the Davenport building, and extensive renovation, through multiple projects, of Lash Miller. Extensive details of the projects, funding, and staged approvals are captured in a memorandum from Vice-Provost Ron Venter to the Planning and Budget Committee dated May 25th, 2002. The Master Plan table listing the individual projects has as Project #31 "Future allocation to U/G laboratories" with status noted as "longer term planning".

The Phase I Chemistry Undergraduate Teaching Labs renovation (completed Fall, 2003) and proposed Phase II renovations are part of this approved Master Plan.

The Department of Chemistry proposes to renovate approx. 2,175 NASM of aging practical laboratories located in various existing labs and supporting spaces in the first and second floor of the Lash Miller/Chemistry building. These labs used for undergraduate teaching will be upgraded to the standard and exceptional level of functionality created by the Phase I renovations completed in the Fall of 2003. Phase I renovations consisted of 1,058 NASM and included a financial investment of approximately $1.5 million in mechanical capacity (exhaust, supply, chilling, heating) in preparation for Phase II.

Phase II is a unique multi-faculty project that directly addresses the need to enhance the quality of student learning and the overall student experience, as well as addressing space challenges across the participating Faculties.

Chemistry is an experimental science but more uniquely, it is a discipline where student scientists can make the chemicals that they study. It is critical that students are able to design and create molecular architectures, and then investigate their properties. This will result in better prepared and excited students who may be inspired to participate in undergraduate research opportunities and go on to graduate or professional school imbued with a more realistic sense of what it means to design, build, and test molecular materials.

The proposed new practical laboratories will transform the learning experience for the approximately 5,200 student enrollments (2,600 FCE) in the Department of Chemistry's lab courses for instruction in organic, inorganic, materials, analytical, physical, environmental, and biological chemistry. Current projections are that approximately 800 Engineering students (400 FCE) and a further 400 Pharmacy students (200 FCE) that will also utilize the renovated space for enhanced instruction.

The unique design proposed for Phase II will provide students at the Faculty of Applied Science and Engineering with full access to the entire suite of Chemistry teaching labs and will enhance course delivery and provide access for specialized courses offered by the programs of Chemical, Mechanical, Materials and Engineering Science. Student numbers are projected to be between 500 and 1000 with significant expansion potentially driven by a successful project.

Furthermore, the design solution proposed for Phase II will directly address the need to enhance the learning experience for Faculty of Pharmacy students taking Chemistry courses (approximately 400 per year) and provide the opportunity for delivery of specialized Pharmacy courses (240 students).

Phase II will be used for 1st and 2nd year course delivery though the design can be easily adapted to the needs of more specialized 3rd and 4th year courses. Accessibility will be enhanced through wheelchair accessible fume hoods and FM broadcast for the hearing impaired.

Upon completion of Phase I and Phase II, the expectation is that the ability of the Lash Miller building to support teaching will be extended to four decades, and will support the possibility in the future to offer integrated science courses.

The Phase II project is estimated to cost $5,000,000 with funding provided by the various partners; Academic Initiatives Funds request $1,500,000 (tentative), Student Experience Fund (tentative) $2,000,000 (as part of the Faculty of Arts and Science allocation), Faculty of Arts and Science and Chemistry $1,080,000, Faculty of Engineering $350,000, and Faculty of Pharmacy $ 70,000.

Phase II is proposed to be undertaken in Spring of 2007 for completion by September 2007.

Once completed, the Phase I and II renovated laboratories (36,000 nasm) will provide an unparalleled learning environment for chemical lab instruction.

I. DESIGN WORKING GROUP MEMBERSHIP

Chair, Department of Chemistry	Professor Scott Mabury
Technical & Admin Manager, Chemistry	Mike Dymarski
Associate Chair, Undergraduate, Chemistry	Andy Dicks
Assistant Dean, Director of Planning, FAS	Monica Contreras
Capital Projects, Project Manager	Michael Mirkopoulos
Capital Projects, Capital Planning	Julian Binks

Chemistry Student Union, (undergraduate):
Neil Yonson, Alex Disckson, Kristina Boka, Andrew Sydor
Graduate Advisory Committee:
Yuri Bolshan, Ignacio Franco, Julia Gavrilyuk, Nana Kwamena, Chantal Paquet, Chris Smith, M. Zhang.

Note: Dave Stone, Scott Browning, Doug Macintosh, Deborah Zamble, Dan Mathers, and Gilbert Walker (Professors and Lecturers) from the Department of Chemistry met repeatedly for preliminary design work on Sections A, B, C, and D of the proposed renovation.

II. TERMS OF REFERENCE

The purpose of this Report is to:

1. Prepare a space plan that identifies the functional floor plans for the Phase II Undergraduate laboratory project;
2. Identify all resource implications, including an estimate of capital costs; furniture, equipment and operating costs
3. Identify a funding plan for the capital and associated operating costs.
4. Identify an implementation schedule.

III. BACKGROUND

The practical laboratories of the Chemistry/Lash Miller Building, built circa 1961, are rundown, poorly designed, inefficient, and have limited fume hood capacity that preclude many advanced chemistry experiments.

A significant impact of distribution of students is a lack of access to fumehoods in the original practical laboratories. This necessitates spreading teaching and technical staff over broad sections of the existing building resulting in inefficient use of resources. Of significant concern is that the student learning experience is compromised since the department cannot ensure that all work stations in the laboratory can be used. Therefore to ensure safety, large proportions of students are prevented from hands-on experiment-based learning. Moreover, the space and design inefficiency precludes the use of these facilities by any other discipline.

In November 2003, Chemistry opened the newly renovated Phase I undergraduate laboratories to the double cohort students enrolled in the first year organic course. The project was brought on schedule (construction was 4 months and 1 week) and under budget ($5.3 million final cost with approximately $200k returned to the Faculty of Arts and Science). The new laboratories had an immediate and direct impact on enhancing the student learning experience.

Phase 1 laboratories consist of 8 learning pods housing 16 students each, where students work in their own fume hood outfitted with all the necessary services. A closed loop chilled water system and in house vacuum together both save millions of liters of water annually. Each pod has an instruction zone, which significantly enhances the ability of TAs to deliver chalk talks on a digitized white board or run tutorials via the LCD projection screen.

The laboratory design facilitates courses with 128 students or 8 courses of 16 students each or any combination in between (the lab was designed to be adaptable to changes in laboratory instruction in coming decades). The newly renovated space supports two lab courses per day for a total of 256 students. Prior to renovation, this same area only allowed instruction of 90 students, an increase in student contact hours with no increase in staff resources.

This space efficiency allowed Chemistry to convert approx. 370 NASM of basement teaching labs into a research & teaching mass spec lab. With current construction costs for state of the art laboratory facilities ($4,800/NASM) renovation of the existing facility will save $1.8 million.

In the inaugural year, over 2,000 first year double cohort students were taught in demonstrably the best learning environment for Chemistry instruction anywhere. Visitors have come from around the world for tours. Phase I continues to serve 1st and 2nd year students in the 'organic chemistry' courses while all remaining Chemistry lab courses serving both Chemistry and Pharmacy are taught in the 'old labs'.

Phase I laboratories present a stark juxtaposition between new facilities and what remains of the original labs. All first year students currently spend half their time in each version of the lab with a discernable drop in enthusiasm upon moving from new to old. In order to preserve the student experience within the Department of Chemistry this situation needs to be rectified.

IV. STATEMENT OF ACADEMIC PLAN

In 1881, following the retirement of Chemistry's first Professor Henry Holmes Croft, a divergence in views and approach between Professors Pike and Ellis was the beginning of a divergence between the Departments of Chemistry and the eventually named Chemical Engineering and Practical Chemistry. This separation in basic chemistry instruction largely remained until Arts and Science and Engineering jointly funded a multi-user ANALEST advanced instrumentation facility in Chemistry in 1996. This was the first step towards dissolution of these barriers with Chemical Engineering using the lab for a third year analytical course.

External reviews of the Engineering faculty have commented on the broader separation in instruction and have typically recommended a closer partnership in the delivery of chemistry instruction on campus.

The proposed Phase II will result in an evolution towards greater collaboration as laboratory portions of Engineering courses are run by their staff in renovated chemistry labs. One can imagine a day when all UofT St. George students requiring courses in 'chemistry' would take them from the Department of Chemistry to the benefit of both Arts and Science and Engineering students. Benefits to student learning and the inherent financial and space efficiencies are compelling. This Phase II project is required for the necessary capacity to make it possible for Engineering and Pharmacy to use Chemistry's space to offer their courses.

Chemistry is an experimental science but more uniquely, it is a discipline where student scientists can make the chemicals they study. It is critical that students are able to design and create molecular architectures and then investigate their properties. Fundamentally the main enhancement is in ensuring students learn real chemistry by making complicated molecules using advanced methods of synthesis and then interrogating these molecules with the appropriate tools. This will result in better prepared and excited students who may be inspired to participate in undergraduate research opportunities then potentially go on to graduate or professional school imbued with a more realistic sense of what it means to design, build, and test molecular materials. These skills are worthwhile whether students continue in chemistry or other related fields. An exceptional job of lecture-based instruction is now done, but the real potential for providing a unique and powerful learning enhancement is in the laboratory.

Essentially all Chemistry courses are 'H' and as such annually have over 7,500 enrollments in lab based courses, all of whom would have lab courses in the renovated space; the bulk of these students are in the basic medical sciences or other Arts and Science programs. Pharmacy has approximately 50, and 100 are in our first and second year organic courses respectively, and 240 in the potential 3rd year specialized course. Engineering students would number in the mid-hundreds.

The best evidence that Phase II is a project worth doing is already in hand. In comparing metrics prior to Phase I with the current year, Chemistry has increased its Dobell numbers by 45% and F.C.E. by 48% when the values for Arts and Science as a whole only rose 6% and 17% respectivel. The Dobell increase in Chemistry was the highest in the Faculty. During this same period, Chemistry students increased by ~300%. Phase I was exclusively for 1st and 2nd year students with the metric of 'course retake %' rising from 45% to 67% for all 1st year courses and from 40% to 58% for 2nd year courses.

There are multiple reasons why these metrics are so positive but by far the most significant is that a Chemistry student will have experienced a change in a portion of their lab experience. The data support the conclusion that the student experience was enhanced in a significant way and students are choosing to take more Chemistry because they want to, not because they have to.

Further significant increases are projected since only 3 courses are presently taught in the 'new lab'. Thus all Chemistry students currently spend the bulk of their time in the old labs.

Chemistry and all the units and disciplines of the students will benefit directly from the enhanced lab-based skills and learning acquired in the renovated laboratories.

V. SPACE PROGRAM

Current Space Allocations

The Phase II project does not proposed any changes to the total current allocation of space of the Department of Chemistry. Existing space dedicated to undergraduate practical laboratory teaching and support space will continue for this purpose.

Proposed Space Allocations

Please refer to Section VI functional Plans for the detail description of the space distribution by Sections.

CHART 5.2 Space subject of Phase II Renovations

EXISTING SPACE ALLOCATIONS	NASM*
Section A: Biological, Analytical Chem & Physical Chem	**238.6**
Room LM 6	238.6
Section B: General Chemistry	**683.9**
Room LM 102	330.7
Room LM 102B	16.7
Room LM 103	11.2
Room LM 104	14.5
Room LM 105	17.0
Room LM 106	243.5
Room LM 107A	15.9
Room LM 108	25.4
Room LM 109	9.0
Section C: Organic Chemistry	**723.4**
Room LM 113	333.4
Room LM 114	17.9
Room LM 115	13.6
Room LM 116	18.6
Room LM 117B	18.6
Room LM 117	321.3
Section D: Inorganic & Materials Chemistry	**527.2**
Room LM 206	167.6
Room LM 208	17.1
Room LM 209	24.4
Room LM 210	17.4
Room LM 211	250.5
Room LM 212	28.9
Room LM 213	21.4
TOTAL PROJECT	**2,173.1**

* NASM refers to Net Assignable area of space, which can be used by an occupant/occupancy, in square meters for the intended use described.

CHART 5.3 Proposed Practical laboratory courses by Section for Phase II Renovations

	Course	Title	Term	06/07 Enrollment
Section A	CHM 217	Intro to Analytical Chem	F	100
	CHM 317	Into Instrumental Analysis	S	63
	CHM 379	Biological Chemistry	S	34
	CHM 327	Physical Chemistry Lab	S	27
	CHM 417	Instrumentation for Anal Chem	F	19
	CHM 410	Analytical Environmental	F	32
	CHE 230	Environmental Chemistry (Eng)	S	120
Section B	CHM 139	Chemical Physical Principles	F/S*	1647
Section C	CHM 247	Intro Organic Chem II	F/S*	1207
	CHM 249	Organic Chemistry	S	48
	CHM 346	Modern Organic Synthesis	S	94
	CHM 348	Organic Reaction Mechanisms	F	62
	CHM 151	Chemistry: Molecular Science	Y	120
	CHE 203	Organic (Eng)	S	70
	CHE 391	Organic & Biochem (Eng)	H	100-150
	MSC 242	Organic (Eng)	S	65
	MSC 243	Organic Materials (Eng)	S	65
Section D	CHM 238	Intro Inorganic Chemistry	Y	130
	CHM 338	Intermediate Inorganic Chem	F	53
	CHM 438	Advanced Inorganic Chem	F	4
	CHE 200	Inorganic (Eng)	F	70
	MSC 240	Inorganic (Eng)	F	65
	MSC 241	Inorganic Materials (Eng)	F	65

Note: * means the course has a summer course component. Summer enrolments are **not** included in the 06/07 enrollment numbers.

Note: CHM 138 F/S/* resides in Phase I with enrollment of 2,116.

Note: Pharmacy students currently reside in chemistry courses and are captured in enrollments above though a new Pharmacy course is under development to be offered in Section A. Engineering courses are denoted as (Eng) in title. Those listed are the ones currently proposed with the final list likely to be altered to some degree.

Note: Actual room locations may change a bit depending on further clarity on which Eng courses will be delivered in which labs.

VI. FUNCTIONAL PLAN

A portion of Phase II consisting of approx. 836 NASM of laboratory space will be renovated almost exactly as Phase I (the design was so good that after 3 years of use that the design will not change for Phase II). The remaining 1,394 NASM with the largest portion being space for first year inorganic and materials, is designed around team-learning pods of 8 students and the

balance of space for more specialized lab instruction in chemistry and engineering subdisciplines.

In order to provide the very best in facilities for laboratory instruction, Phase II is segmented into 4 different laboratory sections: Biological, Analytical Chemistry & Physical Chemistry (Section A), General Chemistry (Section B), Organic Chemistry (Section C), and Inorganic and Materials Chemistry (Section D).

Each of these sections will be renovated to meet the modern needs of instruction in chemistry and related disciplines.

Section A:

Biological, Analytical, and Physical Chemistry instruction requires ready access to latest in advanced instrumentation, thus the placement in the lower level near the Analyst, NMR, and Mass Spectrometry facilities ensuring an unparalleled learning experience for chemistry, engineering, and pharmacy students.

Biological, Analytical & Physical Chemistry, with Chemistry will use LM 6 approx. 238.6 NASM. This room will be completely demolished and designed for instruction in biological chemistry and analytical chemistry. It is ideally situated next to the Analyst instrument facility that will be integrally connected to the teaching that goes on in Section A.

Major items are replacement of existing fume hoods with double the capacity, addition of low workbenches that will integrate instruments and experimental sections. Students using this space will be the Department's large second (CHM 217) and third (CHM 317) year analytical courses, the large analytical environmental course (CHM 410) and the high profile third year biological chemistry course CHM 379. Third year physical chemistry discovery based courses will also utilize the space and activities in this and related courses are expected to expand into new offerings in Nanomaterials.

Section B:

General Chemistry space renovations will provide the means to completely alter how students are instructed in these important areas. The plans have been carefully fine tuned to meet the needs of both large-enrollment Chemistry courses as well as more advanced upper level courses while also addressing the more specific aspects of instructing Pharmacy and Engineering students. We remain mindful of the need to significantly enhance accessibility in all of our efforts.

General Chemistry will incorporate the large rooms of LM 102, LM 106, along with the smaller support labs of LM 102b, 103, 104, 105, 107a, 108, and 109 for an approx. total of 683 NASM .

The large rooms will be demolished and converted from lab benches/fume hoods to work stations (8 students each at 13 stations) with a modicum of fume hood support (replace existing with new with no additional capacity).

Lab benches will surround the room for instruments and ancillary lab experiments.

An additional glass washing facility into or near LM 107A and 109 will be included. Students using this space will be the very large first year 'general chemistry course' (CHM 139) which has approximately1,900 students per year and the specialized first year chemistry course LM 151 will also spend significant time in this space.

Section C:

The Organic Chemistry labs will optimize fume hood placement in order to facilitate students being able to carry out sophisticated synthesis using the latest in techniques and methodologies. Optimization of our Inorganic and Materials lab will allow instructors to expand offerings in these and new areas like Nanochemistry.

Organic Chemistry courses will be housed in the two large rooms, LM 113 and LM 117, and smaller labs of LM 114, 115, 116, and 117b for a total approx. 723.4 NASM. The entire suite of rooms are to be demolished and replaced. This will deliver 6 learning pods housing 16 students each with an oval office in the middle as the nerve centre; faculty offices, instrument and storage rooms will be aligned along the west side of the hallway. 24 back to back fume hoods (4 ft fronts) and 6 x 5 ft common fume hoods will be required with attendant lab benches and teaching zones. This large expansion in fume hood capacity was planned and provided for in Phase I construction. The only change from Phase I is that the space will be wireless rather than wired while all other main components are to be replicated; mechanical systems will vary since location and site conditions diverge from the second floor.

The largest second year organic course (CHM 247 with >1200 students) and specialized third year organic courses will make prime use of this space.

Section D:

Inorganic and Materials Chemistry is currently housed in the large rooms of LM 206 approx. and LM 211 with smaller support labs of LM 208, 209, 210, 212, 213 for a total of approx. 527.2 NASM .

This space currently is seriously compromised for instruction of the necessary second, third, and fourth year courses. This section will be overhauled though not demolished. The floors will be replaced with resilient flooring, the lab benches will be resurfaced and properly finished; the rooms will be painted.

The ancillary labs will be outfitted to better support the main teaching function of these areas for the inorganic and materials chemistry courses. Fume hood functionality will be enhanced by replacing the existing fume hoods with more efficient new ones.

Courses using this space are CHM 238, 338, and 438 which enroll approximately 200 students over the course of these offerings. It is expected this space will have significant usage by both Chemical and Materials Engineering.

Please note that this part of the scope of work will be included in the project tender package and noted as "Separate Price No. 1". This work will be engaged, with the final scope potentially modified based on tender results.

VII ENVIRONMENTAL IMPACT

All construction for Phase II shall be done in accordance with the University's Environmental Protection Policy adopted March 7, 1994. Based on the EPP, all matters related to the project shall follow these principles as follows:

- It shall be used to make optimum environmental decisions;
- It shall be considered in the selection of consultants;
- It shall be used in making decisions on design, processes and products

While the EPP Checklist is to be used as a guide, the reference philosophy that represents the commitment to responsible property development by the Faculty of Arts & Science shall be reflected in all aspects of the project.

Responsible Property Development shall be defined as strategic relationships that balance the interests of: Economic Responsibility, working within the budget and within the schedule for the project; Equity with respect to space relationships, wages/fair trade, accessibility and mobility, safety and well-being for the occupants and visitors; and Ecology, so that the project's impact will be sustainable within the natural environment and within its context and contribute to community-building within existing University fabric.

The Implementation Plan strategies are to include the following in order of importance:

1. Natural light:
    a. for all work spaces as the existing conditions permit;
    b. use energy-efficient lighting fixtures (T8, T5 or better)
2. Any interior materials that are required to be selected shall adhere to the following:
    a. materials that are a result of low-emission manufacturing;
    b. a supply chain management that ensure the use of local materials, manufactured locally or transported in mass efficient manner;
    c. buy only material from fair/wage/trade companies with a recognized designation of energy conservation;
    d. use labeled green products;
    e. use high recycle content products;
    f. use low-life impact products;
    g. use closed-loop re-usable products;
    h. use non-voc content products;
3. Furnishings, equipment and all other incidentals shall be purchased using a triple-balance matrix.

See Appendix ‘A’ for Environmental Design Standards and Checklist.

VIII SPECIAL CONSIDERATIONS

ACCESSIBILITY

All floors of Lash Miller/Chemistry Building are accessible, including four wheelchair accessible ramps. As was achieved by Phase I, Phase II will be fully accessible and will include wheelchair accessible fume hoods (Sections B and C) and FM broadcast for the hearing impaired (Section C).

SECURITY

Lash Miller/Chemistry Building is currently undertaking a building controlled door access system project, which will include some internal door controls.

DEFERRED MAINTENANCE

This renovation will not have any significant impact on deferred maintenance for the Lash Miller building. All mechanical and electrical changes are limited to finishes and local electrical, HVAC and plumbing distribution requirements.

TELECOMMUNICATIONS AND NETWORK CONNECTIONS

Similarly, to Phase I, Phase II data requirements will include wireless student access within the laboratory spaces. All data connectivity will be done via the Departmental switches, which will need to be upgraded to meet increase port demands.

AV INFRASTRUCTURE

Similar to Phase I, Phase II AV requirements have been included in the scope of work for Section C only and consist of the replication of Phase I functionality. This includes having an LCD projector at each pod (six in total). In contrast to Phase I the digitized white board has been deleted and a traditional white board will be placed at each teaching station. Further, Phase I provided 128 ethernet connections while Phase II will be designed for wireless connectivity.

IX RESOURCE IMPLICATIONS

CAPITAL COSTS ESTIMATES

It should be noted that preliminary design work has commenced based on an earlier AFD Approval for $85,234.00 dated October 26, 2006. This cost is included in the TPC attached to the planning report.

		PROJECT NUMBER: 073-06-161	PROJECT MANAGER: M.M.		
	Capital Projects Department	PROJECT NAME: Phase 2 Renovation	CAMPUS: St. George		
	TOTAL PROJECT COST (TPC)	DRAFT	PROJECT DURATION:		
Number	**Item**	**Remarks**	**Base Cost**	**GST (1.98%)**	**Cost**
CONSTRUCTION					
835730	Construction: Main Contract		2,420,000	47,916	2,467,916
835752	Construction: Other Contract		-	-	-
835754	Secondary Effects		-	-	-
835757	Construction Contingency	10%	242,000	4,792	246,792
835762	Hazardous Waste Removal	Demolition Included	274,223	5,430	279,653
835765	Demolition Services		-	-	-
835768	Site Preparation	Lab Decon 24,5K	24,500	485	24,985
				Total Construction	***$3,019,345***
LANDSCAPING					
835755	Landscaping Services		-	-	-
				Total Landscaping	***$0***
PERMITS, INSURANCE					
835400	Licences / Permits		10,000	198	10,198
836700	Insurance	Calculated at 0.30% of Main Contract	10,400	206	10,606
				Total Permits, Insurance	***$20,804***
PROFESSIONAL FEES					
835200	Consulting	Includes 10,000 for Structural	$335,000.00	6,633	341,633
835201	Consultants: Disbursements		10,000	198	10,198
835204	Construction Management Fees		-	-	-
835206	Other Consultants	HazMat $27,5K/ Quality Control $10K / Cost$2K	$39,500	782	40,282
835210	Legal Services		-	-	-
835721	External Project Manager			-	-
895720	Design Fees: In House		-	-	-
895721	Design: Disbursements	Meals, parking, mileage, printing	-	-	-
835723	Project Disbursements	Meals, parking, mileage, printing	-	-	-
895725	Project Management: Fees	3.50%	150,000	-	150,000
				0	***$542,113***
SERVICES TO SITE					
835700	Site Services and Infrastructure	City charges	-	-	-
				Total Site Services	***$0***
COMPUTER WIRING AND TELEPHONES					
821110	Equipment: Computing: Purchase	Included in Main Contract	-	-	-
835010	Telephone Line Service	TBD	-	-	-
				Total Computer Wiring & Telephones	***$0***
MOVING AND STAGING					
837100	Moving	By Client	5,000	116	5,116
837101	Staging		-	-	-
				Total Moving and Staging	***$5,116***
FURNISHINGS AND EQUIPMENT					
820010	Furniture: Purchase	By Client	20,000	396	20,396
821010	Equipment: Purchase	Lab Benches	1,250,000	24,750	1,274,750
821510	Equipment: Audio / Visual: Purchase		50,000	990	50,990
821610	Equipment: Teaching:	Glassware	-	-	-
				Total Furnishings and Equipment	***$1,346,136***
OTHERS					
820011	Interior Signage: Purchase / Design	By Client	-	-	-
821325	Security and Access Systems	By Client	-	-	-
835070	Courier		-	-	-
835756	Exterior Signage: Purchase / Design		-	-	-
835764	Client Construction Expenses		-	-	-
835766	Ceremonies	Ground breaking, top off, grand opening		-	-
835900	Advertising / Marketing		-	-	-
836430	Donor Recognition	Plaques	-	-	-
890670	Facilities Repair/ Renovation: Internal	Trades (1.25%)	20,000	-	20,000
				Total Others	***$20,000***
				SUB TOTAL:	$4,953,514
PROJECT CONTINGENCY					
835758	Project Contingency		$46,486	-	46,486
				Total Project Contingency	***$46,486***
FINANCE COSTS					
835305	Interest Charges		-	-	-
				Total Finance Costs	***$0***
Total Square Footage of this Project: 24000 SF		**Construction Cost per SF:**			
				TOTAL PROJECT COST:	**$5,000,000**
Project Management Fees		**Recommended by:**	**Approved by:**		
$150,000		1/11/2007 14:45	Date:		

SECONDARY EFFECTS

Please note the scope of work for this project excludes all secondary project costs for future internal renovations resulting from this work.

LANDSCAPING AND SITE IMPROVEMENTS

This section is not applicable to this Project.

FURNITURE, FURNISHINGS AND EQUIPMENT COSTS

Refer to Section IX for details regarding these costs. Loose furniture comprises basic faculty offices for 6 offices along the first floor. Fixed benching and fume hoods are the fixed assets of the laboratories.

Equipment requirements are for basic items required in the newly renovated labs for basic functionality; this equipment currently does not exist in current labs. Items consist of balances, stirrers, specialized glassware (e.g. condensers), heating units, connectors for the new house vacuum and chilled water systems.

COMPUTING AND COMMUNICATION

The Operational costs for computing (network access) and communications (phone) shall be part of the overall operation and maintenance costs for the Department.

MOVING

This section is not applicable to this Project. Any temporary movement of equipment or laboratory glassware etc. will be organized by the Department of Chemistry.

OPERATING COSTS

The current (2006-2007) annual costs for the operation of the Lash Miller/Chemistry Building per GSM is $218.77 which includes comprising the caretaking services and utility costs, i.e. heat, hydro, water & gas.

Phase II will provide some efficiency from the incorporation of in-house vacuum and chilled water systems since these replace the wasteful use of tap water which is currently practiced in the current space.

Overall operating costs are not projected to increase on a per student basis over current allocations since the function of the labs will essentially remain the same. Any incremental increases accruing from the use of the space by Engineering or Pharmacy courses will be captured pursuant to a memorandum of agreement currently being developed between Arts and Science, Pharmacy, and Engineering.

X. FUNDING SOURCES AND CASH FLOW ANALYSIS

Funding for the project will be from the following sources:

Source of Funds

Faculty of Arts and Science & Department of Chemistry (50%-50%)	$1,080,000 (c)
Faculty of Applied Science & Engineering	$ 350,000(d)
Faculty of Pharmacy	$70,000
Outstanding funding request	**$3,500,000(b)**
Total	**$5,000,000**

(a) Faculty of Arts and Science has confirmed this Divisional contribution to the project and will provide bridge financing if these monies are not available until 2007-2008;

(b) Faculty of Arts and Science undertakes to provide bridge financing for the AIF fund if these monies are not available until 2007-2008;

(c) 50% of the contribution is a four-year contribution from Department of Chemistry;

(d) The contribution by the Faculty of Applied Science & Engineering may change arising from divisional financial reviews in early 2007 which would result in the Faculty of Arts and Science &Chem contribution to be commensurately increased or reduced.

The completion schedule of the Project for September 2007 occupancy requires Governance approvals by the end of the February 2007 cycle. Long-lead item orders and any construction related expense would only be undertaken once approvals are in place and all funding commitments are confirmed.

XI. SCHEDULE

The Proposed schedule for the Project is as follows:

Governance Approvals	January –February 2007
Tender	March 15, 2007
Construction Start	April 1, 2007
Substantial Completion	August 15, 2007
Inspections / Commissioning	August 31, 2007
Moving / Occupancy	September 4, 2007

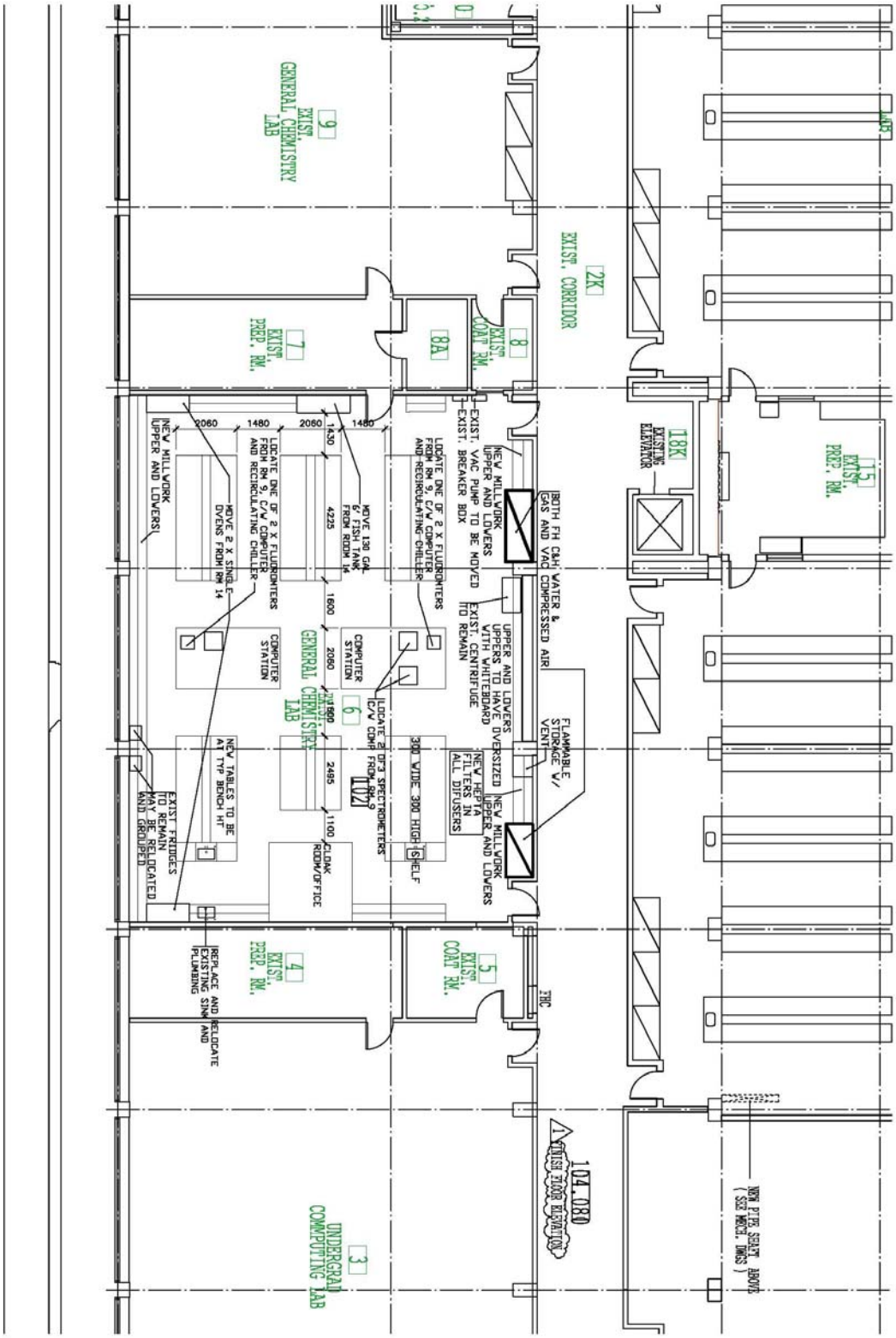
XII. Recommendations

THAT the scope of work described in the Project Planning Report for the Phase II Chemistry Undergraduate Practical Laboratory Renovations to approximately 2175nasm at an estimated cost of $5 million be approved with the sources of funding as identified.

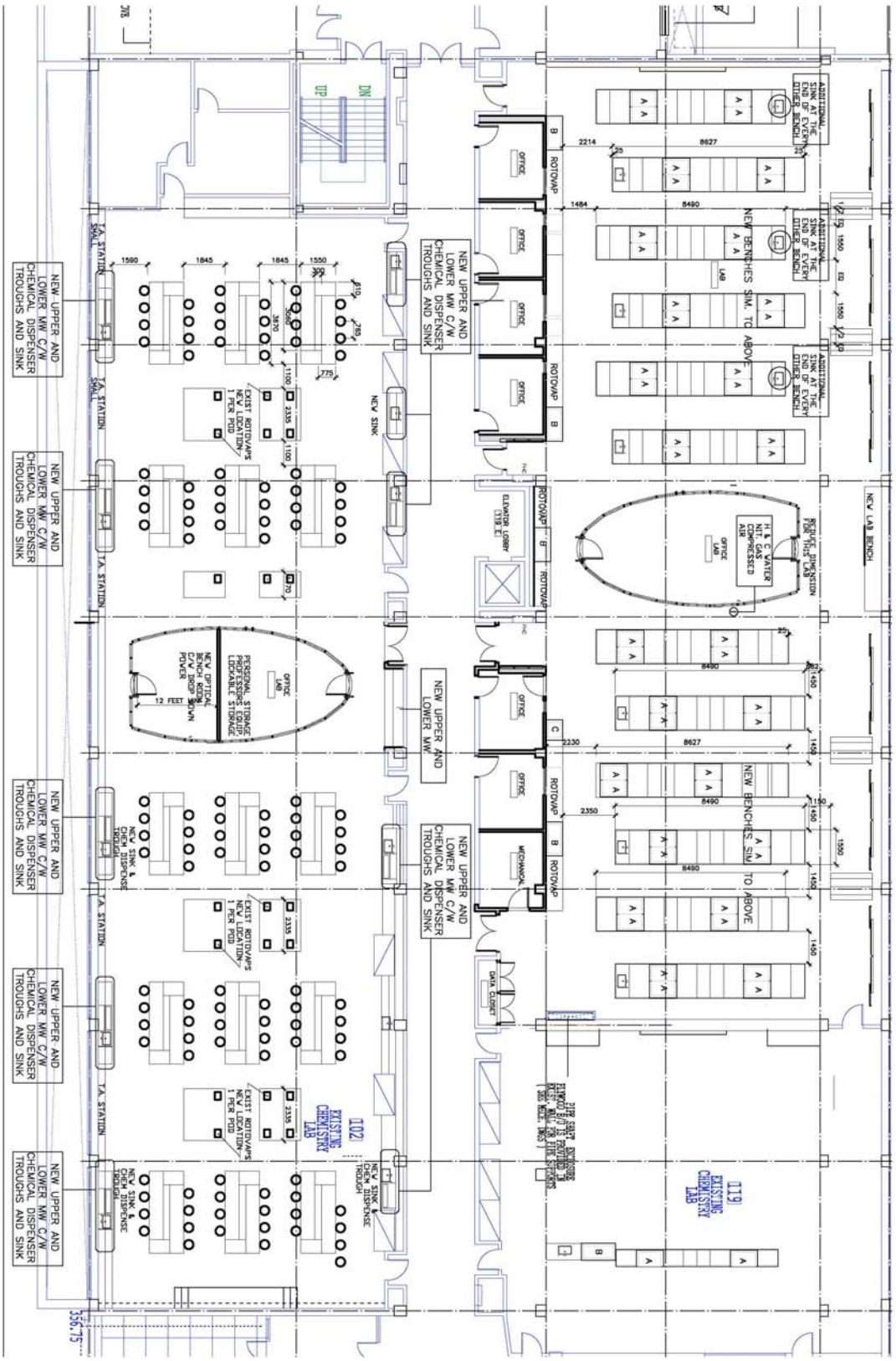
APPENDIX ‘A’

1. **Functional Plans**

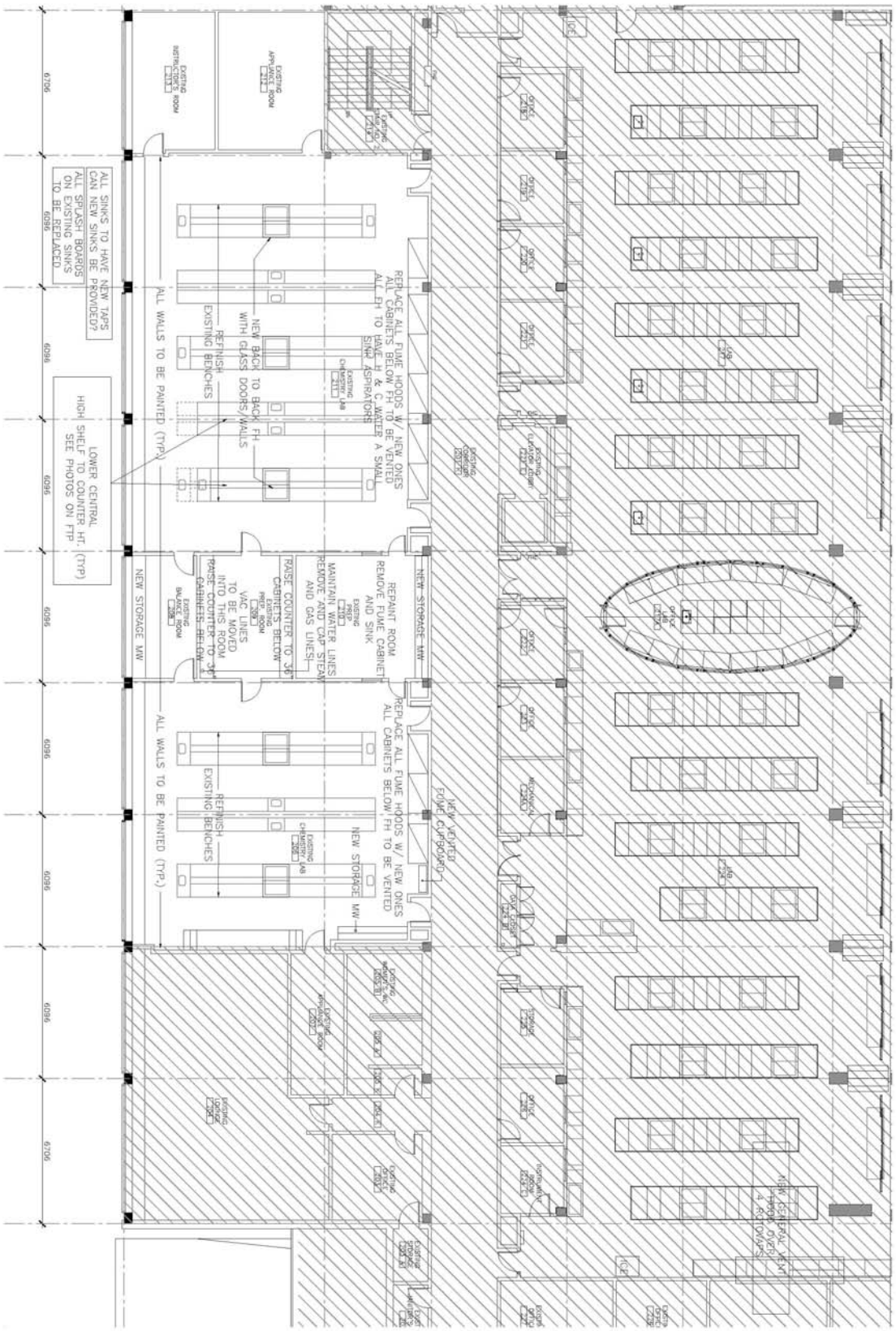
2. **University of Toronto Environmental Policy (available upon request)**



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN