Interim

Project Planning Report

for the

Centre for Biological Timing & Cognition

Department of Psychology
Faculty of Arts & Science

[Final Project Planning Report to be tabled at the
Planning and Budget Committee meeting on December 7, 2004]

Prepared by:
Campus & Facilities Planning
October 29, 2004

I. Committee Membership

Elizabeth Sisam (Chair)	Director, Campus & Facilities Planning, Office of the Vice-Provost, Space and Facilities Planning
Prof. Lynn Hasher,	Chair, Department of Psychology
Prof. Martin R. Ralph	Professor, Department of Psychology
Frieda Chan	Departmental Manager, Department of Psychology
Raymond deSouza	Director, Planning and Infrastructure, Faculty of Arts and Science
Dr. George M. Harapa	University Veterinarian, Office of Vice-President of Research and Associate Provost
Judith Chadwick	Director, Government Research Infrastructure Programs, Office of Vice-President of Research and Associate Provost
Ron Swail	Assistant Vice-President (Interim), Facilities and Services
Eugene Siciunas	Director, Computer and Networking Services, University Computing
Julian Binks	Manager, Projects Planning, Department of Capital Projects
William Yasui	Senior Facilities Planner, Campus and Facilities Planning

II. Terms of Reference

The Project Committee was chaired by Elizabeth Sisam, Director of Campus and Facilities Planning, and was charged with the following terms of reference:

1. Determine a functional layout and the space requirements for the Centre for Biological Timing and Cognition.
2. Make recommendations regarding the location of the Centre and review options for the rodent colony and related support space including the use of the existing and expanded (CCBR) facilities at the Division of Comparative Medicine. Specifically recommend that Dr. Richard Renlund, Director, Division of Comparative Medicine, be invited to provide the appropriate input to the Committee.
3. Respond to the requirements set out in the application to the Canada Foundation for Innovation and any conditions of the award.
4. Determine a detailed space program for the entire Department of Psychology taking into account Council of Ontario Universities' and the University of Toronto's space standards.
5. Identify the capital cost of construction, including renovations, data and communications requirements and the cost of all equipment and furnishings for the Centre and separately for the Department of Psychology if it is possible to locate the entire Department in close proximity to the Centre.
6. Identify all operating costs for the facility and also any operating costs associated with the possible relocation of the Department of Psychology.
7. Identify all security and occupational health and safety requirements and their related costs.
8. Identify deferred maintenance issues that could impact the project and possible additional sources of funding that could address these particular issues.
9. Identify all communication and computer networks & interfaces that are required by the Department of Psychology and the Centre for Biological Timing and Cognition.
10. Identify all proposed sources of funding.
11. Report by December 30, 2004.

III. Background Information

In 2003, researchers from the Department of Psychology, together with the Toronto Hospital (Western Division), the Centre for Addiction and Mental Health (CAMH), the Peel District School Board, and the Ontario Institute for Studies in Education/University of Toronto (OISE/UT), submitted a grant application to the Canada Foundation for Innovation (CFI) requesting funding for research to investigate the impacts of biological timing, environmental cycles, and work schedules on cognitive ability and mental health. This application for a new Centre for Biological Timing and Cognition was successful and notification was provided to the University in March, 2004.

This CFI application requested grant funding for the construction of new facilities to accommodate a rodent colony, testing and observation facilities with human and animal test subjects, research laboratories and associated support facilities.

At the time of CFI submission, a location on the south side of the Ramsay Wright Zoological Laboratories (072) was proposed as a suitable construction site. Since the CFI award was announced, alternate sites were suggested for consideration. The sites included the unfinished floors of the CCBR, and the Norman Hughes Building together with 1 Spadina Crescent. These locations required further detailed investigation in the broader Faculty of Arts and Science, and University context with respect to their suitability. During this period of time, funding became available to complete the remaining floors of the CCBR thus eliminating the possibility of using the facilities, together with laboratories for the CTBC in this location. Upon reviewing the Norman Hughes building location, it was found that the entire Department of Psychology could not be accommodated on this site without a major addition. To fully use the site (Site 18) the workshop and delivery area of 215 Huron Street would have to be relocated, causing the project costs and timing to increase. It was agreed that the Ramsay Wright Building together with space at Sidney Smith Hall would best suit the requirements of the Department of Psychology and allow for full consolidation in the long-term.

The Project Committee also explored whether these alternate sites could accommodate the entire Department of Psychology and consolidate all departmental activities within a single location. Currently, the Department of Psychology is accommodated in Sidney Smith Hall (033), Ramsay Wright Zoological Laboratories (072), and 1 Spadina Crescent (034).

IV. Statement of Academic Plan

Researchers within the Centre for Biological Timing and Cognition (CBTC) will integrate studies of the neural mechanisms underlying cognition and rhythmicity with the application of research findings to human situations. A major research issue of the CBTC will be the impact of work and social schedules on education and achievement in Northern communities with a focus on the needs of aboriginal peoples.

The CBTC will concentrate in four main areas of research:

- *Neural Basis of Temporal Organization and Learning*; studies of the molecular and neural underpinnings of circadian rhythms, learning, memory and performance; the impact of sleep and rhythym disturbance on these cognitive processes;
- *Rhythms, Cognition, and Achievement*; study the impact on performance and achievement caused either by rhythm disruption or by mismatches between circadian rhythms, environmental cycles, and rhythms of society (for example, school schedules, shift work, etc.);

- ♦ *Sleep, Cognition, and MentalHealth*; study the effects of disturbed circadian rhythms on impairment of mental and physical health including seasonal affective disorder, depression, heart disease, Alzheimer's Disease, and insomnia.
- ♦ *Impact on the Northern Environment*; study the effects of rhythm and sleep disturbances of life in the North, with the cultural needs of aboriginal peoples.

Although the focus of this Planning Report is the accommodation of CBTC's activities at the University of Toronto, the CBTC will also have research facilities located at Lakehead University, the Nunavut Cognitive Assessment Facility in Iqaluit, Nunavut, the Sleep and Cognition Facility at the Toronto Hospital (Western Division), the Gene Discovery Laboratory at the Centre for Addiction and Mental Health, and the Cognitive Assessment Facility of the Peel District School Board.

V. Space Program

Existing Space Allocation

Currently, the Department of Psychology is accommodated in three buildings on the St. George Campus. The department is based in Sidney Smith Hall (033) with satellite facilities in 1 Spadina Crescent (054), and the Ramsay Wright Zoological Laboratories (072).

The Department has a total space allocation of 4,540 net assignable square metres (NASM) that is distributed as follows:

Sidney Smith Hall (033)		
o Sub-basement (Level B2)	657	nasm
o Basement (Level B1)	1,594	nasm
o Fourth Floor (Level 04)	596	nasm
o Fifth Floor (Level 05)	186	nasm
Building Subtotal	3,033	nasm
1 Spadina Crescent (054)		
o Basement Floor	157	nasm
o First Floor	290	nasm
o Second Floor	306	nasm
o Third Floor	437	nasm
Building Subtotal	1,190	nasm
Ramsay Wright Zoological Laboratories (072)		
o Basement Floor	146	nasm
o Third Floor	172	nasm
Building Subtotal	318	nasm
Total Departmental Allocation	4,541	nasm

Within the Department's basement and first floor holdings in 1 Spadina Crescent, an animal care facility (of approximately 251 nasm) for mixed species is maintained by the Department. As well, the Department's allocation of 146 nasm on the basement level of Ramsay Wright is within the Department of Zoology's Animal Care Facility.

Currently, Psychology researchers associated with new CBTC are accommodated within the Department's existing space inventory. The CFI proposal includes the construction of new clinical and animal research laboratories, testing and observation suites, research support facilities, and an animal care facility. These new facilities are separate from other existing space allocations and will be dedicated to the research activities that are identified in the CBTC proposal.

The above space inventory does not consider space located at partner institutions that are not a direct part of the University of Toronto.

Departmental Space Requirements

The proposed infrastructure for the CBTC will allow the simultaneous long term recording and analysis of both circadian rhythms and cognitive performance in diverse situations. The CBTC proposal for the St. George Campus involves the construction of a significant amount of new research facilities.

The following space program for the CBTC has been developed:

Room Name/Description	Area (nasm)
Human Cognition Testing Rooms (10 @ 6.97 nasm each)	69.70
EEG Testing & Observation Suites (2 @ 13.94 nasm each)	27.88
Eye Testing & Observation Suites (2 @ 7.43 nasm each)	14.86
Waiting Area	14.17
Reception Area	10.41
Kitchen	7.43
Computer	7.43
Molecular Biology/Proteomics Research Laboratory	171.22
Wet Research Laboratory	60.39
Microscopy/ICC Research Laboratory	91.05
Confocal Microscope Room	15.79
Data Analysis Room	14.63
Equipment Storage Room	19.51
Animal Behavioural Testing & Observation Suites (8 @ 9.72 nasm)	77.76
Large Animal Behaviour Test Rooms (2 @ 26.95 nasm each)	43.90
Circadian Rhythm Monitoring Rooms (6 @ 16.09 nasm each)	96.54
Scheduling/Co-ordination Room	10.57
Electrophysiology Research Laboratory	83.61
Dialysis Facility	14.31
Electrochemistry Facility	14.31
Cell Culture Suites (2 @ 10.41 nasm each)	20.82
Surgical Suites (2 @ 10.41 nasm each)	20.82
Research Support Room	19.51
Animal Holding Rooms (7 @ 20.44 nasm each)	143.08
Support Room (Autoclave, Cage Washing)	22.99
Clean Cage Storage Room	11.15
Food and Bedding Storage Room	20.90
Gowns and Supplies Storage Room	1.53
Total CBTC Area Requirement	1,126 nasm

Typically, the University of Toronto applies a building gross up factor of 1.80. However, larger factors have been used with research facilities that have considerable mechanical and electrical infrastructures (such as animal care facilities). For the CBTC addition, a factor of 1.84 was considered reasonable for its mix of clinical and animal research facilities, and small animal care facility. A total gross area for the CBTC addition of 2,072 gross square metres was used for planning and cost estimating purposes.

Detailed descriptions and requirements for each of the programmed rooms are provided in the Room Specification Sheets that can be found in Appendix E.

VI. Functional Plan

Departmental and CBTC Siting Options

The initial CFI proposal for the CBTC was developed with considerations to the best location for its activities as they related to the Department's current facilities and functions. The CBTC considered the expansion of its existing animal care facilities within the site occupied by the Ramsay Wright Zoological Laboratories. The CFI application proposed that a three-storey addition (with ground floor access) could be built atop of Ramsay Wright's receiving and workshop facilities and stores area that are located on the south side of the ground (basement) level.

Subsequent to the CFI submission, the Faculty of Arts and Science completed a master planning study of its departments and functions. Within this faculty plan, the Department of Psychology would be consolidated within one facility on the St. George Campus from its three current locations; the new CBTC could provide an opportunity for this departmental consolidation to occur. The following options were considered:

A. Expansion of Original CBTC Addition

The Project Committee initially considered the expansion of the CBTC from a three storey addition to a structure that matched all of the Ramsay Wright's floor levels. Each of the CBTC's proposed floors has a gross area of approximately 675 gsm without a penthouse (the main mechanical and electrical systems were to be accommodated on the third floor).

If the CBTC floor plates could be expanded upwards for another three levels and a mechanical penthouse put on top, then a total building area of approximately 4,640 gsm could be built within the same footprint as the CBTC proposal. With a gross up factor of 1.80, a total assignable area of 2,577 nasm was calculated.

With a programmed space requirement of 1,126 nasm for the CBTC, the expanded addition could only provide 1,451 nasm for the consolidation of the Department of Psychology. Assuming that the existing Ramsay Wright facilities could be retained, the Department requires approximately 4,223 nasm to simply match its existing space inventory. Although the animal care facility at 1 Spadina Crescent may not be required after the CBTC is opened, this potential space reduction is not significant (251 nasm) and cannot offset the department's planned growth. This option was rejected as it could not meet the Department's current or future space requirements.

B.F. Norman Hughes Pharmacy Building

With the pending completion of the new Leslie L. Dan Pharmacy Building, the Faculty of Pharmacy is scheduled to vacate its current facilities in the F. Norman Hughes Building in the

summer of 2005. This building provides and excellent opportunity for an academic development and was considered as a possible candidate to allow for the consolidation of the Department of Psychology and the new CBTC.

The Hughes Pharmacy Building has a total net assignable area of 4,163 square metres of which 3,736 nasm is assigned to the Faculty of Pharmacy, 196 nasm is assigned to the Gerstein Information Centre, 212 nasm is assigned to the Office of Space Management, and 19 nasm to Building and Grounds. In total, 3,932 nasm would be available after Pharmacy moves into its new building; the space assigned to the Office of Space Management, and Building and Grounds will not change.

Under this scenario, it was assumed that the Department of Psychology would vacate all of its space in Sidney Smith Hall, Ramsay Wright Zoological Laboratories and 1 Spadina Crescent. With a current space inventory of 4,540 nasm and a CBTC requirement of 1,126 nasm, the Department of Psychology has a current space requirement of 5,667 nasm (slightly less if the animal care facilities at 1 Spadina Crescent do not have to be duplicated).

Although the Hughes Pharmacy Building is significant in size, the Department of Psychology would still require an addition of 1,734 nasm (3,121 gsm using a 1.80 gross up factor) to meet its current space requirements. The only possible location for an addition would be on the south side of the building in the existing service yard for Facilities and Services shops in 215 Huron Street. Such an expansion to the Norman Hughes Building is identified in the Campus Master Plan (Site 18) but will require that areas of 215 Huron Street be relocated. Unless the remainder of Site 18 is fully utilized, such a solution would not be cost effective.

Given that the Hughes addition would be significantly larger (even more so if the Department's future growth is included) than the original CBTC addition onto Ramsay Wright and that the entire Hughes Pharmacy Building would need to be renovated, this option was considered to be economically unviable and was rejected.

C. Centre for Cellular and Biomolecular Research (CCBR)

A major biomedical research and development facility is under construction on the former Taddle Creek Road and will be attached to the Medical Sciences Building with connections to the FitzGerald and Rosebrugh Buildings. Although the CCBR will add a considerable amount of assignable area to the campus inventory and includes a large facility to house transgenic mice, this option was not considered desirable for several reasons.

Except for the main floor of the building, the CCBR will have access restrictions as virtually all of its facilities will be assigned to highly sensitive biomedical research. This building was not intended for undergraduate instruction as would be required if the Department of Psychology were consolidated here and the regular flow of students would not be possible.

The Division of Comparative Medicine (DCM) will operate a large transgenic mouse facility in the basement level of the CCBR. This facility will house only mice that would therefore require Psychology and the CBTC to locate non-mouse species elsewhere.

The CCBR/DCM facility is a Level 2 facility for transgenic mice colonies and as such animals, that leave the facility for procedures, testing or observation elsewhere, cannot return to the CCBR/DCM. The CBTC's animal-based research activities are significant and would occupy a considerable portion of the CCBR/DCM's available facilities if they were to be wholly accommodated within this facility.

The five research floors that were originally unfunded and therefore left unfinished in the original capital project have since been funded and will now be fitted out for assignment to CCBR researchers. These unfinished floors were initially considered a possibility for CBTC research, but as the funding has been made available to complete the floors for activities within the CCBR no space is available for research activity in the new facilities other than for CCBR researchers.

D. Other Siting Options

With the majority of Psychology's current space inventory within Sidney Smith Hall, consolidation within this building was considered. In addition to its current holdings, the faculty of Arts and Science would have to identify at least 2,634 nasm within Sidney Smith to accommodate not only the Department's activities in Ramsay Wright and 1 Spadina but also the requirements of the CBTC.

In order for a Psychology consolidation and the development of new CBTC facilities to take place completely within Sidney Smith Hall, a considerable amount of space would have to be released. Several departments would have to be identified and suitable accommodations found, therefore the CBTC facilities could not be built until enough space was released for re-assignment.

Also, Sidney Smith Hall is essentially an academic facility best suited to accommodate undergraduate instruction, academic and administrative office functions, and dry-based graduate and faculty research activities. It would be impractical and expensive to incorporate animal care and research facilities, and intensive wet research laboratories as required by the CBTC. This option was also not considered viable.

Campus and Facilities Planning were not able to identify any other potential locations for Psychology's consolidation and the accommodation of the CBTC. The few available development sites on the St. George Campus have been reserved for other initiatives; a new building to accommodate the CBTC and Psychology's current and future needs would not be economically feasible at this time or in the foreseeable future.

Recommended CBTC Location

After considerable investigations by the Project Planning Committee and in discussion with the Faculty of Arts and Science, it was determined that the original location for the CBTC was the most logical and that it could be reasonably implemented. This location was not dependent upon the permanent relocation of any other FAS functions or activities and would allow the design, tendering and construction process to begin as soon as governance and CFI approval to proceed had been obtained.

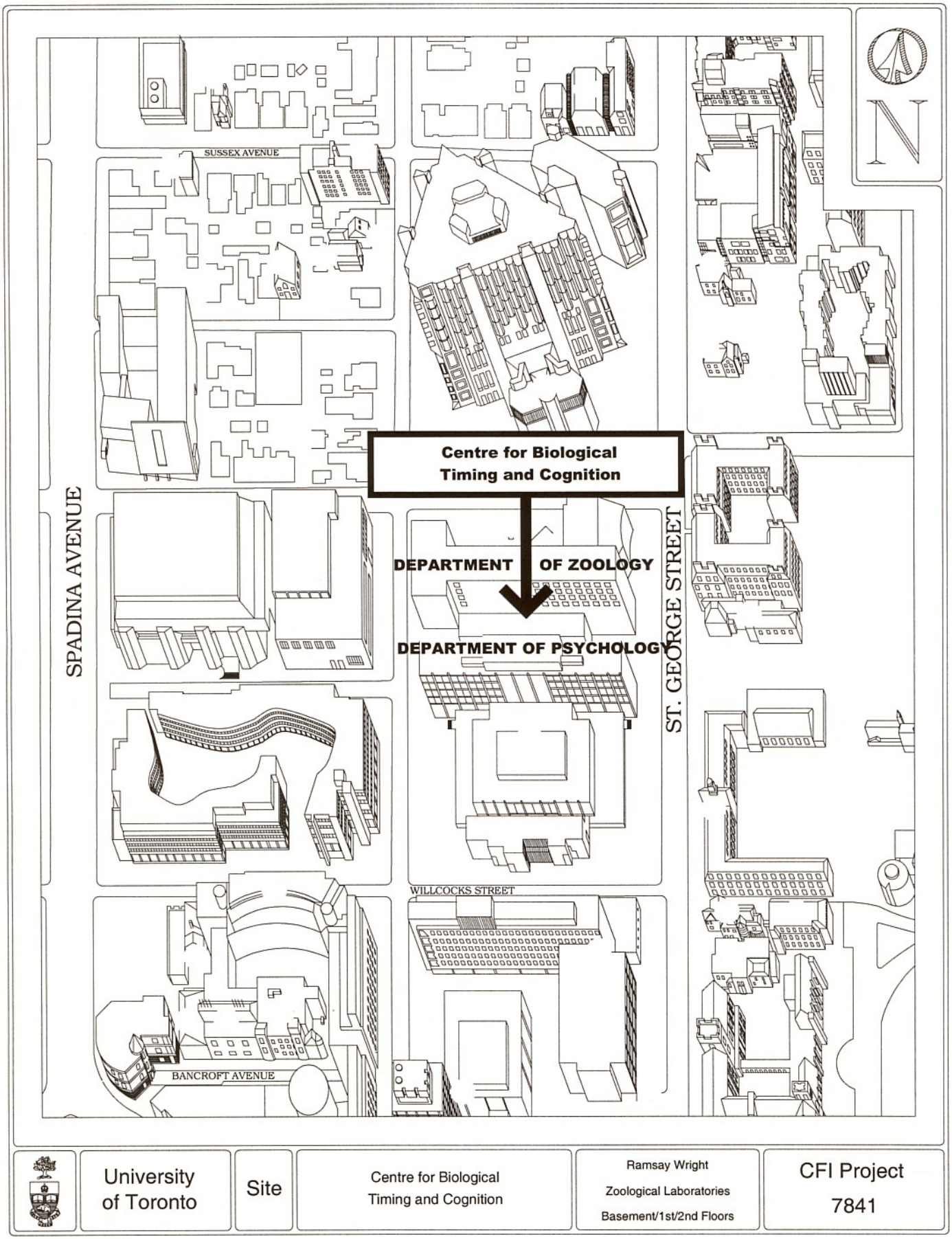
The consolidation of the Department of Psychology will be accomplished through the consolidation of the Department of Anthropology from its several campus locations to the F. Norman Hughes Pharmacy Building. The available inventory (3,932 nasm) in the Norman Hughes Building can accommodate Anthropology's current allocation of 2,404 nasm leaving surplus space for future departmental expansion and other university activities.

The Department of Anthropology currently occupies 1,075 nasm in the first basement level of Sidney Smith Hall and another 313 nasm on the first floor. Although some rationalization of space allocations within Sidney Smith will likely be needed to fulfill the FAS master plan, Anthropology's departure will release enough space to accommodate Psychology's current activities in 1 Spadina Crescent. This proposal assumes that the existing animal care facility in the basement of Ramsay Wright will remain in operation and that all animal housing and

research requirements will be satisfied by it and the CBTC facility; the 1 Spadina animal care facility will not have to be duplicated.

Although the Department of Psychology will not be completely consolidated within a single location, the CBTC addition will be on the south side of Ramsay Wright immediately opposite the north side of Sidney Smith. As well, consideration should be given during the design of the CBTC addition and the redevelopment of Sidney Smith for a future connecting link between the two buildings.

A partial isometric campus plan (as included with the CFI application) is duplicated here to illustrate the site for the new CBTC addition.


N
SUSSEX AVENUE
Centre for Biological
Timing and Cognition
DEPARTMENT OF ZOOLOGY
DEPARTMENT OF PSYCHOLOGY
SPADINA AVENUE
ST. GEORGE STREET
WILLCOCKS STREET
BANCROFT AVENUE
University of Toronto
Site
Centre for Biological Timing and Cognition
Ramsay Wright Zoological Laboratories Basement/1st/2nd Floors
CFI Project 7841

Proposed CBTC Floor Layouts

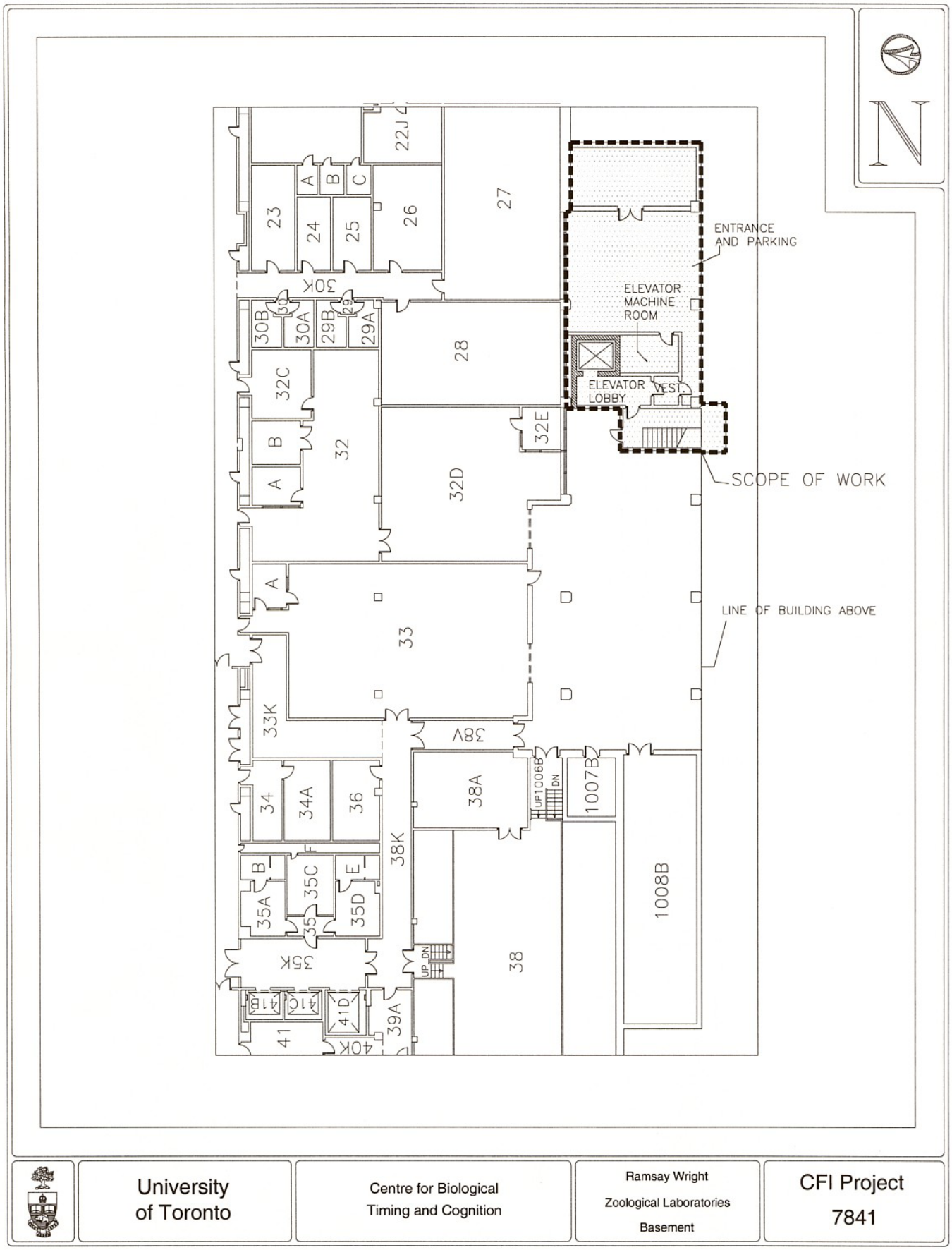
The CBTC schematic proposal has distributed its space program and associated building facilities into four distinct clusters. Although pedestrian corridor connections will be provided between the CBTC and the corresponding Ramsay Wright floor level, the CBTC will essentially be a separate, stand-alone structure with access to authorized researchers and staff only. As such, the CBTC will require a separate public entrance that is distinct from Ramsay Wright entry points. The basement level of the Centre will have both elevator and stair entry into the addition by clinical test subjects and visitors; the elevator cab and stairwell will be secured to ensure that public access to only the clinical research level (first floor) is allowed.

The CBTC's activities can be grouped into three relatively distinct activities: clinical (human) research; animal research; and, animal holding. These groupings lend themselves to separation by floor levels and are the basis for the Centre's three floors (above the basement entry). The first floor will accommodate the various human cognition, EEG and eye testing suites, associated support facilities (such as waiting area, reception area, kitchen, etc.) as well as primary research facilities; such as, the molecular biology/proteomics laboratory, microscopy/ICC laboratory, confocal microscope room, etc. The human testing areas will be accessed by test subjects only through the reception area and all other areas will only be accessible by authorized researchers and staff.

The second floor will accommodate the Centre's animal-based research and will contain circadian and behaviour testing and observation suites, cell culture suites, primary research facilities (such as electrophysiology, electrochemistry, dialysis) and support functions (such as surgery, monitoring, etc.). This floor will only be accessible by authorized researchers and staff.

The third floor will accommodate the animal care facility and will be accessible to authorized animal care staff only. The animal care facility does not require the entire floor plate and it's recommended that the remaining space house the addition's mechanical and electrical systems. These mechanical and electrical areas will need to have independent access from the animal care facility; that is, building maintenance and repair staff do not need to pass through the animal care facility.

The proposed location and floor plans for the Centre for Biological Timing and Cognition as included in the CFI application follow. The consultants will review the space program and refine the schematic plans in the process of preparing contract documents after discussion with the Project Committee.


N
ENTRANCE AND PARKING
ELEVATOR MACHINE ROOM
ELEVATOR LOBBY
VEST.
SCOPE OF WORK
LINE OF BUILDING ABOVE
22J
23
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25
26
27
28
30K
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30A
29B
29A
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32
32E
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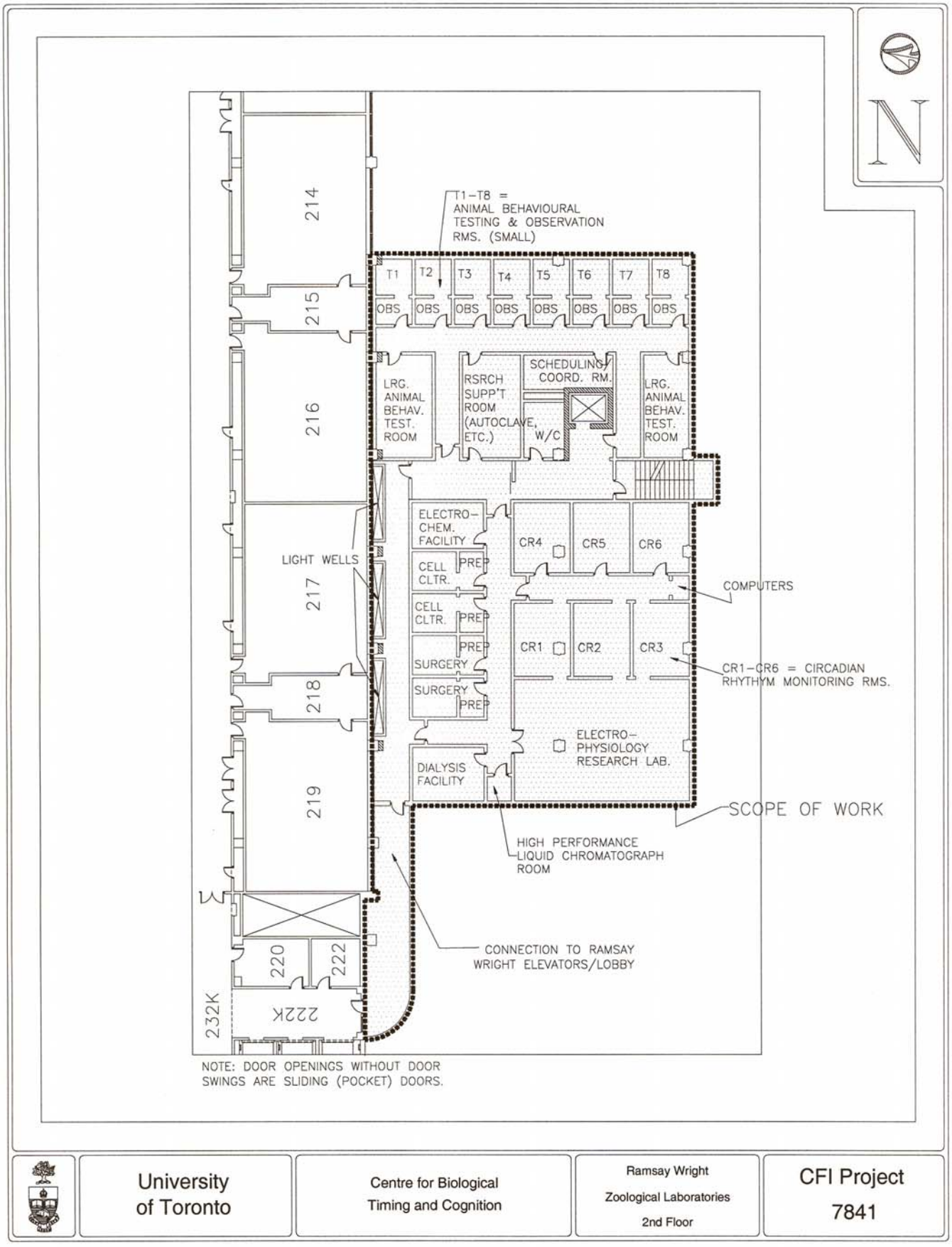
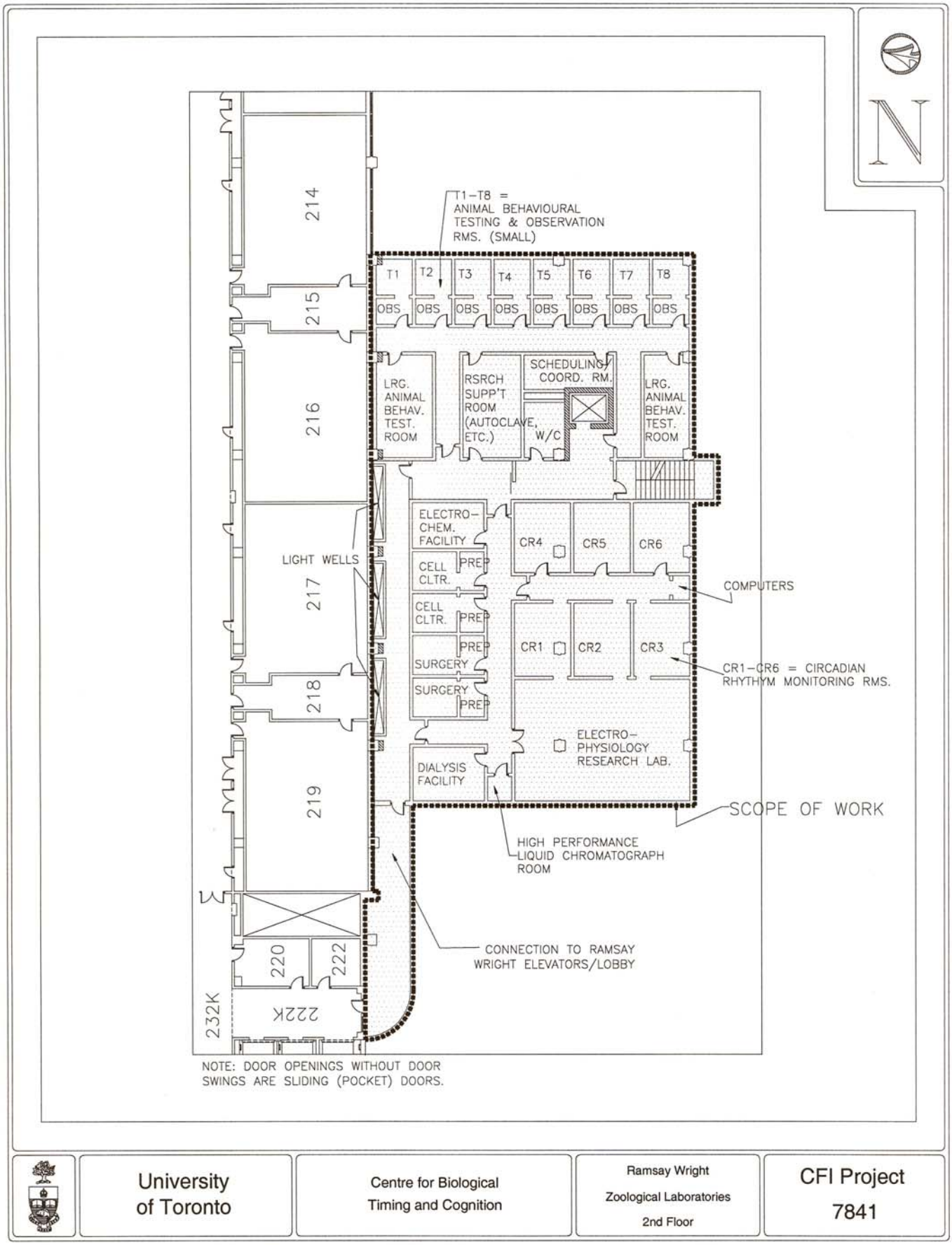
40K
University of Toronto
Centre for Biological Timing and Cognition
Ramsay Wright Zoological Laboratories Basement
CFI Project 7841


N
T1–T8 =
ANIMAL BEHAVIOURAL
TESTING & OBSERVATION
RMS. (SMALL)
T1
T2
T3
T4
T5
T6
T7
T8
OBS
LRG.
ANIMAL
BEHAV.
TEST.
ROOM
RSRCH
SUPP'T
ROOM
(AUTOCLAVE,
ETC.)
SCHEDULING/
COORD. RM.
W/C
ELECTRO–
CHEM.
FACILITY
CR4
CR5
CR6
CELL
CLTR.
PREP
SURGERY
CR1
CR2
CR3
DIALYSIS
FACILITY
ELECTRO–
PHYSIOLOGY
RESEARCH LAB.
LIGHT WELLS
COMPUTERS
CR1–CR6 = CIRCADIAN
RHYTHYM MONITORING RMS.
SCOPE OF WORK
HIGH PERFORMANCE
LIQUID CHROMATOGRAPH
ROOM
CONNECTION TO RAMSAY
WRIGHT ELEVATORS/LOBBY
214
215
216
217
218
219
220
222
222K
232K
NOTE: DOOR OPENINGS WITHOUT DOOR
SWINGS ARE SLIDING (POCKET) DOORS.
University
of Toronto
Centre for Biological
Timing and Cognition
Ramsay Wright
Zoological Laboratories
2nd Floor
CFI Project
7841


N
214
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222
222K
232K
T1–T8 =
ANIMAL BEHAVIOURAL
TESTING & OBSERVATION
RMS. (SMALL)
T1
T2
T3
T4
T5
T6
T7
T8
OBS
LRG.
ANIMAL
BEHAV.
TEST.
ROOM
RSRCH
SUPP'T
ROOM
(AUTOCLAVE,
ETC.)
SCHEDULING/
COORD. RM.
W/C
LRG.
ANIMAL
BEHAV.
TEST.
ROOM
ELECTRO–
CHEM.
FACILITY
CELL
CLTR.
PREP
SURGERY
CR4
CR5
CR6
CR1
CR2
CR3
COMPUTERS
CR1–CR6 = CIRCADIAN
RHYTHYM MONITORING RMS.
LIGHT WELLS
ELECTRO–
PHYSIOLOGY
RESEARCH LAB.
DIALYSIS
FACILITY
SCOPE OF WORK
HIGH PERFORMANCE
LIQUID CHROMATOGRAPH
ROOM
CONNECTION TO RAMSAY
WRIGHT ELEVATORS/LOBBY
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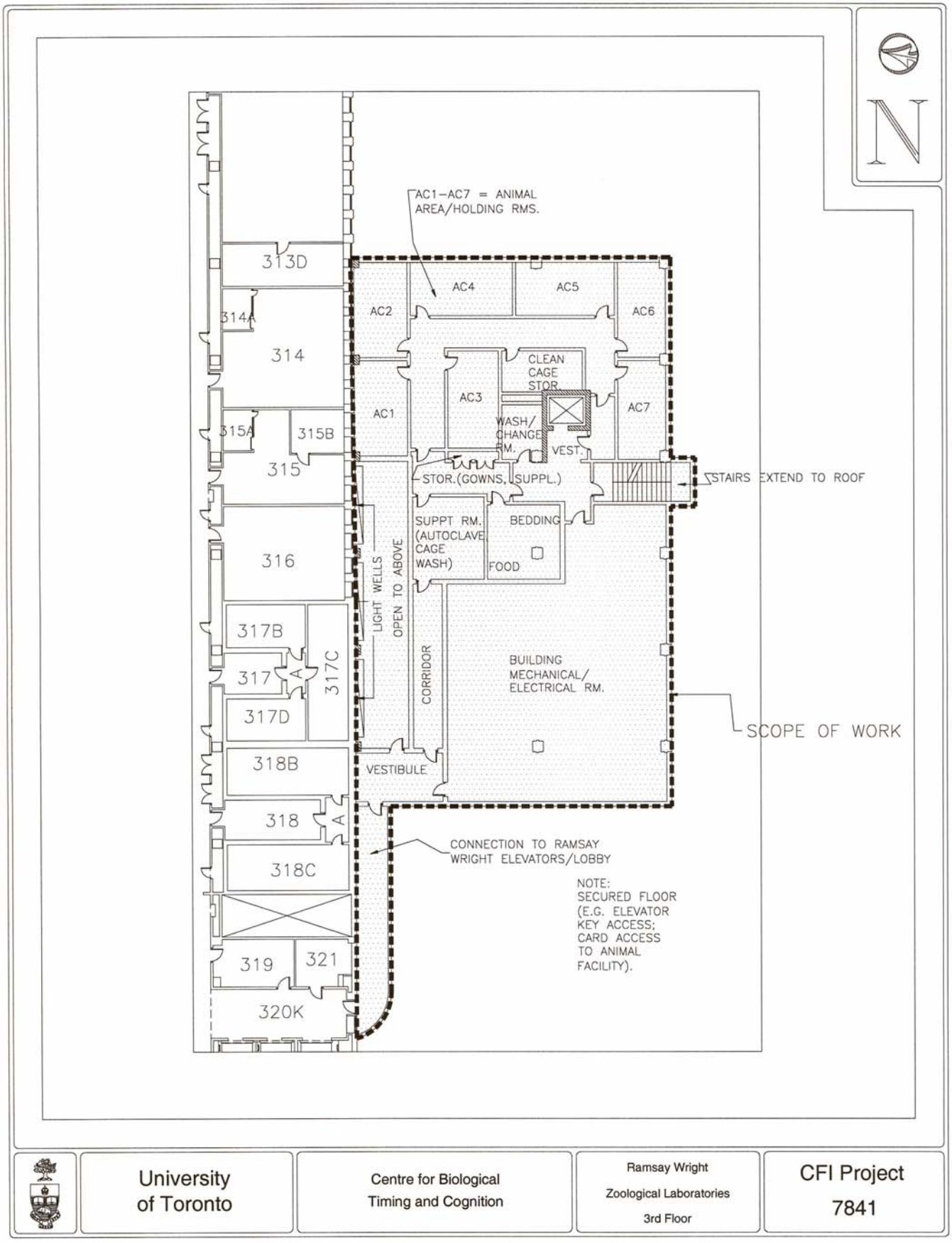
University
of Toronto
Centre for Biological
Timing and Cognition
Ramsay Wright
Zoological Laboratories
2nd Floor
CFI Project
7841


N
AC1–AC7 = ANIMAL AREA/HOLDING RMS.
313D
314A
314
315A
315B
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316
317B
317
317A
317C
317D
318B
318
318A
318C
319
321
320K
AC1
AC2
AC3
AC4
AC5
AC6
AC7
CLEAN CAGE STOR.
WASH/ CHANGE RM.
VEST.
STOR.(GOWNS, SUPPL.)
STAIRS EXTEND TO ROOF
SUPPT RM. (AUTOCLAVE CAGE WASH)
BEDDING
FOOD
LIGHT WELLS OPEN TO ABOVE
CORRIDOR
BUILDING MECHANICAL/ ELECTRICAL RM.
SCOPE OF WORK
VESTIBULE
CONNECTION TO RAMSAY WRIGHT ELEVATORS/LOBBY
NOTE:
SECURED FLOOR
(E.G. ELEVATOR
KEY ACCESS;
CARD ACCESS
TO ANIMAL
FACILITY).
University of Toronto
Centre for Biological Timing and Cognition
Ramsay Wright Zoological Laboratories 3rd Floor
CFI Project 7841

VII. Environmental Impact

Environmental Protection Policy

The University of Toronto is strongly committed to the development and maintenance of exemplary strategies that are aimed at enhancing not only the campus but also the global environment. This commitment is set out in the University's *Environmental Protection Policy*, dated 7 March 1994 and is reproduced in Appendix A.

This policy has had, and will continue to have, important impact on construction projects that range from siting policy to material selection. The University does not under-estimate the difficulties in making the most effective environmental choices nor can the budget implications of such choices be ignored. On campus, buildings represent the single most important element that affects the environment; they give it a recognizable form and are major consumers of natural resources in their construction and operation. Building design professionals have an inherent responsibility to foster good environmental practices as do building users and university administrators.

In order to encourage building designs that meet the University's environmental policy, an environmental section has been incorporated into the University's *Design Standards Manual*. This section obligates the design team to adhere to a set of environmental design principles:

- When making decisions about designs, processes and products that influence resource use (e.g., energy, water, materials) and other environmental impacts (e.g., indoor air quality, lighting, waste management), alternative choices, including innovative but proven alternatives, be considered;
- When making decisions about life cycle costs to consider those which also offer environmental benefits; and,
- To assess environmental impact broadly – recognizing that impacts in one area must be assessed in relation to others so that the "system" can be effective.

Notwithstanding the University's environmental goals, this Project Committee does want to clarify that the any environmental design strategies cannot compromise the specified requirements of the CBTC.

Environmental Design

Although the CBTC will not be as large as the Ramsay Wright Zoological Laboratories, this structure represents a significant addition to St. George Campus' building stock. Its significant size and intensive animal and clinical research activities will result in significant environmental implications; such as, increases in energy and water consumption, hazardous and non-hazardous waste generation, etc. From a simplistic standpoint, better environmental designs can significantly reduce operating costs over the life of the building; conversely, a poor design can add considerably to not only the University's operating costs but also can provide a less than comfortable working environment for its users.

Because of the CBTC's siting and size, the design team should pay particular attention to:

- building orientation, form and envelope to maximize the use of natural energy or passive strategies such as the use and control of sunlight, ventilating air movements, and diurnal and seasonal temperatures,

- minimize energy use for heating, cooling and lighting through the careful design of the building envelope, mechanical and electrical systems, and the use of low energy fixtures in combination with natural daylight and task lighting wherever possible,
- water conservation through the use of water saving fixtures and close-looped equipment cooling systems,
- metering of energy and water use in the building, or parts of it,
- building materials, finishes (e.g. paint), furnishings (e.g. carpets) and furniture which are not only emission-free (to provide building occupants with highest quality of indoor environment) but also were the most environmentally friendly in their manufacture and installation,
- provision of recycling depots for source-separation of waste throughout the building to meet the needs of the University's recycling and waste reduction programs,
- conveniently locating waste receptacles to minimize litter,
- creating a sufficiently large central area for the central area for the consolidation of and access to recycled materials and waste,
- directing rainwater (roof) runoff from the City's stormwater system and other sources of 'gray' water to satisfy landscaping needs,
- using water penetrable systems in outdoor areas where hard landscaping is required to minimize flows to the City's stormwater system, and choosing paving materials to assist the University in minimizing the amount of salt used in snow and ice clearance,
- the design of roofs and access to them to permit future use as campus open space by building users, where practical,
- the landscape design to promote local plant species that require low maintenance,
- the design of outdoor spaces for all-season use, with shade and cool air movement for the summer, and sun-trapping and wind shelter for winter use.

VIII. Special Considerations

Campus Planning

The proposed location for the CBTC addition is not one of the development sites identified within the University of Toronto Area Part II Plan. Specific building and site development criteria or constraints are not defined for the area above the basement podium of the Ramsay Wright Zoological Laboratories or for the site between this building and Sidney Smith Hall. However, the design team will not only have to consider life and building safety issues between the addition and Ramsay Wright, and possible limiting distance factors between the addition and Sidney Smith but also be sensitive to the occupants of both these existing buildings. Zoning review will be necessary for municipal approvals for this addition.

Accessibility and Security

With the inclusion of a passenger elevator in the addition, the CBTC will be fully accessible to individuals with disabilities; the design of the addition will have to comply not only with provincial codes and regulations but also the University's own design standards.

As stated under the section on the functional plan, the CBTC will have public access through the basement/ground floor entrance to the reception and waiting areas of the first floor only. The remaining floor areas will be accessible by authorized researchers and personnel.

Computing and Communications Services

The Department of Psychology will extend its existing computer network into the CBTC and the system will be maintained by departmental staff. Voice communication outlets will be located in the reception area and main research laboratories but will not be a significant need as the CBTC will not contain administration, faculty, staff or graduate student offices.

Deferred Maintenance

TBD

Infrastructure Upgrades

TBD

IX. Resource Implications

Construction Cost Estimate

For the CFI application, a professional quantity surveyor was retained by the Capital Projects Office to undertake a cost estimate for the construction of the CBTC addition. In 2003 dollars, the firm of Curran McCabe Ravindran Ross Inc. provided an estimate of $8,430,750 to construct the CBTC. The Total Project Cost, submitted to CFI at the time of application identified total costs of $12,097,560. This estimate is now being reviewed.

In so far as the location or the building program for the CBTC has not changed from the CFI submission, the original construction cost estimate of 2003 has not changed, but other secondary costs, such as impact to the workshop and stores area must be added. In addition the cost of furnishings, previously excluded, must also be added to the estimate.

Operating Costs

TBD

Impact on Deferred Maintenance Issues

TBD

Landscaping and Site Improvements

The CBTC development will not affect the existing landscaped environment or present any opportunities to undertake any site improvements because the addition is being constructed over the existing Ramsay Wright facilities. However, the well-being of the existing east garden and the landscaped area to the west of the project site should be protected during construction.

Equipment Cost

The CFI submission included a significant amount or research equipment and instrumentation. A complete list is provided in Appendix D.

Computing and Communications Costs

Beyond the infrastructure costs (i.e. conduits, junction boxes, etc.) included in the construction cost estimate, the Department of Psychology will carry the costs of extending its data and voice communication systems into the CBTC.

Furnishings Costs

TBD

Moving Costs

TBD

Secondary Effects

Although the CBTC is new construction, it will have a significant impact on the Ramsay Wright Zoological Laboratories. Foremost is that the addition will be built on top of the building's shipping and receiving facilities and the Department of Zoology's central workshop and undergraduate teaching laboratory preparation and support facility. Not only will penetrations need to be made in the roof structure to allow the construction of main support elements for the addition but also the existing roof (fabric) will need to be removed and replaced with a new floor. The operations in these facilities will need to be permanently relocated during the construction period or shut down temporarily (as needed) throughout construction.

Also, those rooms and facilities within Ramsay Wright that are immediately adjacent to the CBTC addition will be disrupted (installation of fire separations, etc.) and disturbed (noise, vibration, dust, etc.) throughout the construction period. The contractor may require a significant portion (if not all) of the service area between Ramsay Wright and Sidney Smith.

Project Costs: TBD

Total Project Cost Estimate

For the 2003 CFI application, the Capital Projects Office prepared a total project cost (TPC) estimate of $12,097,560. This estimate included those project elements that are not included in the construction cost estimate but normally required in a capital project (as noted in section on Construction Cost Estimate).

However, the original estimate assumed that escalation to a June 2004 construction start was needed and the much later than anticipated award date will likely require an adjustment in inflation to a contract award date sometime in the middle of 2005. As well, the CFI estimate assumed that any secondary effects, moving expenses, furniture, furnishings and non-CFI equipment and other indirect costs (e.g. financing charges) would be the res