PROJECT PLANNING REPORT

FOR THE RENOVATION AND EXPANSION OF SCIENCE FACILITIES AT THE UNIVERSITY OF TORONTO AT SCARBOROUGH

Phase 1 2003-04 : Science Teaching Laboratories

(Executive Summary available as separate document)

27 November 2003 revision

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I. EXECUTIVE SUMMARY

In the context of enrolment growth for the University of Toronto, associated in the first instance with the double cohort of 2003-04, the University of Toronto at Scarborough will by 2007-08 expand enrolment by 65 to 75 per cent over its 2000-01 enrolment. The Renovation and Expansion of Science Facilities is one of several projects at UTSC proposed to accommodate this expansion.

A Comprehensive Plan for the Renovation and Expansion of Science Facilities at UTSC has been developed in association with this Report. It indicates four phases of renovation and construction that are required to accommodate enrolment growth and related faculty appointments in the Sciences between 2003 and steady state in 2010-11. The renovation of teaching laboratories is addressed in Phase 1. The subsequent phases are identified, but will require additional development and administrative approval prior to seeking governance approval. Phases 2, 3, and 4 address the development of essential facilities, both offices and research facilities, for new faculty members that will be hired in support of the increased enrolments.

Undergraduate teaching laboratories in the Sciences Wing at UTSC were completed in 1965, and have not been renovated or updated since then. Antiquated facilities pose significant health and safety risks, and do not permit efficient and flexible arrangements for instruction.

Undergraduate fce enrolment in Biology courses with practicals has increased from 530 in 2001-02 to 1515 in 2003-04. Undergraduate fce enrolment in Chemistry courses has increased from 320 in 2001-02 to 1312 in 2003-04. It is anticipated that the current levels of enrolment will continue to increase in relation to planned overall enrolment growth and as students move from first year to upper year courses. Renovation of teaching laboratories for Biology and Chemistry will permit the accommodation of additional practicals associated with these increases through greater efficiency of use of existing facilities.

Deep renovations of four chemistry class laboratories and related facilities are necessary to accommodate increased enrolments and to provide up-to-date instructional

methods for chemistry courses. The Chemistry Lab renovations will achieve a substantial improvement in space utilization, and will allow more students to be taught in less space.

More modest renovations are required in eleven Biology teaching laboratories to ensure that safety and health standards are met, and to achieve efficiencies in utilization.

These renovations, especially those in Chemistry that require additional fume hoods at laboratory benches, require significant modifications to mechanical and electrical systems, including improved duct capacity and air handing systems. The capital costs of these are included in the total project cost.

Space for research laboratories will be made available as a secondary effect of these renovations, because the increased efficiencies of utilization of teaching laboratories will render surplus to needs the existing lab preparation facility and a teaching laboratory. The renovation and other costs of these research laboratories are part of Phase 2 of the comprehensive plan and are not costed as part of Phase 1.

The estimated total project cost for Phase 1 renovations is $4.3 million, including all mechanical and electrical work, fees, contingencies, finance costs and taxes. Specifically the estimated cost for the renovations of the Chemistry Teaching Laboratories is about $4.05 million and for the Biology Teaching Laboratories is about $250,000.

Funding for Phase 1 Science Renovations is entirely covered by Provincial capital funding of $1.83 million and dedicated Enrolment Growth funds of $2.47 million.

II. MEMBERSHIP AND TERMS OF REFERENCE

Members

Edward Relph, (Chair), Associate Principal Campus Development, UTSC
Kim McLean, Chief Administrative Officer and Associate Principal, UTSC
Gail Milgrom, Office of the Vice-Provost, Space and Facilities Planning
Rudy Boonstra, Vice Principal Research, UTSC (from May 03)
Lisa Jeffrey, Professor, Computer and Mathematical Sciences, UTSC (from Sept 03)
John Kennedy, Chair Life Sciences, UTSC (from July 03)
Julian Binks, Capital Projects Office
John Scherk, Chair, Acting Chair, Computer and Mathematical Sciences, UTSC (until Sept 03)
Charles Dyer, Chair, Physical and Environmental Sciences, UTSC
John Youson, Chair, Life Sciences, UTSC (until June 03)
Mark Schmuckler, Psychology, Life Sciences, UTSC
Mike Richard, Manager, Facilities Management, UTSC

This report is to be understood in the context of a comprehensive plan for the renovation and expansion of science facilities at UTSC that is being prepared simultaneously and which draws on the work of several previous project committees for a Sciences Building. No project reports were submitted by those committees because no funding was available and the committees did not complete their work. A summary of this comprehensive plan is appended.

Terms of Reference (modified September 2003 to reflect teaching laboratory needs and Province of Ontario funding)

1. Identify the demand for teaching laboratory space for the Sciences at UTSC in the context of enrolment growth plans for UTSC.

2. Identify the possibilities for renovating and reorganizing existing teaching laboratories, and relevant teaching support spaces.

3. Make recommendations for a detailed plan or programme indicating how teaching laboratory space and facilities should be organized.

4. Ensure that the proposals are consistent with a comprehensive, long-term plan for renovation, space reorganization and capital expansion for teaching, research and administration of the Sciences at UTSC

5. Demonstrate how the proposed changes will take into account the space standards of the Council of Ontario Universities

6. Identify the functional relationships between the elements of the detailed space and renovation proposals.

7. Identify all secondary effects, including the reuse of vacated space, the temporary effects of construction, and impacts on campus services and infrastructure

8. Identify equipment and movable furnishings necessary and their estimated cost.

9. Identify all resource implications, including a preliminary estimate of capital costs, and projected increases to the annual operating costs of the University of Toronto at Scarborough

10. Identify a funding plan for capital and operating costs.

11. Report by 7 October 2003

III. BACKGROUND INFORMATION AND VISION

A. Summary of Events since 2001 leading to this Report

The University of Toronto at Scarborough is implementing an enrolment growth plan that will result in a 75% enrolment growth over 2000-01 levels by 2010-11, when a steady state will be achieved. A major programme of capital construction has been undertaken to accommodate this growth, including an Academic Resource Centre, a Management Building and an Arts Building. These new buildings will provide many of the general classrooms and offices needed for growth.

The needs of the Sciences, however, are specific and are not being accommodated in these new buildings. The Sciences need improved teaching laboratories, additional facilities for graduate students, and teaching assistants and extra offices and research laboratories. From Fall 2000 to early 2003 a sequence of committees developed proposals for a new science building to accommodate all these needs. In January 2003 it became clear that insufficient funding would be available to construct a substantial new building, but that about $3 million of SuperBuild funding might be available to meet essential requirements, especially those related to teaching.

The teaching laboratories for Chemistry and Biology are in the lower levels of the Science Wing. They were constructed in the mid-1960s and have not been updated since then. UTSC was originally designed for television based instruction and there are 1960s era TVs suspended from the ceilings. There are water stained walls from chronic roof leaks (the roof was replaced in 2002); the floor tiles are cracked, benches are stained and chipped, the metal storage cabinets are rusty and most of the equipment is decades old. Over the years several teaching labs

have been converted to research with the consequence that the lab preparation and support areas are now inconveniently located – in some cases almost 100 metres from the teaching labs. In short, the wet teaching labs are obsolete, barely capable of handling current demands, and will be woefully inadequate for dealing with enrolment growth.

The Sciences Wing which houses these laboratories is a massive poured concrete structure, now 38 years old with serious problems in terms of infrastructure. The ducts and fans are barely adequate even for existing fume hoods, the emergency generator provides erratic service, air and water supplies are at their limits. Improvements to the teaching laboratories will be ineffective without some simultaneous improvements to the facilities that support them.

Offices for faculty and graduate students in the Sciences are inadequate for existing faculty needs – almost all the tenure stream professors in Computer and Mathematical Sciences share office space, and there are no offices for faculty appointments in Life Sciences that are planned for 2004.

There are very few spaces available for research laboratories for new faculty. In the past few years research laboratories have been created by the conversion of washrooms, storerooms and underutilized teaching laboratories. With the rapid enrolment growth associated with the double cohort few of these options are now available.

In short, substantial renovations and expansion to the Sciences Wing at UTSC is required to accommodate enrolment growth and associated growth in the faculty and graduate student numbers. The renovations and expansions have to address almost simultaneously needs for teaching laboratories, infrastructure requirements, offices, and research laboratories, A serious shortfall in attention to any one of these will make it extremely difficult and perhaps impossible for the Sciences to accommodate enrolments in the numbers that are currently projected.

B. A Comprehensive Plan for the Science Facilities at UTSC

The overall and interconnected need for teaching laboratories, infrastructure upgrades, offices and research laboratories is addressed in a Comprehensive Plan for the Sciences at UTSC that is being prepared in association with this report. A summary of the Draft Comprehensive Plan, indicating four phases of renovation and construction that are required to accommodate all the changes needed to accommodate enrolment growth in the Sciences, is presented in Appendix 1. This has been reviewed and approved in principle by the Project Committee, but several details need to be completed or reviewed, especially cost estimates for Phases 3 and 4. Work on the complete Comprehensive Plan should be completed in Spring 2004

The demands of the Science departments at UTSC for teaching laboratories, related infrastructure upgrades, offices and research laboratories must be understood as interconnected, so that mistakes such as the premature conversion of teaching facilities to research, or the addition of labs that cannot function to capacity because of inadequate air handling, are avoided. It is also imperative to deal with the interconnections between different demands in order to grasp the most efficient spatial arrangements for the three departments and the most appropriate phasing of renovations and other changes. The Comprehensive Plan maps out a strategy for

turning the science teaching and research spaces into a facility that is up-to-date, efficiently organised, appropriate for doing modern science, capable of attracting and retaining outstanding faculty and students, and capable of attracting the attention of potential donors.

A summary of the Draft Comprehensive Plan for the Renovation and Expansion of Science Facilities at UTSC is included as Appendix 1. This Report deals with Phase 1 [2003-04]: Renovations of Teaching Laboratories. Phase 2 [2004-05] proposes initial conversions of former teaching laboratories to research uses, (and the enclosure of balconies for essential graduate student and office space, should funding become available – if not these will be completed as part of Phase 4). Phase 3 [2005-06] proposes the conversion of the existing Soil Erosion Laboratory to several research laboratories, plus the conversion of space made available through the opening of the Arts Building to Science facilities. Phase 4 [2006-07] proposes the construction of a new building of about 1100 to 1400 nasm to accommodate graduate student and research laboratory needs (and, if not already completed, the enclosure of Science Wing balconies). The completion of all four phases will meet the needs of the Sciences at UTSC in terms of planned enrolment growth to steady state in 2010-2011.

C. Context of Phase 1: Teaching Laboratory Renovations in Sciences at UTSC.

The Sciences at UTSC are grouped in three interdisciplinary departments. Life Sciences consists of the disciplines of Biology and Psychology; Physical and Environmental Sciences consists of the disciplines of Astronomy, Chemistry, Environmental Science and Physics; Computer and Mathematical Sciences (CMS) was created in 2002 by separating the disciplines of Mathematics and Computer Science and Statistics from Physical Sciences. Most of the faculty, administrative offices and research labs are housed in the Sciences Wing, but are mixed up so that a psychologist's office might be adjacent to a geologist's office and a mathematician's office. Furthermore some CMS offices and the computer labs are in the Bladen Wing, as are the Science Coop administrative offices that serve all three departments. While this sort of spatial arrangement was a means of promoting interdisciplinarity when enrolments were smaller, now it is a source of inefficiency.

Teaching laboratories are less chaotically organized. All but two of the Computer Labs (which are not the subject of this report), are located in a cluster in the Bladen Wing, and have been recently upgraded using ATOP funds. A specific need for CMS is a much larger Math Aid room than the current 43 nasm facility. In the long run it is intended that this will be replaced by a room of about 120 nasms on the 6th floor of the Science Wing, but this is not possible until 2005 because it is contingent on several space exchanges which cannot be achieved until the Arts Building has opened. In the short run, various ad hoc arrangements will have to be made to accommodate Math Aid needs.

The particular concern of this report is the Biology and Chemistry Teaching Laboratories. The Biology Labs are located more or less in a line along Level 2 of the Sciences Wing, though some are situated on Levels 1 and 3. The Chemistry teaching labs are situated on Level 1 of the Sciences Wing.

D. Lash-Miller Chemistry Teaching Laboratory Renovations

The most expensive part of the proposal for UTSC teaching labs is for the updating of Chemistry class laboratories. These proposals were informed by the renovation of three large laboratories in the Lash Miller Chemistry Building on the St. George campus.. Approved by the Planning and Budget Committee in April 2003 and completed in November 2003 at a total project cost of $5.9 million, these provide 128 student stations, each with two linear feet of fume hood space, as well as substantial infrastructure upgrades. The design for these has set the standard for laboratories for Chemistry instruction at the University of Toronto and has been closely followed in the proposals made in this report.

IV. ACADEMIC AND OTHER PLANS AND SPACE NEEDS

A. Initiatives in the Sciences

Since it was established in 1970, the Department of Life Sciences at UTSC has been very successful in attracting excellent faculty and students. All the professors have their research labs at UTSC, and many of the graduate students they supervise do their work in these labs. A notable recent achievement was the establishment of the CFI funded Centre for the Neurobiology of Stress. This local research activity has helped to make programmes in Biology, Neuroscience and Psychology attractive for excellent undergraduates. In 2003 several additional programmes have been introduced – including Human Biology, ParaMedicine, Industrial Microbiology and Environmental Science and Technology (both Joint Programmes with Centennial), and Cooperative Programmes in Cell and Molecular Biology, Neuroscience and Psychology and its Applications, and these have attracted far more applicants than was anticipated (in some cases 10 applicants for every place). A coop programme in Conservation Biology will be introduced this year.

In contrast, Chemistry has largely been a service discipline, attracting high enrolment in first year courses but relatively few students into specialist programmes. The faculty have mostly had their research labs on the St. George Campus and there have been only a handful of graduate students at UTSC. This is about to change because in future the research lab space on St. George will be required for additional St. George faculty. As senior professors at UTSC retire over the next five years their replacements will be allocated research space at UTSC, where they will accommodate the graduates they supervise. It is anticipated that this in turn will create a stronger demand for undergraduate chemistry programmes. As an indication of this, one chemistry professor appointed in 1998 has several graduate students and two post-doctoral fellows working in his research lab at UTSC, and another faculty member appointed in 2002 has already established a substantial NMR facility which is the foundation for a major CFI application that could create a national centre for specialised environmental analyses.

B. Enrolment Growth

The plan that is most instrumental in creating the need for Phase 1 of the Science Wing Renovations is the Provostial plan to achieve about 75% enrolment growth over 2000-01 levels at UTSC by 2010-11. Projections from the April 2003 enrolment growth model are summarised in Table 1. This table also shows the anticipated nasms per fte student, and gives some indication of the decrease in available space that will occur even with the opening of new academic buildings.

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2010-11
Headcount	5752	6029	6762	8203	9279	10074	10132	9924	9669
Total ftes	4637	4888	5499	6621	7504	8133	8182	8014	7808
Total nasms	32797	32797	32797	36240	41402	43967	43967	43967	43967
Nasms/fte	**7.07**	**6.71**	**5.96**	**5.47**	**5.52**	**5.41**	**5.37**	**5.48**	**5.63**
				ARC Opens	Managem't & Student Centre Open	Arts Building Opens			

TABLE 1 : ENROLMENT GROWTH AND NASMS PER UNDERGRADUATE FTE AT UTSC
[ftes from Planning Office Enrolment Growth Model 16 April 2003, nasms from Planning Office September 2003]

In 2000-01 at UTSC fte undergraduate enrolment was 4,637, and there were 35 graduate students officially located here. The intention is by 2006-07 to increase the undergraduate enrolment to 8182 ftes and the graduate enrolment to 185 ftes.

C. Enrolment Balance and Enrolment Projections in the Sciences

A balanced undergraduate enrolment across a range of disciplines is considered suitable for UTSC, but there are no formal plans for adjusting the enrolment balance between Sciences, Social Sciences, Management and Humanities. However, this does not mean that science enrolments are growing at exactly the same rate as enrolments in other disciplines – there are continual shifts in the overall enrolment balance. In the absence of a formal plan, and for the specific purposes of this report, the best way to assess the future need for science teaching laboratories is to project fce enrolment for science courses with practicals (i.e that require laboratories) on the basis of trends over the last three years compared with overall enrolment at UTSC. These projections are shown in Table 2.

These data are complicated by the change to three semesters at UTSC which means pervious Y courses are now two H courses, and by the very steep jump in enrolments in first year biology and chemistry in 2003-04. The projections are made on the basis of a two-year average of enrolment in, for example, BGYA01 as a percentage of total course enrolment at UTSC (10.9%). This percentage is then used as a basis for determining projected enrolment in BGYA01 to 2008-09 or steady state. Of course, if 2003-04 levels of enrolment in BGYA01 and CHMA01 are sustained in the next few years these projections will be low. Note, too, that this method does not capture well the probable flow through from high enrolments in first year courses to demand for second and third year courses with practicals. Courses with fewer the 30 fce enrolments are omitted.

	Actual Student Enrolment				% of Total Hdcnt			Projected Student Enrolment				
Course	2000-01	2001-02	2002-03	2003-04	2002-03	2003-04	2 yr. Avg.	2004-05	2005-06	2006-07	2007-08	2008-09
BGYA01Y3	463	447	635		9.4%							
BGYA01H3				1011		12.3%	**10.9%**	1009	1094	1100	1078	1062
BGYA02H3				948		11.6%	**10.5%**	974	1055	1061	1039	1025
BGYB12H3	94	98	83	86	1.2%	1.0%	**1.1%**	106	115	115	113	111
BGYB32H3	97	120	122	199	1.8%	2.4%	**2.1%**	197	213	214	210	207
BGYB33H3			86	137	1.3%	1.7%	**1.5%**	137	148	149	146	144
BGYB52H3	46	46	39	58	0.6%	0.7%	**0.6%**	60	65	65	64	63
BGYC15H3	67	62	49	61	0.7%	0.7%	**0.7%**	68	74	74	73	72
BGYC17H3	114	99	109	116	1.6%	1.4%	**1.5%**	141	152	153	150	148
BGYC20H3		3	47	67	0.7%	0.8%	**0.8%**	70	76	77	75	74
BGYC21H3	83	92	125	124	1.8%	1.5%	**1.7%**	156	169	170	167	164
BGYC22H3			75	59	1.1%	0.7%	**0.9%**	85	92	93	91	89
BGYC23H3	51	50	36	34	0.5%	0.4%	**0.5%**	44	48	48	47	46
BGYC29H3	38	22	35		0.5%		**0.5%**	48	52	52	51	51
BGYC33H3				96		1.2%	**1.2%**	109	118	119	116	115
CHMA01Y3			605		8.9%							
CHMA10H3				1063		13.0%	**11.0%**	1018	1103	1110	1087	1072
CHMA11H3				904		11.0%	**10.0%**	928	1006	1012	991	977
CHMB16H3	49	43	23	65	0.3%	0.8%	**0.6%**	53	57	57	56	55
CHMB41H3				311		3.8%	**3.1%**	286	310	312	306	301
CHMB42H3				254		3.1%	**2.7%**	254	275	277	271	267
CHMB44Y3	167	159	160		2.4%							
CHMC41H3	37		23		0.3%		**0.3%**	32	34	34	34	33
CHMC42H3		28		22		0.3%	**0.3%**	25	27	27	27	26
EESA06H3	66	80	130	130	1.9%	1.6%	**1.8%**	163	177	178	174	172
EESB02H3	19	27	30		0.4%		**0.4%**	41	45	45	44	43
EESB04H3	35	25	42	54	0.6%	0.7%	**0.6%**	59	64	65	63	63
EESB05H3	41	39	50	60	0.7%	0.7%	**0.7%**	68	74	75	73	72
EESB15H3			20	34	0.3%	0.4%	**0.4%**	33	36	36	35	35
EESC03H3	36	22	30	32	0.4%	0.4%	**0.4%**	39	42	42	41	41
EESC13H3	29	39	31	29	0.5%	0.4%	**0.4%**	38	41	41	40	40
NROB60H3	78	65	85	127	1.3%	1.5%	**1.4%**	130	141	142	139	137
PHYA10H3	217	240	377	597	5.6%	7.3%	**6.4%**	597	647	651	638	629
PHYA21H3	183	154	259	399	3.8%	4.9%	**4.3%**	404	438	440	431	425
UTSC hdcnt	5752	6029	6762	8203				9297	10074	10132	9924	9785

TABLE 2 : PROJECTED HEADCOUNT ENROLMENTS IN SCIENCE COURSES WITH PRACTICALS (see text for explanation. UTSC total headcount is shown for comparison)

Table 2 shows that in 2004-05 the peak one-term demand for laboratory spaces in Biology (A02H, B32H, B52H, C17H, C21H. C23H, C33H) is 1882. In Chemistry it is 1444 combined for the courses at A, B and C level. Demand more than doubled between 2001-02 and 2003-04. A conservative projection indicates that demand is expected to rise slightly from 2004-05 to 2005-06 and then to fall slightly to steady state in 2010-11 with a demand of about 1650 in Biology and 1400 in Chemistry. (Note that the one term demand projected for the Lash Miller teaching lab renovations is also coincidentally about 1400 – almost all for 100 level courses).

The projected enrolments in Table 2 are the basis for a projection of needs for laboratories

An alternative analysis by the Planning Office projects total classroom hour needs, using the input measures of length of practicals and course enrolment. This analysis indicates that a total of 67 lab hours per week will be required in Chemistry in 2008-09, a year close to peak demand, assuming that the labs are modified as proposed in this report. Four laboratories, each in use at the minimum COU standard of 18 hours per week, will provide 72 hours of lab instruction. Extra demand can be met either by increasing the numbers of hours of utilization per week or by offering courses with practicals in the summer session. The proposal in this report will provide higher efficiency of utlisation – more students will be taught in less laboratory space.

D. Quality of Laboratories and Undergraduate Recruitment and Retention

There is a high level of competition between universities to attract the best undergraduates in the Sciences. While location and other factors play important roles in selecting a university, it is also the case that quality of facilities is a key consideration. This is no less important in retaining students, especially if there are significant differences in the quality of laboratories and equipment between different universities.

In order to attract and retain the best undergraduates in Sciences, and to provide training in the sciences that is appropriate for current industry standards, high quality undergraduate laboratory facilities are required. The laboratories at UTSC are 35 years old, and much of the furniture and equipment is equally old. There is evidence in most of them of water damage caused by a chronic problem with a leaking roof (that has now been corrected). Health and safety requirements dictate that most chemical procedures be done in fume hoods, but the shortage of fume hoods necessitates taking turns and this reduces the effective capacity of the laboratories. Existing fume hoods are inefficient and inadequate for modern ways of teaching..Furthermore, the chemistry labs at Lash-Miller on the St. George campus are currently undergoing a major renovation, and the new University of Ontario in Oshawa is equipped with state of the art facilities. If UTSC is to continue to compete for top quality undergraduates in the Sciences it is imperative that the undergraduate laboratories be renovated and brought up to a twenty-first century standard.

E. Space Needs in Sciences at UTSC and COU Standards

The most recent update of the space inventory at UTSC for the COU was completed in 2001-02. The space analysis associated with this indicated that while overall UTSC was at 74% of the COU space standard, and below the system average, for teaching laboratories it was at 112% of the COU standard. Analysis of this apparent space surplus revealed some remarkable discrepancies. The Biology first year teaching labs are in use 30 hours per week (the COU standard is 18 hours per week) but some laboratories for upper level Biology and Chemistry courses were in use for only 6 hours per week. The reasons for these extreme variations apparently have to do mostly with the physical arrangements of the laboratories, the location of preparation rooms, insufficient lab technicians to facilitate rapid set-up and take-down (so a single lab cannot be used for different courses), and inadequate fume hoods and other equipment.

Since about 1998 several underutilized teaching laboratories have been converted to research facilities, because this has been a pressing space need, and this has helped to redress the space surplus in teaching laboratories. Since 2002 increasing enrolments, without any additions to the teaching laboratory inventory, have reduced this apparent surplus so that in 2003-04 teaching laboratory space is estimated to be at 88% of the standard. Even so the analysis of utilization of existing spaces and projections of needs for teaching laboratories, indicates that the redesign of facilities and the considerable increases in efficiency resulting from this redesign will allow some of the existing laboratories to be converted to other uses.

In the course of writing this report several measurement errors in the space inventory for the Science Wing at UTSC were identified. To correct these a systematic re-measurement of all the spaces associated with this report was undertaken by the Planning Office. These areas are the ones used for this report.

V. PROPOSED TEACHING LABORATORY RENOVATIONS

A. Overview of Existing Space

A comprehensive list of science teaching laboratories at UTSC as of Fall 2003 is shown in Table 3. The project committee has reviewed this list in terms of necessary and urgent renovations, and has identified the Chemistry Labs as those in most urgent need of improvement and renovation in order to accommodate increased enrolments, and Biology Labs as in need of less intense but essential renovations to correct code violations and repair visible damage and deterioration of fixtures and fittings.

Teaching Laboratory	Category	Area Nasms	ubtotal Nasms	Use
CMS				
S506F	Unsched Class Dry Lab	43		Math Aid Room
S628	Unsched Class Dry Lab	59	**96**	CSC Computer Lab
Biology				
S133	Sched Class Wet Lab	129		,C,D levels, Cell and Molecular Class Lab
S135	Sched Class Wet Lab	129		B,C,D Cell and Molecular Class Lab
S148	UnSched Class Wet Lab	42		Animal surgery
S237	Sched Class Wet Lab	107		A-Level Class Lab
S240	Sched Class Wet Lab	109		A-Level Class Lab
S242	Sched Class Wet Lab	109		A-Level Class Lab
S248	Sched Class Wet Lab	109		A-Level Class Lab
S250	Sched Class Wet Lab	109		A-Level Class Lab
S321	Sched Class Wet Lab	109		B and C
S323	Sched Class Wet Lab	109		B, C level Class Lab
S326	Sched Class WetLab	109		B, C level Class Lab
S328	Sched Class Wet Lab	109	**1279**	B, C level Class Lab
Psychology				
S316	Unched Class Dry Lab	106	**106**	UG/Grad Computer Labs (former wet lab)
Earth Sciences				
S313	Sched Class Wet Lab	106	**106**	Mostly B and C level EES
Physics				
S503	Unsched Class Dry Lab	66		Physics Computer
S503D	Sched Class Dry Lab	120		Dry Instrument Lab
S503E	Unsched Class Dry Lab	12		Physics Aid Centre
S503H	Sched Class Dry Lab	85		Dry Lab and Drop-In Centre
S504	Sched Class Dry Lab	114		Instrument Room
S504A	Sched Class Dry Lab	28	**425**	Logic Lab
Chemistry				
S132, S132C	Undergrad Lab Support	74		Teaching Prep Area
S141	Sched Class Wet Lab	129		B level organic Class Lab
S151	Unsched Class Wet Lab	131		Chemistry Help Room
S153	Sched Class Wet Lab	131		A-Level Class Lab
S157	Sched Class Wet Lab	131		A-Level Class Lab
S159	Sched Class Wet Lab	131		A-Level Class Lab
S163	Sched Class Wet Lab	131		A-Level Class Lab
S136A	Undergrad Lab Support	20		Instrument Room
S164	Undergrad Lab Support	32		Lab Prep Room
S165	Sched Class Wet Lab	131	**1041**	A-Level Class Lab
Anthropology				
S311	Unsched Class Dry Lab	106	**106**	Archeology Lab
TOTAL NASMS			**3159**	

TABLE 3: TEACHING LABORATORIES IN THE SCIENCES WING 2003-04

B. Proposed Renovations of Teaching Laboratories

The existing teaching laboratories were built in the 1960s and have seen only incremental and ad hoc improvements since then. Many have suffered water damage from former roof leaks, or have missing floor tiles, rusting metal cabinets, inadequate projection facilities and other problems. Some of these problems involve ad hoc wiring arrangements that are probable code violations and can only be corrected by adding duplex outlets. They all need redecoration and repair of fixtures. The proposed changes include some significant reallocation of spaces, especially the teaching support areas for Chemistry, in order to improve efficiency of use.

Biology: In terms of layout and essential facilities most of the Biology teaching laboratories require redecoration, repair and the improvement of storage areas. The A-level Biology Labs are very heavily used – they have scheduled classes for 30 hours per week in Fall and Winter Sessions, compared with the COU standard of 18 hours. To handle increased enrolment a fifth first-year laboratory was added in Fall 2003 by converting an upper-level teaching lab to first-year instruction and making minor renovations including the installation of a fume hood. The upper level courses were transferred to a less well utilized upper level teaching lab .

The improvements to the Biology Laboratories involve repair of all damaged surfaces, cabinets and fume hoods, bringing connectivity up to current requirements for teaching, correcting code deficiencies as necessary, modifying electrical supply and switches to meet current demands, upgrading and replacing defective equipment, and installing secure storage units for microscopes and other equipment.

Chemistry: Unlike the Biology labs, the Chemistry teaching laboratories require fundamental changes to be brought up to date and to permit efficient and flexible use for instruction. In particular, the number of fume hoods has to be considerably increased to be consistent with current safety and pedagogic requirements, and there has to be some reorganization of facilities to facilitate improvements in efficiency in delivering practicals.

A subcommittee of Professor Jamie Donaldson, and lecturers Ann Verner and Karen Henderson was struck in June 2003 to investigate the requirements for renovations of the Chemistry teaching labs. Their work was informed by the recent renovations of the Lash Miller chemistry teaching laboratories on the St George Campus which provide 2 feet of fume hood space and 4 feet of bench space per student. It also proposes a reorganization that includes the move of a teaching support area, currently located some distance away along a public corridor, to the heart of the laboratory cluster. An instrument laboratory will be created from an existing lab support area, and some modifications will be made to the offices for Lecturers. A small chemistry help room will be created from existing office space.

Four existing teaching labs, each with a capacity of 20, will be modified by removing intervening block walls to create two large laboratories each with a capacity of 48. New benches will be installed, each with 16 stations. Each station will have two feet of fume hood and three feet of bench space, duplex outlets, steam, vacuum and cooling water. Existing areas at the back

of each laboratory are currently used for balances and small equipment and need modest upgrading to accommodate additional equipment. In each 48 station laboratory there will be three teaching assistant stations for dispensing chemicals and collecting waste, each with a four foot fume hood. One of the TA stations in each laboratory will be designed so that it is wheelchair accessible and can be used by an undergraduate student if necessary, but will otherwise serve as a TA station. A projection screen and a data drop will be provided at the front of the laboratory.

In so far as possible without compromising the quality of the renovations, existing benches and cabinets will be refurbished and reused. The benches, in particular, are made of high quality materials that have experienced minimal wear and tear and it should be possible to refurbish them to an excellent condition. Reuse of furniture and fittings wherever possible will reduce the overall cost of the project

The teaching support area, currently located about 70 metres away along a public corridor, will be relocated to an area between the two laboratories that is currently used as a technician's office. Service openings will be cut into the walls to allow easy access to the teaching labs. A second technician's office at the side of one of the labs will be converted into an instrument room. The offices for technicians and lecturers will be relocated across the corridor to an area currently used mostly for storage.

These proposed renovations will hugely increase the capacity of the labs for instruction, allow practicals for different courses to be conducted simultaneously in one laboratory (each course can work at a single bench), and will allow one existing teaching laboratory and the current teaching support area to be released for conversion to research activities without in any way compromising the availability of teaching laboratories. The two renovated laboratories will have 96 student stations, compared with the existing 80 stations in four labs. There are two other 20 seat teaching labs adjacent to the area being renovated. These will be redecorated and upgraded in minor ways. They will be used for specialized practicals and small enrolment upper level courses. It is intended that these will be renovated to the standard of the main laboratories in Phase 3 of the comprehensive plan for Science Facilities at UTSC.

Table 4 below summarises the proposed teaching laboratory renovations and changes to related spaces for Phase 1.

Room	Area Nasms	Description of Renovation
Biology		
S133	129	General refurbishment –repair walls and floors, correct deficiencies
S135	129	General refurbishment –repair walls and floors, correct deficiencies
S148	42	Animal surgery recently upgraded – no changes
S237	107	General refurbishment –repair walls and floors, correct deficiencies
S240	109	General refurbishment –repair walls and floors, correct deficiencies
S242	109	General refurbishment –repair walls and floors, correct deficiencies
S248	109	General refurbishment –repair walls and floors, correct deficiencies
S250	109	General refurbishment –repair walls and floors, correct deficiencies
S321	109	General refurbishment –repair walls and floors, correct deficiencies
S323	109	General refurbishment –repair walls and floors, correct deficiencies
S326	109	General refurbishment –repair walls and floors, correct deficiencies
S328	109	General refurbishment –repair walls and floors, correct deficiencies
Chemistry		
S132, S132C	74	Teaching Prep Area surplus to needs – convert to research lab (not costed in Phase 1)
S141	129	B level organic Class Lab – may be surplus to needs – no change
S151	131	General refurbishment –repair walls, storage, floors, fume hoods
S153 S157	262	Remove demising block wall, renovate with 2 benches at 16 stations and 1 at 8, plus TA locations, with one fume hood per station, rear work area for storage of small equipment and balances.
S159 S163	262	Remove demising block wall, renovate with 2 benches at 16 stations and 1 at 8, plus TA locations, with one fume hood per station, rear work area for storage of small equipment and balances, plus chemicals.
S155	31	Redecorate and refurnish as lecturers' offices
S158	32	Existing lecturer's office. Convert to teaching support area, create pass-throughs to teaching laboratories
S162	23	Existing technician's office. Convert to Help Room – redecorate and refurnish
S164	32	Convert existing lab preparation room to Instrument Laboratory
S165	131	General refurbishment –repair walls, storage, floors, fume hoods

TABLE 4 : PROPOSED TEACHING LABORATORY RENOVATIONS

VI SECONDARY EFFECTS AND SPECIAL CONSIDERATIONS

A. Computing and Telecommunications

All teaching laboratories will have data drops installed at the front of the room. (several do not have these at present.) All teaching laboratories will have an adequate pull down projection screen at the front of the room, and a clearly identifiable location with power outlet for a portable data projector to be mounted.

B. Accessibility

The teaching laboratories will be designed to be accessible, with flat floors. In addition two accessible bench stations will be included in the deeply renovated chemistry labs, one in each of the large teaching laboratories. These will have all the fittings of other student stations, including the fume hoods, but will be at wheelchair height and have space under the bench to accommodate a wheelchair. They will be used as TA stations when they are not required for instructional purposes

C. Spaces made available through Secondary Effects

The reorganisation of the Chemistry Teaching Labs will allow more efficient use of existing facilities. The teaching support activities, currently located in S132, will be moved to S158, and S132 will no longer be required. This space be converted to a research laboratory.

S141 is currently used as a teaching lab for B-level organic chemistry. With the reorganisation of the laboratories so that they are suitable to teaching all levels of chemistry, and with the existing levels of enrolment, this laboratory will no longer be required. However, given the fluctuations in enrolment and uncertainty about future demands it is considered unwise to release this for use as research space for at least another 12 months. If at that time the demand indicates that this will not be required for teaching purposes it can appropriately be converted to research facilities.

These conversions of inefficiently used teaching support space and undergraduate laboratory space to research laboratories will provide some of the space immediately required to provide research labs for new faculty hired to accommodate enrolment growth in the Sciences. Without research lab space it will be impossible to attract excellent faculty. The costs of renovations to convert existing space to meet specific research needs are not part of Phase 1 of the Science Renovations, and will be met from start-up funds.

D. Infrastructure Requirements

The new fume hoods will not function without upgrades to the air handling system in the Science wing to extract the fumes and transfer them to the vents on the roof. The engineering firm Totten Sims Hubicki, which has beenn a consultant on the heating, cooling and ventilation systems for two major research laboratory renovations in the Sciences Wing, was asked to report on requirements for the teaching laboratory renovations and to provide a cost estimate of meeting those requyirements. TSH provided a pre-design report in October 2003. This report assumed a future condition in which all Chemistry teaching laboratories will be provided with fume hoods at 2 linear feet per station (136 stations in total, which is the target at the end of Phase 3 of the Comprehensive Plan; Phase 1 proposes 96 stations). In other words their proposal provides sufficient HVAC capacity for planned expansions.

The proposal assumes 100 per cent fresh air replacement. It treats the labs as modules that can be operated independently, and assumes that the student fume hoods will be turned off when they are not required for instruction.

To meet these assumptions it will be necessary to upgrade main air handling systems, and the supporting heating and cooling systems. The capacity of the distribution ductwork will have to be increased.

Assuming a stand-alone system, with venting to the roof of the Sciences Wing, the ductshaft capacity will have to be increased by raising the roof of the existing ductshaft.

The preferred solution to the requirements of the Science Teaching Laboratories is to connect it to the central plant. The main heating, cooling and power services at UTSC are now about 37 years old and a central connection will allow this project to reinforce other initiatives to upgrade central infrastructure. A stand-alone system will simply increase maintenance and operating requirements. Connecting the laboratories to central plant will result in operating and maintenance efficiencies. For these reasons, TSH was asked to provide a pre-design proposal for providing power, heating, cooling and air, using central infrastructure. This report was submitted in November 2003.

The decision to develop a stand-alone or a centrally connected system will be made on the basis of an analysis of these two pre-design studies and their implications for central plant.

E. Temporary Impacts on Teaching

The renovations of the Biology and Chemistry Laboratories need to be undertaken during the summer of 2004 and completed by September 2004. Because it is probable that several science courses with practicals will be scheduled for the summer semester, it is important that this work be scheduled so that these practicals are not compromised even as the renovations proceed. In particular it is important that the existing Teaching Preparation area for Chemistry and the teaching lab S141be available for use in the summer of 2004. The location of the

laboratories to be renovated fortunately enables this to accomplished without difficulty.

VII. EQUIPMENT

Existing and usable laboratory equipment, such as glassware, balances and Bunsen burners will be reused. Equipment that is outdated, and no longer can be repaired, such as compound microscopes in the Biology Labs, will be replaced. The existing compound microscopes have been in use since Scarborough College was opened in 1965 and can no longer be adequately maintained or further cannibalised. In addition, there will be new storage shelving, new fume hoods, benches etc. This equipment is included in the total project costs for the Biology Labs and the Chemistry Labs

VIII. RESOURCE IMPLICATIONS, OPERATING CONSIDERATIONS AND SOURCES OF FUNDING

Advice on estimating costs of this project was obtained from Totten Sims Hubicki for the mechanical systems, Curran McCabe Ravindran Ross, and individuals in Capital Projects with specialized knowledge of laboratory renovation projects.

The estimated total project cost for renovating both the Biology and the Chemistry teaching laboratories, and including all equipment, construction and renovation costs, mechanical and electrical costs, fees, taxes, and finance costs, is $4,300,000. The Biology Laboratories require little more than redecoration and repair and these, plus replacement of about 30 compound microscopes, are estimated to cost $250,000. The substantial renovations of the Chemistry Laboratories are estimated to cost about $4,050,000.

Details are given in Appendix 2 Project Cost Estimate .

Depending on the details of the renovations and upgrades to air handling systems required for this project, operating and maintenance costs could increase or decrease. A stand-alone system will require additional operating and maintenance; a system that connects to the central plant will require modifications to that plant which should result in greater operating efficiencies for the whole campus. The preference is clearly for the latter, but a firm decision about which solution is to be adopted cannot be made until detailed design is undertaken. Any additional costs of air handling will be accommodated through the UTSC operating budget.

The sources of funding for this project are firmly established. $2.47m has been allocated from enrolment growth funds, and $1.83m from the Provincial Government (SuperBuild).

IX. SCHEDULE

It is important that this project be completed by September 2004 to accommodate planned increases in enrolments in Sciences at UTSC. To achieve this, construction will have to begin as soon as classes end in April 2004. This in turn requires that the design work is begun no later than February 2003.

The proposed schedule for Phase 1 of the Renovation and Expansion of the Science Facilities at UTSC is as follows :

December 2003/January 2004	Governance Approvals
February-March 2004	Design
April 2004	Contracts Issued
April – August 2004	Construction
September 2004	Occupancy

X RECOMMENDATIONS

The Planning and Budget Committee recommends to the Academic Board:

1. THAT the Project Planning Report for Phase 1 of the Science Renovations and Expansion : Teaching Laboratories at the University of Toronto at Scarborough be approved in principle.
2. THAT the project scope of renovation of six chemistry teaching laboratories and 11 biology teaching laboratories, and associated mechanical systems and preparation areas, at a total project cost of $4.3 million, with funding of $1.83 million from Provincial Funds (SuperBuild) and $2.47 from Enrolment Growth Funds, be approved.

APPENDIX 1

SUMMARY OF DRAFT COMPREHENSIVE PLAN FOR SCIENCE FACILITIES AT UTSC

Background

Since 2000 a number of proposals for the renovation and expansion of the facilities for the Sciences at UTSC have been discussed, mostly in relation to possible SuperBuild funding. These proposals have not resulted in formally approved project reports because SuperBuild funds were not forthcoming either at the times or in the amounts expected. The discussions have, however, led to the recognition of a number of pressing needs for the reorganization and expansion of the Sciences at UTSC, and also to some suggestions for achieving these based on improved efficiency of space use, incremental additions, renovations and new construction. These suggestions have several components that require implementation in several stages over a period of about 5 years. If all these are completed they should provide sufficient teaching, research and administrative facilities for UTSC to accommodate planned enrolment growth in the Sciences. It must, however, be stressed that without balcony enclosures, the renovation of the Soil Erosion Laboratory and some new construction it will be impossible to provide offices and research facilities for the new faculty members required to teach the planned increases in undergraduate and graduate students, and if funding for these is not found it may be necessary to restrict enrolment increases in the Sciences.

In May 2003 the Province announced the results of the 2002 SuperBuild awards, and these include $1.83 million allocated specifically for Sciences at UTSC; this is to be supplemented by $2.47 million of Enrolment Growth Funds for a total of $4.3 million. The Comprehensive Plan for Renovation and Expansion of Science Facilities has been developed to ensure that these and any future funds be expended as effectively as possible, given all the competing claims.

Phase 1 Sci : Renovation of Teaching Laboratories and Related Infrastructure Upgrades 2003-04

Deadline

Complete by Sept 04 to accommodate planned enrolment increases.

Rationale

In 2002-03 and 2003-04 enrolment in both Biology and Chemistry grew faster that the overall enrolment growth rate at UTSC. Practicals in both these disciplines are taught in laboratories more than 35 years old, and inefficiently organized. first year courses grew from about 600 fces to 1000 fces, and this new level of demand is expected to be maintained. Practicals in both disciplines are taught in laboratories that are 35 years old, and inefficiently organized. Without appropriate upgrades to the teaching laboratories it will be possible neither to provide high quality instruction to Science students, nor to accommodate the additional numbers of students in upper year courses.

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Proposal

a) Deep renovations to four Chemistry teaching laboratories; install new fume hoods to current standards, upgrade benches, upgrade essential equipment, improve storage of equipment and chemicals, reorganize teaching support areas, upgrade safety equipment. Light renovations to two Chemistry laboratories, light renovations to five first-year Biology Laboratories and six upper year Biology laboratories to repair existing furniture and fittings, improve storage, replace obsolete equipment.

b) Upgrade infrastructure (ducts, air handling, heating, cooling) as required to support new chemistry laboratories.

Outcome

State-of-the-art Chemistry teaching laboratories, comparable to Lash Miller, and attractive teaching laboratories in Biology that will enable UTSC to compete for and retain excellent students in the Sciences. Efficient arrangements of teaching laboratories that will enable teaching of increased enrolments.

Preliminary Estimated Total Project Cost Phase 1

$4.30m total cost; funds identified $4.3m [BGY laboratories $250,000, Chm laboratories $4.05m Infrastructure Upgrades/Air Handling, Electrical etc included in Chm lab renovations, Source of funds :$1.83m Province of Ontario and$2.47m Enrolment Growth)]

Phase 2 Sci : Expansion of Research Laboratories and Other Facilities through Space Reallocations 2004-05 (plus Balcony enclosures described under Phase 4a, if funding becomes available)

Deadline

Research Laboratories and offices are required for new appointments by Sept 04.

Rationale

Teaching increased undergraduate enrolment in the Sciences requires additional faculty and teaching assistants who require additional space for offices and laboratories. Furthermore, as UTSC chemistry faculty retire, their replacements will no longer have access to laboratories on St. George, and will be based primarily at UTSC. Without good quality facilities and offices, UTSC will be unable to recruit excellent science faculty.

Proposal

a) Convert the former laboratory preparation area and one teaching laboratory made surplus by renovations in Phase 1 to research facilities for new appointment, convert former aquatics lab no longer required because of a retirement to other research. Possible conversion of former wet lab now used as general classroom back to laboratory use depending on scheduling needs.

b) Use offices made available through the opening of the Management Building as temporary offices for Science faculty, primarily those who do not need to be close to laboratories, until a more satisfactory long term solution can be found.

Outcome

Provision of research laboratories and temporary allocation of offices makes possible hiring of new science faculty.

Preliminary Estimated Total Project Cost Phase 2

$0.30m to $0.40m total cost; funds identified $0.3m-$0.4m from CFI new opps, OIT, start-up etc.Exact figures will depend on nature of appointments and research requirements; offices are minimal cost].

Phase 3 Sci: Conversion of Soil Erosion Lab to multiple research labs, Internal Expansion (additional Chemistry Teaching Lab renovations?) 2005-06

Deadline

Completion by July 2006 or as soon as possible after July 2005. The professor running experiments in the Soil Erosion Laboratory retires June 2005. The opening of the Arts Building scheduled for September 05 will leave administrative offices on 4th level of S-Wing vacant. Additional Chemistry Teaching Lab renovations may be needed by Sept 2005 but could be deferred until enrolments justify this.

Rationale

The soil erosion laboratory is a single-purpose, stand-alone research building of 267 nasms. From July 2005 it will no longer be required for its current purpose and the intention is to convert it to at least three research laboratories, plus office space, that can be the core facilities for the new Masters Programmes in Environmental Science (approved in principle by the University 2003). This conversion will free up space for Life Sciences research as environmental scientists move from their existing laboratories. Iinfrastructure improvements, especially related to power supply, are required to support the conversion of the Soil Erosion Lab

The move of the central administration offices from the 4th level of S-Wing will provide at least 467 nasms of high quality office space adjacent to existing science offices. This space can be used for faculty growth positions, for teaching assistants and graduate students, and to accommodate the Science Coop administrative offices that are presently located in another building.

Two Chemistry laboratories, each with 20 stations, that will not be upgraded as part of Phase 1, may need be renovated to the same standards as the other teaching laboratories if enrolments warrant. Even with courses offered in the summer semester, it is anticipated that the Phase 1 laboratory upgrades will be required for core A and B level courses for at least 25 hours a week (the COU standard is 18 hours per week) and there will be no capacity for C-level and other B-level courses. Increased programme enrolments in Chemistry will follow both from the growth in A-level enrolments and from the repatriation of the Chemistry faculty, and these will result in more students in upper level courses who will require laboratory facilities at the same quality as those used for introductory courses. This need will have to be assessed over the next two years.

Proposal

a) Convert the existing soil erosion laboratory into three research laboratories associated with new graduate programmes in environmental sciences. Move one existing research laboratory in environmental sciences from Science Wing to soil erosion building to create extra research laboratory space for Biology

b) Undertake infratructure upgrades, especially power supply, to support research lab conversions.

c) Expand science offices and teaching assistant space into 4th level S-Wing. Through secondary effects this will give Computer and Math Science a consolidated block of space, allow for the expansion of the Math Aid room, teaching assistant spaces and the specialized instructional computer laboratory. Science Coop will move into a consolidated space adjacent to science facilities. Most of this space is already used for offices, so minimal changes are required and costs will be low. This has been budgeted as a secondary effect of the Arts Building

d) Renovate two remaining Chemistry Teaching Laboratories to standards of Phase 1 renovations.if student demand indicates this is warranted.

Outcome

Provision of good quality research facilities to accommodate enrolment growth in Life and Physical Sciences. Offices for growth of faculty and graduates in all three Science departments, plus additional space for administrative uses.

Preliminary Estimated Cost of Phase 3

$1.070 m total for research facilities ($0.680 for soil erosion renovations labs, $0.300 for infrastructure, $0.090 for staging)..Funds identified for research labs $0.750 (start-up, CFI new opps OIT, UTSC matching etc. Funding still to

be identified $0.320m.
$0.075m for 4th floor office renovations Funds identified for Science offices $0.050m (from Arts Building secondary effects) , for renovations for administration $0.025 (from Arts Building secondary effects)
$0.800 to $1.2m for renovation of two additional CHM teaching labs. No funds identified..

Phase 4a Sci : Balcony Enclosures 2006-07 (should be completed in earlier phases if secure funding can be established)

Deadline

Completion by July 07

Rationale

Additional office and support space is required to accommodate increased faculty and graduate student numbers as early as 2004. Temporary arrangements using surplus offices in the new Management Building or Humanities Wing can be made for one or two years. Current projections indicate that by 2006-07 this space will be required for Management, Humanities and Social Sciences growth positions. Furthermore, to create cohesive and efficient departments, with offices reasonably close to teaching and research labs it is necessary to locate new offices in or adjacent to the Sciences Wing. The two balconies are excellently located to provide appropriate locations for departmental offices for Life Sciences and Physical Sciences, and the proposed office arrangement would also permit the division of those Departments into smaller departmental units should that be considered necessary..

Proposal

Enclose two balconies with a total combined area of 301 nasms, and renovate 141 nasms of adjacent space to create a net addition of 15 offices for administration, faculty and teaching assistants, plus meeting rooms and support space. These enclosures have to be designed carefully because they are on the distinctive façade of the Science Wing.
Initial cost estimates suggest that the balcony enclosures can be completed at about one third the cost of equivalen new construction - $2225 to $3322 per nasm of additional balcony space compared with about $7000 per nasm for new construction

Outcome

Excellent office space, sufficient for administrative and faculty complement growth in Sciences to steady-state

Preliminary Estimated Total Project Cost Phase 2

$0.380m for one balcony to $0.750m for both balconies. No funding sources identified.

Phase 4b Sci : New Science Building for Research and Graduate Student facilities 2006-07

Deadline

By July 2007 a new research building will be required to accommodate faculty complement growth and increases in graduate presence at UTSC

Rationale

The first stages of planned enrolment, faculty and graduate student growth can be accommodated by the strategies outlined in Phases 1, 2, 3 and 4a – improved efficiency in usage of teaching laboratories, internal renovations and expansions, and balcony enclosures. These strategies will provide sufficient space for undergraduate teaching laboratories, offices and administration, but there will still be a significant shortfall in space for graduate students and research laboratories. A new building for these is required by July 2007. Without this it will neither be possible to accommodate planned increases in graduate students nor to attract excellent faculty to

teach the planned undergraduate enrolment increases in the Sciences because there will be no research facilities available.

There are, however, several major research initiatives being tentatively explored, including CFI applications and requests by private corporations for use of UTSC facilities, and if any one of these is successful a substantially larger science building will be required. For this reason, it is impossible at this stage to give a firm indication of the size of the building, but the application of COU standards to growth projections indicate that it should not be smaller than about 1100 nasms.

Proposal

Construct a new sciences building dedicated to research laboratories and graduate students on a site adjacent to or connected to the existing Soil Erosion Laboratory, as indicated in the 2001 Campus Master Plan. The exact needs will be determined in the context of an analysis for the detailed Comprehensive Plan for the Sciences at UTSC. It should be designed in a way that allows maximum flexibility for modifications and additions in the future. This is expected to be the last major capital project in this phase of expansion at UTSC, and it should be substantial contribution to the intellectual life of the campus. This could require a building between 2500 and 5000 nasms.

Outcome :

Excellent, up-to-date research facilities that can make UTSC a regional centre of scientific excellence

Preliminary Estimated Cost of Phase 4

The current cost of science labs is $10,000 per nasm, based on CCBR costs. No funding sources yet identified

SUMMARY OF ESTIMATED COSTS AND REVENUES OF PROPOSED RENOVATIONS AND EXPANSION OF SCIENCE FACILITIES AT UTSC 2003-2007

	SuperBuild Province	EGF	CFI NewOpps Start-Up	ARTS Secondary Effects	Unfunded	TOTALS (million dollars)
PHASE 1Sci –2003-04 Teaching Laboratories	1.83	2.47			0	4.3
PHASE 2 Sci – 2004-05 Research Labs/offices			0.30 to 0.40		0	0.30 to 0.40
PHASE 3 Sci – 2005-06						
Soil Erosion conversion			0.750		0.320	1.070
Office expansion				0.075		0.075
More Chm labs?					0.80 to 1.20	0.80 to 1.20
PHASE 4A Sci 2006-07 Balcony Enclosures					0.380 to 0.750	0.38 to 0.75
PHASE 4B Sci – 2006-07 New Science Building					Not yet established	Not yet established
TOTALS	1.83	2.47	1.05 to 1.15	0.075	11.50 to 2.27	
GRAND TOTAL						**6.862 to 7.732**

APPENDIX 2
PROJECT: UTSC Chemistry lab upgrade rooms S153/157, S159/163, S158, S164.
plus minor bio lab renos, S133,135,148,237,240,242,248,250,321,323,326,328.

TABLE 1: Total Project Cost Estimates

Column 1 will be completed with the Project Planning Report.
Column 1-5 will be included in the Project Implementation Report.

Items	Project Planning Report	Concept Design	Design Devel't	Drawings @ 90%	Tender	100% Complete
Construction Cost Note A	3,129,000					
Construction Contingency	219,030					
Applicable GST	77,339					
Total Construction Costs, including taxes	**$3,425,369**					
Infrastructure Upgrades in Sector	0					
Secondary Effects	0					
Demolition Note B	10,231					
Landscaping	0					
Permits & Insurance	11,704					
Professional Fees Note C	517,912					
Computing Infrastructure	0					
Telephone Terminations	0					
Audio/Visual	0					
Moving	0					

Staging	1,023					
Furnishings: Department	0					
Furnishings: Classrooms	51,155					
Equipment	61,386					
Security & access systems	0					
Signage: Interior & Exterior	0					
Signage: Donor Recognition	0					
Groundbreaking & Building opening	8,185					
Miscellaneous	6,092					
Project Contingency	146,943					
Finance Costs	60,000					
Total Project Cost Estimate GST included	**$4,300,000**	**$0**	**$0**	**$0**	**$0**	**$0**

prepared jcb 17 Nov 2003

Notes:

A per CMRR report 16 Oct 2003, $3,094k less $120k reduction in casework plus $155k construction allowance for minor Biology Lab upgrades.

B additional allowance for minor hazmat removal.

C Includes premium for MoE fumehood approval.

APPENDIX 3

UTSC Science Lab upgrades, Phase 1, Cashflow estimate.
Approval in Jan 2004,
tendered in Apr 2004.

Quarter		nov-jan	feb-apr	may-jul	aug-oct	nov-jan	feb-apr	totals	
		2003-4	2004	2004	2004	2004-5	2005		
Approval									
Selection & Design & Tender									
Construction									
Funding:									
Superbuild		0	0	0	0	1,830	0	1,830	
1 Enrollment growth				0		2,470		2,470	
subtotal		0	0	0	0	4,300	0	**4,300**	
Expenditure:									
proff fees & permits.		0	400	65	65	0	0	530	
construction		0	0	1,717	1,718	0	0	3,435	
furn,equip, misc.		0	0	0	275	0	0	275	
levies, sec effects					0			0	
subtotal		0	400	1,782	2,058	0	0	4,240	
net cash flow		0	-400	-1,782	-2,058	4,300	0		
open bal		0	0	-403	-2,201	-4,299	1		
change		0	-400	-1782	-2058	4,300	0		
2 int exp @	**5.0%**	0	-3	-16	-40	0	0	**-59**	**est. project intr. expense.**
close bal		0	-403	-2,201	-4,299	1	1		

Notes:

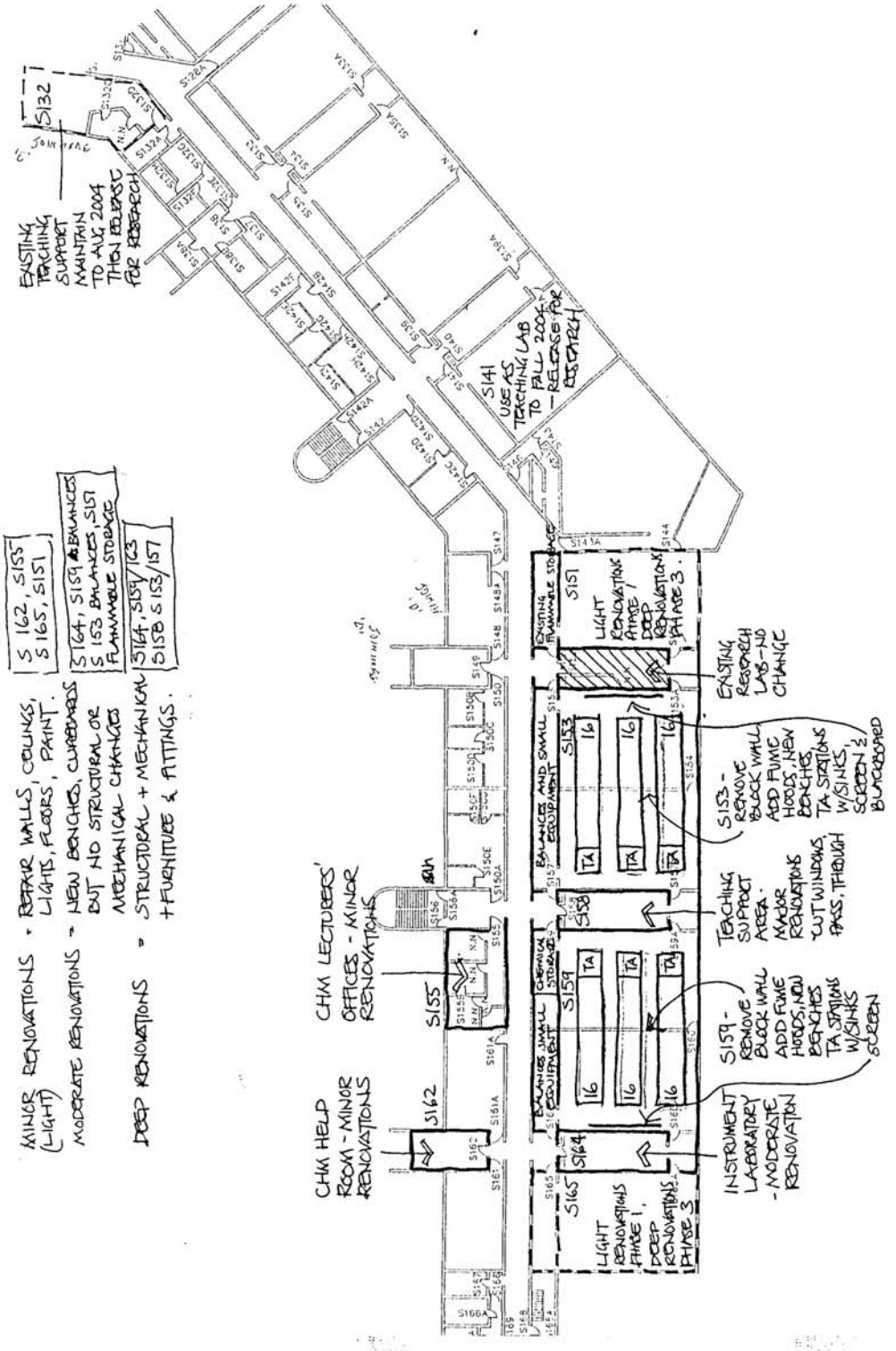
1 shows balance of funding required at completion of project.

2 expect to pay money market rate plus 0.25% for short term financing.

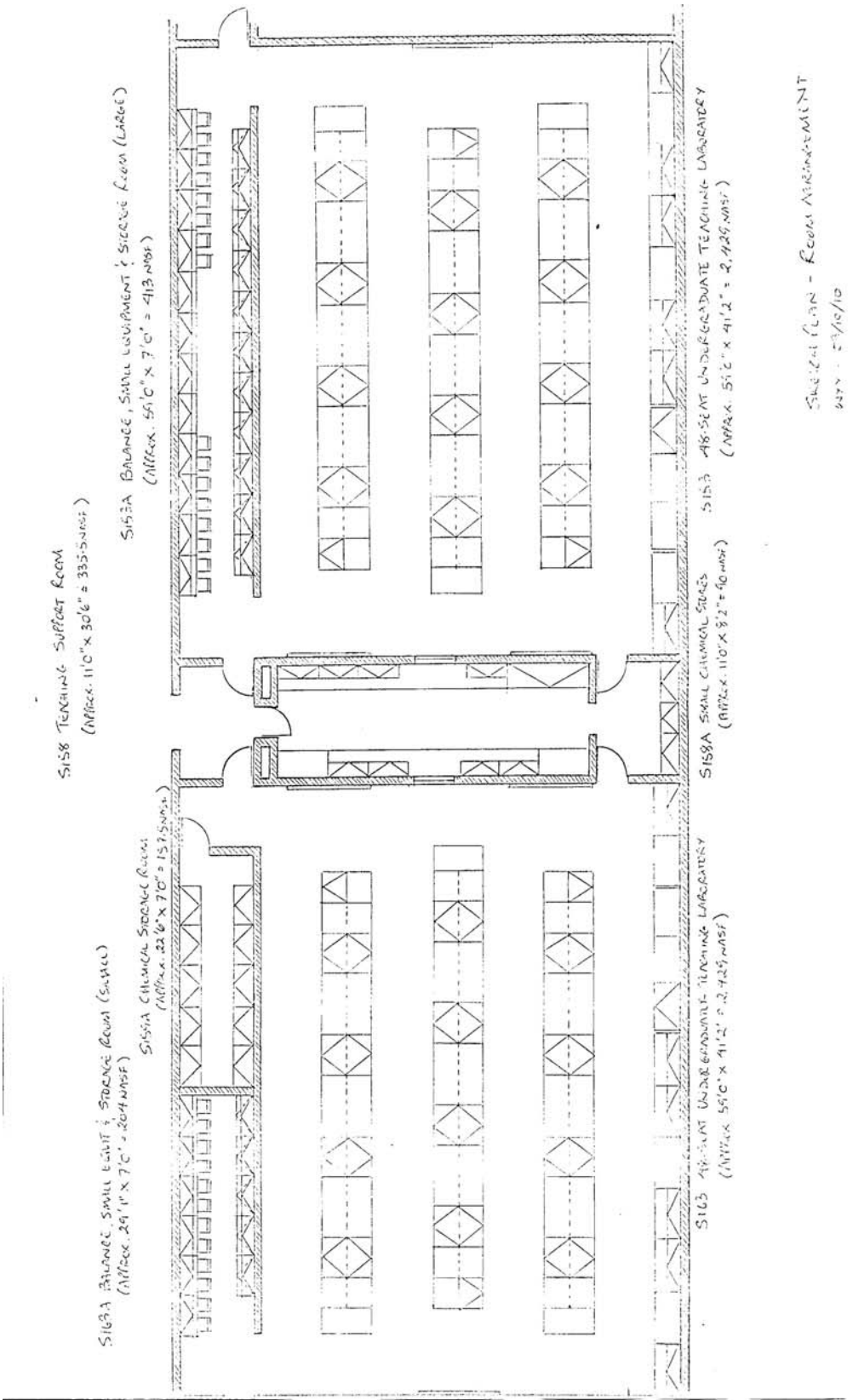
prepared jb Nov 17th 2003 rev Nov 27 2003.

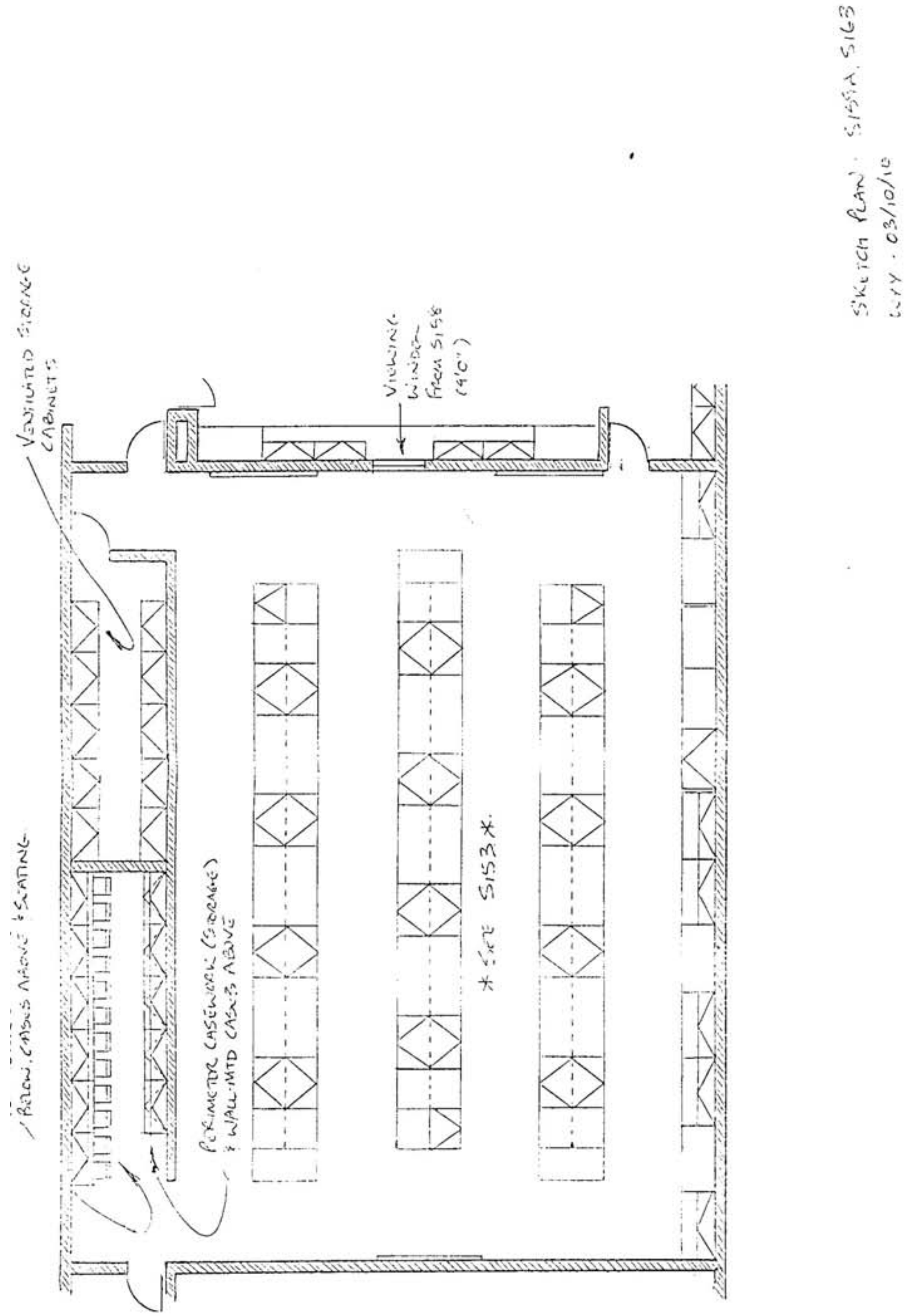
Project Planning Report – Science Teaching Laboratories UTSC 32

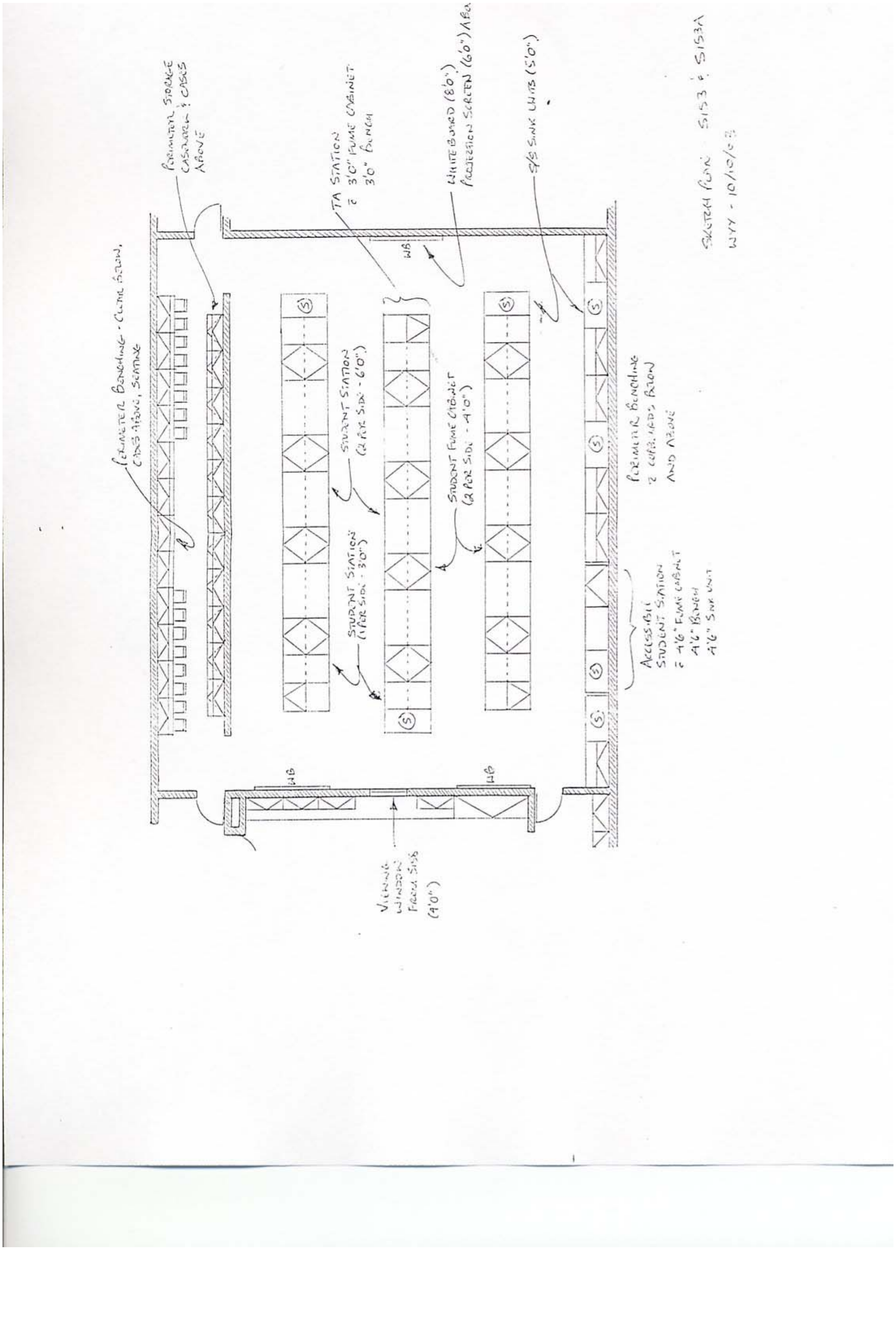
APPENDIX 4 : OVERVIEW OF CHEMISTRY LABORATORY RENOVATIONS AND RELATED FACILITIES

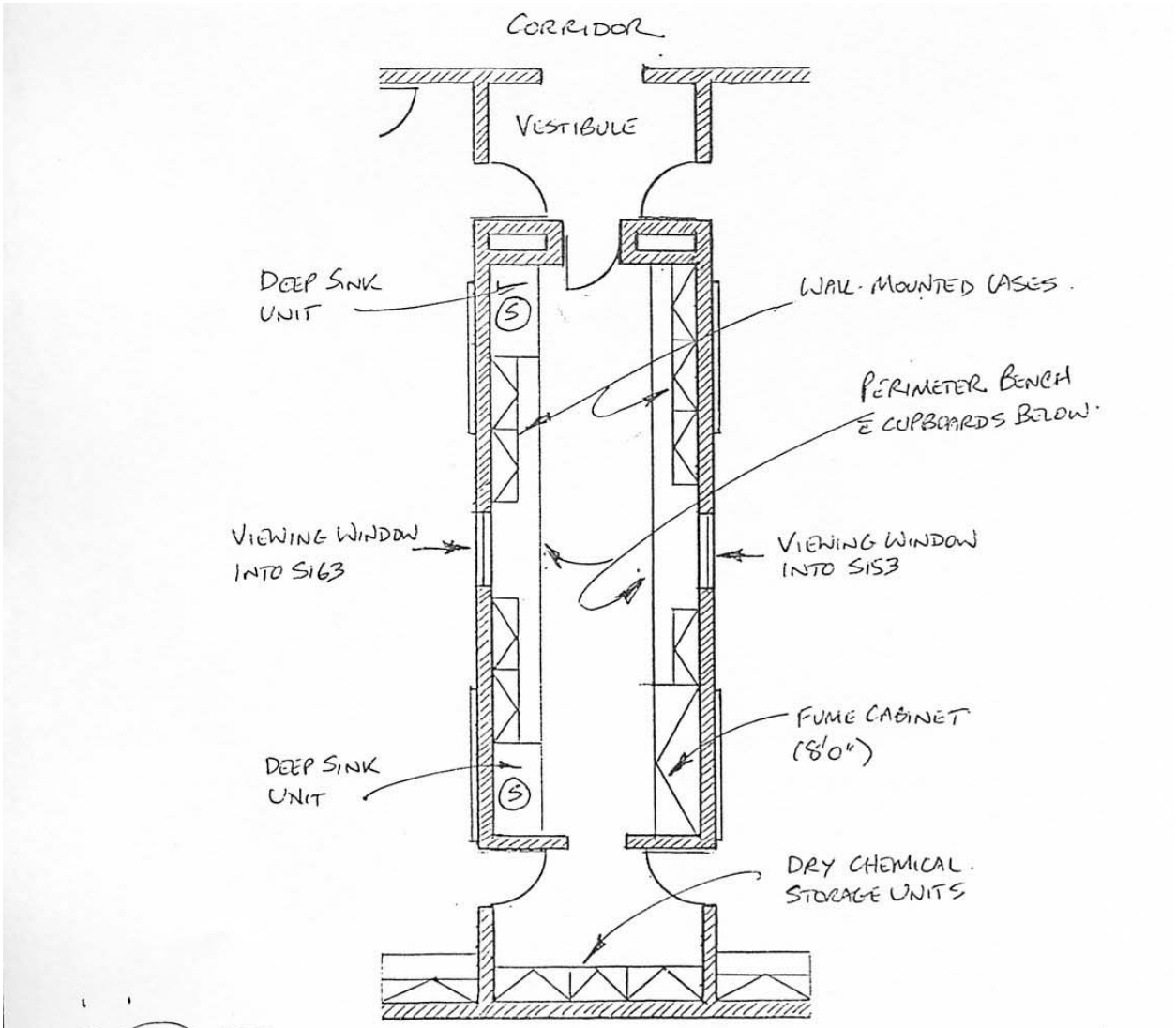


APPENDIX 5 : DETAILED CONCEPTUAL LAYOUT OF CHEMISTRY LABORATORIES


S158 TEACHING SUPPORT ROOM
(APPROX. 110" × 30'6" = 335 SNSF)
S163A BALANCE, SMALL EQUIPMENT & SCIENCE ROOM (LARGE)
(APPROX. 55'0" × 7'0" = 413 NSF)
S163 BALANCE, SMALL EQUIP. & STORAGE ROOM (SMALL)
(APPROX. 29'1" × 7'0" = 204 NSF)
S163A CHEMICAL STORAGE ROOM
(APPROX. 22'6" × 7'0" = 157 SNSF)
S153A SMALL CHEMICAL STORES
(APPROX. 110" × 8'2" = 90 NSF)
S153 48-SEAT UNDERGRADUATE TEACHING LABORATORY
(APPROX. 55'0" × 41'2" = 2,425 NSF)
S163 48-SEAT UNDERGRADUATE TEACHING LABORATORY
(APPROX. 55'0" × 41'2" = 2,425 NSF)
SCHEMATIC PLAN - ROOM ARRANGEMENT
MAY - 23/10/10


SKETCH PLAN: S153A, S163
VENTILATED STORAGE CABINETS
VIEWING WINDOW FROM S158 (4'0")
PERIMETER CASEWORK (STORAGE) & WALL-MTD CASES ABOVE
* SEE S153 *


PERIMETER STORAGE CASEWORK & CASES ABOVE
TA STATION
3'0" FUME CABINET
3'0" BENCH
WHITEBOARD (8'0")
PROJECTION SCREEN (6'0") ABOVE
E/S SINK UNITS (5'0")
SKETCH PLAN S153 & S153A
WYY - 10/10/03
STUDENT STATION (2 PER SIDE - 6'0")
STUDENT FUME CABINET (2 PER SIDE - 4'0")
STUDENT STATION (1 PER SIDE - 3'0")
PERIMETER BENCHING
AND ABOVE
ACCESSIBLE STUDENT STATION
4'6" FUME CABINET
4'6" BENCH
4'6" SINK UNIT
VIEWING WINDOW
(4'0")
WB
WB
WB


CORRIDOR
VESTIBULE
DEEP SINK UNIT
WALL-MOUNTED CASES.
PERIMETER BENCH & CUPBOARDS BELOW.
VIEWING WINDOW INTO S163
VIEWING WINDOW INTO S153
FUME CABINET (8'0")
DEEP SINK UNIT
DRY CHEMICAL STORAGE UNITS
* NOTE *
INSTRUMENT LABORATORY (S164) HAS SIMILAR LAYOUT EXCEPT HAS 4' FUME CABINET, ONE STANDARD SINK UNIT, SIX ADDITIONAL WALL CASES, WALL STORAGE UNITS (INSTEAD OF CHEMICAL ONES) & NO VIEWING
SKETCH PLAN - S158 & S158A
WYY - 03/10/10

APPENDIX 6 : ROOM SPECIFICATIONS.

AVAILABLE ON REQUEST

ROOM NAME: Chemistry Undergraduate Teaching Laboratory #1

V. Section 1 – Space Required

A. Existing Room/s Number/s: S151

B. NASM Per Room: 111.54 nasm

C. Total NASM: 111.54 nasm

VI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

VII. Section 3 – Equipment and Furnishings

I. **Existing Equipment/Furniture to be removed:** remove currently installed fumehoods and benches,both floor mounted and along the walls.

J. New Equipment:

K. New Furniture, moveable:

L. New Furniture, built in/millwork:

M. Accessories, built in (whiteboards, etc.):

VIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

IX. Section 5 – General Description of Work to be Done

ROOM NAME: Flammable Storage

X. Section 1 – Space Required

A. Existing Room/s Number/s: S151A

C. NASM Per Room: 19.41 nasm

C. Total NASM: 19.41 nasm

XI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

XII. Section 3 – Equipment and Furnishings

J. **Existing Equipment/Furniture to be removed:** remove existing fumehoods, shelving and benches

J. New Equipment:

K. New Furniture, moveable:

N. New Furniture, built in/millwork:

O. Accessories, built in (whiteboards, etc.):

XIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

XIV. Section 5 – General Description of Work to be Done

ROOM NAME: Chemistry Undergraduate Teaching Laboratory #2

XV. Section 1 – Space Required

A. Existing Room/s Number/s: S153 and S157

D. NASM Per Room: 111.54 plus 111.54 nasm

C. Total NASM: 223.08 nasm

XVI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

XVII. Section 3 – Equipment and Furnishings

K. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

P. New Furniture, built in/millwork:

Q. Accessories, built in (whiteboards, etc.):

XVIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

XIX. Section 5 – General Description of Work to be Done

Combine S153 and S157 into a single room by removal of the dividing wall

ROOM NAME: Balances and Small Equipment #1

XX. Section 1 – Space Required

A. Existing Room/s Number/s: S153A and S157A

E. NASM Per Room: 19.41 nasm plus 19.41 nasm

C. Total NASM: 38.82 nasm

XXI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

XXII. Section 3 – Equipment and Furnishings

L. **Existing Equipment/Furniture to be removed:** remove existing fumehood shelving and benches

J. New Equipment:

K. New Furniture, moveable:

R. New Furniture, built in/millwork:

S. Accessories, built in (whiteboards, etc.):

XXIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

XXIV. Section 5 – General Description of Work to be Done

Combine S153A and S157A into a single room by removal of the dividing wall.

ROOM NAME: Chemistry Undergraduate Teaching Laboratory #3

XXV. Section 1 – Space Required

A. Existing Room/s Number/s: S159 and S163

F. **NASM Per Room:** 111.54 plus 111.54

C. Total NASM: 223.08 nasm

XXVI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

XXVII. Section 3 – Equipment and Furnishings

M. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

T. New Furniture, built in/millwork:

U. Accessories, built in (whiteboards, etc.):

XXVIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

XXIX. Section 5 – General Description of Work to be Done

Combine S159 and S163 into a single room by removal of the dividing wall.

ROOM NAME: Chemical Storage

XXX. Section 1 – Space Required

A. Existing Room/s Number/s: S159A

G. NASM Per Room:

C. Total NASM:

XXXI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

XXXII. Section 3 – Equipment and Furnishings

N. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

V. New Furniture, built in/millwork:

W. Accessories, built in (whiteboards, etc.):

XXXIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

XXXIV. Section 5 – General Description of Work to be Done

ROOM NAME: Balances and Small Equipment #2

XXXV. Section 1 – Space Required

A. Existing Room/s Number/s: S163A

H. NASM Per Room:

C. Total NASM:

XXXVI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

XXXVII. Section 3 – Equipment and Furnishings

O. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

X. New Furniture, built in/millwork:

Y. Accessories, built in (whiteboards, etc.):

XXXVIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

XXXIX. Section 5 – General Description of Work to be Done

ROOM NAME: Instrument Laboratory

XL. Section 1 – Space Required

A. Existing Room/s Number/s: S164

I. NASM Per Room: 32.37 nasm

C. Total NASM: 32.37 nasm

XLI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

XLII. Section 3 – Equipment and Furnishings

P. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

Z. New Furniture, built in/millwork:

AA. Accessories, built in (whiteboards, etc.):

XLIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

XLIV. Section 5 – General Description of Work to be Done

ROOM NAME: Chemistry Undergraduate Teaching Laboratory #4

XLV. Section 1 – Space Required

A. Existing Room/s Number/s: S165

J. NASM Per Room:

C. Total NASM:

XLVI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

XLVII. Section 3 – Equipment and Furnishings

Q. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

BB. New Furniture, built in/millwork:

CC. Accessories, built in (whiteboards, etc.):

XLVIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

XLIX. Section 5 – General Description of Work to be Done

ROOM NAME: Balances and Small Equipment #3

L. Section 1 – Space Required

A. Existing Room/s Number/s: S165A

K. NASM Per Room:

C. Total NASM:

LI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

LII. Section 3 – Equipment and Furnishings

R. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

DD. New Furniture, built in/millwork:

EE. Accessories, built in (whiteboards, etc.):

LIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

LIV. Section 5 – General Description of Work to be Done

ROOM NAME: Chemistry Help Room

LV. Section 1 – Space Required

A. Existing Room/s Number/s: S162

L. NASM Per Room:

C. Total NASM:

LVI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

LVII. Section 3 – Equipment and Furnishings

S. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

FF. New Furniture, built in/millwork:

GG. Accessories, built in (whiteboards, etc.):

LVIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

LIX. Section 5 – General Description of Work to be Done

ROOM NAME: Lecturer's Offices

LX. Section 1 – Space Required

A. Existing Room/s Number/s: Suite 155

M. NASM Per Room:

C. Total NASM:

LXI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

LXII. Section 3 – Equipment and Furnishings

T. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

HH. New Furniture, built in/millwork:

II. Accessories, built in (whiteboards, etc.):

LXIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

LXIV. Section 5 – General Description of Work to be Done

ROOM NAME:

LXV. Section 1 – Space Required

A. Existing Room/s Number/s:

N. NASM Per Room:

C. Total NASM:

LXVI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

LXVII. Section 3 – Equipment and Furnishings

U. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

JJ. New Furniture, built in/millwork:

KK. Accessories, built in (whiteboards, etc.):

LXVIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

LXIX. Section 5 – General Description of Work to be Done

ROOM NAME:

LXX. Section 1 – Space Required

A. Existing Room/s Number/s:

O. NASM Per Room:

C. Total NASM:

LXXI. Section 2 – Room Use and Functional Relationships

D. Space purpose and type of activity:

E. Number of occupants, resident:

F. Number of occupants, transient:

G. Space relationship, proximity to other rooms/facilities:

H. Visual relationship, proximity to other rooms/facilities:

LXXII. Section 3 – Equipment and Furnishings

V. Existing Equipment/Furniture to be removed:

J. New Equipment:

K. New Furniture, moveable:

LL. New Furniture, built in/millwork:

MM. Accessories, built in (whiteboards, etc.):

LXXIII. Section 4 – Room Services

N. Lighting:

O. Power:

P. Phone:

Q. Data:

R. HVAC (Heating, Ventilation, Air Conditioning):

S. Plumbing:

T. Special Considerations (systems, finishes, needs, signage, security):

LXXIV. Section 5 – General Description of Work to be Done