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REPORT TO THE LAKEHEAD COLLEGE OF ARTS, SCIENCE AND TECHNOLOGY

TAYLOR, LIEBERFELD AND HELDMAN (CANADA) LIMITED

NEW YORK

TORONTO

JULY 1963

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REPORT TO THE LAKEHEAD COLLEGE OF ARTS, SCIENCE AND TECHNOLOGY

CHAPTER 1

INTRODUCTION AND SUMMARY

In November 1962 Lakehead College of Arts, Science and Technology retained Taylor, Lieberfeld and Heldman (Canada) Limited as Consultants to undertake a comprehensive study of institutional development. The Consultants' assignment included the presentation of analyses and recommendations concerning 1) physical plant requirements, 2) the disposition of facilities on the campus, 3) financial requirements for College operations and capital programs and 4) a development time-table and schedule of priorities. The recommendations were to be based on three projected enrollment targets stipulated by the College: 400, 700 and 1200 students.

The initial phase of the study consisted of a field survey of existing facilities, interviews with officials of the College and the Lakehead community and the collection of data from local and other sources. Subsequently, corresponding to the progressive stages of the project, meetings were held at the College with members of the Board of Governors, the Principal and others. In April 1963 a preliminary report was submitted and in July the study was completed.

A. Summary of Findings and Recommendations

1. Enrollment

In order to fulfill the objectives of the assignment it was essential to determine the dates at which the selected enrollment targets would be attained. The study indicates that the full-time enrollment could reach the 400-student level in 1963-64, the 700-student level in 1966-67 and the

doubtful

1200-student level in 1973-74. Part-time student enrollment is also projected.

It is estimated that the Bachelor of Arts degree will be first awarded in June, 1966. 1965 At the 1200-student enrollment level 668 students will be in the Arts program of the University Division, 104 students will be in the first two years of an Applied Science degree program and 428 students will be in the Technology Division.

The proportion of students in the Technology program is expected to decline from about 50 percent in 1961-62 to about 36 percent in 1973-74.

2. Staff

The projection of the number of faculty at the College is an important element of the study. Expressed as full-time equivalents, at the 400-student enrollment level 38 instructors will be required, at the 700-student level the total is 74 instructors and at the 1200-student enrollment level the total is 105 instructors.

3. Net Area Requirements[a]

The net area requirements for all non-residential activities of the College for the three target enrollments are as follows: 400-student level,

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[a]Net area, sometimes termed useable area, may be defined as the gross area of a building less the sum of the space occupied by stairs, corridors, elevators, exterior and interior wall thicknesses, toilets, mechanical equipment and janitorial space.

77,725 square feet; 700-student level, 110,485 square feet; 1200-student level, 161,715 square feet. The net square feet of non-residential space per student declines from over 300 square feet anticipated for Fall 1963 to 194, 156, and 135 square feet for the three projected enrollment levels. Thus, as the College grows, the physical plant will be utilized with increasing efficiency.

The existing academic building and University Centre will provide 94,540 net square feet in the fall of 1963.

4. Building Program Requirements and Priorities

The College should anticipate the construction of 152,205 gross square feet of non-residential building[a] over the next decade. The principal items of this building program (expressed as gross area) are as follows:

1) a library of 36,300 square feet;

2) academic and administrative space of 67,030 square feet;

3) a gymnasium of 33,900 square feet;

4) a maintenance building of 12,800 square feet.

A wing should be added to the existing academic building in 1964, and the library should be completed by September, 1965. A unit of the balance

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[a]Residential space has been considered separately from non-residential space throughout the report. A potential demand for residential space on the part of up to 25 percent of the students has been projected. For 300 students this would require 58,000 gross square feet, but construction of student residences is considered to be an option rather than a requirement.

of the academic-administrative space, primarily for administrative offices, should be ready for the academic year 1965-66. The balance of the academic space may be constructed in one or two stages over the following few years. The gymnasium should be constructed at approximately the time the enrollment reaches 700 students, unless sufficient funds are available earlier. The maintenance building may be constructed in two stages, the first to be ready by 1966.

Parallel to the construction of these buildings, other types of facilities will also be required. These will include roads, parking fields, playing fields, landscaping and utilities. A detailed listing of all projects is included in tables 10-10, 10-11, and 10-12.

The projected building program envisages the existing academic building as a science and technology center and the projected academic building as the location of non-science facilities.

5. The Master Plan

An important feature of the study is the master plan[a] of the campus. This plan indicates the location and staging of building construction, the pattern of vehicular circulation, the disposition of parking fields and miscellaneous features of the site. Although the study quantifies development only up to the 1200-student enrollment level, some indication is offered of the subsequent growth and location of facilities.

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[a]The plan is located in a pocket at the end of this volume.

The core of the campus is viewed as a group of interconnected academic facilities dominated by two proposed three-story buildings.

6. College Finances

Operating costs of the College will expand during the interval under study. By 1973-74, when the 1200-student enrollment should be realized, costs per student will rise by 137 percent above the 1961-62 level. All components of cost will rise, but the largest increases can be expected in instruction and administration, reflecting the ever-increasing competition for talented human resources across the Canadian economy.

Revenues must rise sufficiently to offset increased costs. Student fees, which are now less than 30 percent of total revenues, are projected to increase by 142 percent over the 1961-62 per student receipts by the time the 1200-student enrollment is reached. This implies that revenues from grants must rise rapidly -- by 120 percent on a per student basis. Grants will continue to represent the principal means for offsetting rising operating costs. No alternative is possible without increased revenues from private sources or student fees.

The capital costs of the physical plant development aggregate $4,407,500 for a ten-year program, excluding student residences. The total project costs[a] for the principal elements are: library, $1,043,600; academic and

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[a] All figures are in 1962 dollars.

administrative office space $1,590,800[a] (to be built in three or four stages); gymnasium, $691,600; site development, $294,670 and utilities, $150,500. The last two figures each represent a group of projects, which are detailed in Chapter 10.

B. Organization of the Report

The first section of the report comprises Chapters 2, 3, 4 and 5. In these chapters a model is constructed of College activities that bear on the subsequent estimates of physical plant and financial requirements.

Chapter 2 describes the projection of the enrollment at the College over the next 15 years, indicating the approximate points in time at which the three enrollment targets could be realized. The College is viewed as increasing its share of over-all participation in higher education in Ontario. The basic distribution of enrollment into the University and Technology Divisions is indicated, as is the subdivision of the University component into an Arts program and an Applied Science program. The number of students in the nursing program and part-time students in the University Division are estimated separately. In Chapter 3 the instructional load characteristics of enrollment at the three target levels are elaborated. Class year distribution patterns are analyzed and the student period workload by class year and division is computed. In Chapter 4 these data are used to compute the clock-hour workload and the number of teaching stations required for lecture and laboratory course offerings. Chapter 5 utilizes the enroll-

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[a]This figure excludes alterations, but includes an addition to the present academic building.

ment data and the analysis of curricular patterns to estimate staff requirements at the three target enrollment levels.

The second part of the report comprises Chapters 6, 7, 8 and 9, which deal with physical plant. In Chapter 6 the teaching stations and staff requirements are converted to a space program for academic activities. A space program for the College library is included in Chapter 7, which presents space programs for all non-academic requirements, including student residence. Chapter 8 allocates the space programs to existing and additionally required buildings. The need for alterations and additions is also considered and schematic drawings are presented for all principal buildings. In Chapter 9 the analysis which forms the basis of the master plan is presented.

The concluding section of the report, concerning College finances, is Chapter 10. The first part of the chapter describes the operating costs and revenues of the College during the planning interval. The second part presents cost estimates of the physical plant program, including priority schedules.

A series of appendixes follows Chapter 10. These are organized to parallel the chapter organization and contain supporting statistical material.

C. A Note on the Enrollment Targets

Further reference must be made to the concept of three enrollment targets and their use in this study. The selection of these targets as a

framework for the preparation of forecasts, space programs and other data is useful in that it is possible to describe and compare different stages in the growth of the College in consistent terms. Nevertheless, in coordinating the building program with the selected targets, certain anomalies arise. Essentially, this is due to the fact that enrollment growth may be thought of as a continuum while construction is a series of steps which are largely discontinuous in character. For example, at the 400-student enrollment level the analysis of enrollment, curriculum and staff is self-contained and complete. But a building program for this level as an interim target is quite different from what it might be if a student body of 400 represented a goal in itself or even a plateau in the pattern of expansion. The position of the library in the over-all building program may be taken as a case in point. A library building is needed at present. The existing library space is unsatisfactory and the collection is growing rapidly. For reasons relating to construction economy and based on an assumption of continuing growth, it is recommended that a library be constructed in the immediate future, adequate for 10-15 years' growth. However, this structure, combined with the existing buildings, results in greater total physical plant capacity than would be programmed for a similar institution with a stable enrollment goal of 400 students. In Chapter 8 it is recommended that a substantial part of the library and University Centre space be given over to temporary use until the enrollment passes the 700-student mark.

Thus, it may be said that the 400- and 700-student enrollments, particularly the former, have little independent identity in reference to the

building program. They are really stages in planning for an institution of 1200 students. The same qualifications apply, of course, to the 1200 level, which is also part of the continuum leading to still higher enrollments. Nevertheless, 1200 students is a sufficiently large and distant total to justify as a terminal point for a study of this kind.

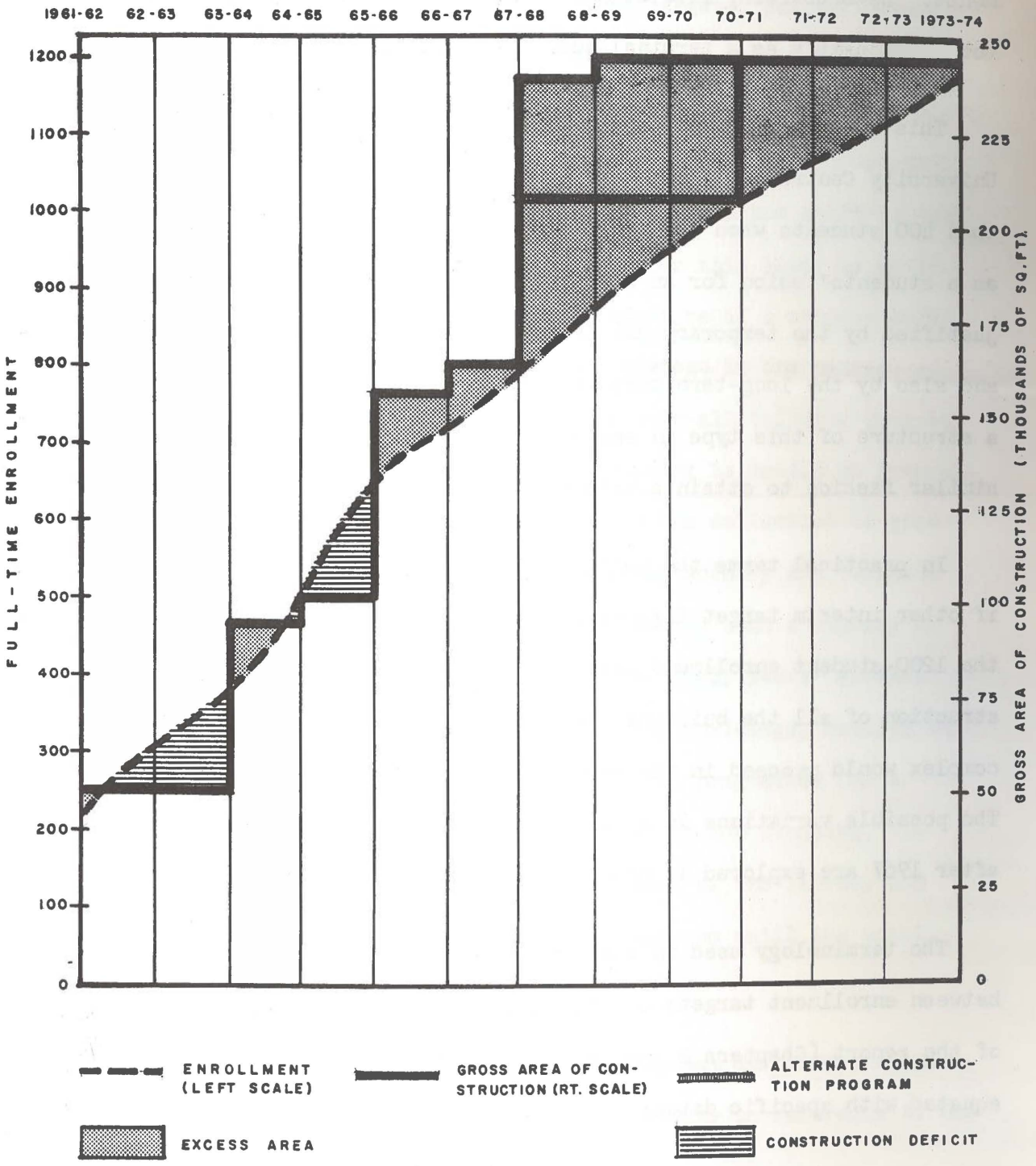
This view is borne out by the action of the College in planning the University Centre. Although the enrollment of the College will be less than 400 students when the building is completed, the Centre is adequate as a students' union for an enrollment of 1200 and more. Its size is justified by the temporary use of some of the space for academic purposes and also by the long-term waste and extra expense involved in building a structure of this type in segments. The Consultants' work attempts in similar fashion to attain a balance between short and long range goals.

In practical terms the building program would not be very different if other interim target figures had been used, assuming the retention of the 1200-student enrollment level as the ultimate goal of the study. Construction of all the buildings except the final stages of the academic complex would proceed in the same time framework as is recommended here. The possible variations in distributing the quantities of academic space after 1967 are explored in Chapter 10.

The terminology used in the report is affected by these relationships between enrollment targets and the building program. In the first section of the report (Chapters 2 through 5), the three target enrollments are equated with specific dates; for example, the 700-student enrollment level

PLATE I

LAKEHEAD COLLEGE: PROJECTED ENROLLMENT AND GROSS AREA OF CONSTRUCTION; 1961-62 TO 1973-74



could be attained in 1966-67. In the balance of the report, in reference to space programs and construction requirements, the phrase "400-student enrollment" is taken to mean the physical plant requirements between the present and the time when enrollment reaches approximately 400 students. The phrase "700-student enrollment" refers to the requirements between the time the 400-student level is attained and the time the student body approximates 700 in size. The phrase "1200-student enrollment" refers to the requirements from the time the 700-student level is attained and the time the student body reaches the final target of 1200. These intervals are to be understood in approximate terms, within one year, in assigning dates to the elements of the building program.

1-1. Lakehead College of Arts, Science and Technology: Selected Indicators of Growth, 1961-62 to Alternate Target Enrollments

Item	1961-62	Target Enrollment: Actual Projection: 400 Students; 1963-64[a]	700 Students; 1966-67[a]	1200 Students; 1973-74[a]	Index of Growth: 1961-62 = 1.000: 400 Students; 1963-64[a]	700 Students; 1966-67[a]	1200 Students; 1973-74[a]
Enrollment							
Full-time							
Total	220	400	700	1200	1.818	3.182	5.455
University Division	107	188	402	772	1.757	3.757	7.215
Technology Division	113	212	298	428	1.876	2.637	3.788
Other							
Nursing students	85	113	149	209	1.329	1.753	2.459
University Division, part-time	140	157	153	191	1.121	1.093	1.364
All categories	445	670	1002	1600	1.506	2.252	3.596
Student periods							
Full-time							
Total	b	10243	17257	28680	--	--	--
University Division	b	4084	8678	16366	--	--	--
Technology Division	b	6159	8579	12314	--	--	--
Other							
Nursing students	b	2260	2980	4180	--	--	--
University Division, part-time	b	550	536	669	--	--	--
All categories	b	13053	20773	33529	--	--	--
Clock hours of meeting per week							
Total	b	473	796	1303	--	--	--
Lecture, classroom meetings	b	318	537	887	--	--	--
Laboratory meetings	b	155	259	416	--	--	--

(Continued)

1-1. (Continued)

Item	1961-62	Target Enrollment: Actual Projection — 400 Students; 1963-64[a]	700 Students; 1966-67[a]	1200 Students; 1973-74[a]	Target Enrollment: Index of Growth: 1961-62 = 1.000 — 400 Students; 1963-64[a]	700 Students; 1966-67[a]	1200 Students; 1973-74[a]
Teaching station requirements							
Classrooms	7[c]	16	22	32	2.286	3.143	4.571
Laboratories	7[c]	13	16	21	1.857	2.286	3.000
Staff requirements							
Faculty[d]	18	38	64	105	2.111	3.556	5.833
Physical plant							
Total useable space (square feet)[e]	32930	77725	110485	161715	2.360	3.355	4.911
Increment of useable space (square feet)[e]	--	+ 44795	+ 32760	+ 51230	--	--	--
Institutional finances (1962 dollars)							
Expenditures per full-time student							
Total	1261	1714	1949	2982	1.359	1.546	2.365
Instruction	830	1188	1403	2250	1.431	1.690	2.711
Administration	79	100	112	167	1.266	1.418	2.114
All other	352	425	433	562	1.207	1.230	1.597
Revenues per full-time student							
Total	1306	1714	1949	2982	1.312	1.492	2.283
Student fees	372	469	557	900	1.261	1.497	2.419
Grants	922	1215	1357	2025	1.318	1.472	2.196
Other	13	30	35	57	2.308	2.692	4.385

(Continued)

1-1. (Continued)

Item	1961-62	Target Enrollment: Actual Projection: 400 Students; 1963-64[a]	Target Enrollment: Actual Projection: 700 Students; 1966-67[a]	Target Enrollment: Actual Projection: 1200 Students; 1973-74[a]	Target Enrollment: Index of Growth: 1961-62 = 1.000: 400 Students; 1963-64[a]	Target Enrollment: Index of Growth: 1961-62 = 1.000: 700 Students; 1966-67[a]	Target Enrollment: Index of Growth: 1961-62 = 1.000: 1200 Students; 1973-74[a]
Institutional finances (1962 dollars) (continued)							
Salary outlays per faculty member	7121	10215	11460	15030	1.434	1.609	2.111
Faculty salary outlays per full-time student	550	970	1048	1315	1.764	1.905	2.391
Incremental capital outlays for campus development (thousands of 1962 dollars)[c]	--	--[f]	2070.7	2336.8	--	--	--

[a]Approximate dates at which target enrollments could be reached.

[b]Not available.

[c]1962-63; actual rooms in scheduled use.

[d]Expressed as full-time equivalents.

[e]Excludes residential space.

[f]Capital outlays begin in 1964-65.

CHAPTER 2

ENROLLMENT: DEVELOPMENT PATTERN

The terms of reference of this study called for the elaboration of a physical plant and campus development program for alternate target enrollments of 400, 700 and 1200 students. Such a program could be evolved without specifying the particular dates at which the target enrollments would be realized; however, the soundness of the program and the pace at which it should be implemented would remain beclouded without some indication of the general timing of the expansion.

Therefore, the Consultants undertook to determine the pattern of enrollment development at the College in order to ascertain a) the likelihood of reaching the specified target enrollments, b) the approximate dates at which these enrollments could be realized, and c) the structure of enrollment. The last, of course, is significant since it implies a delineation of the enrollment data in terms meaningful for planning; that is, the distribution of students by class year level, the distribution of students among various study programs, and so on.

The remainder of this chapter considers the enrollment development pattern. The various building blocks that are important for making the required estimates are explored and their role in affecting the College's enrollment expansion is clarified.

A. Higher Education in Ontario

Both Canada and Ontario are expected to grow rapidly during the com-

ing decade. The population of the nation has been increasing and the upward trend of population growth is likely to continue during the 1961-71 decade. It is also expected that the relatively faster population development characterizing the Province of Ontario will continue unabated. The 19 percent increase projected for Canada during the 1961-71 decade will be accompanied by a 27 percent increase in the population of Ontario and the Province will continue to account for an increasing proportion of total Canadian population.

A significant indicator of potential growth in college and university enrollment is the size of the 18-21 years population age group. This is commonly considered to be the age group from which most college and university students are drawn. In numbers alone, the growth of this age group will cause considerable expansion in the levels of enrollment at higher educational institutions in Cananda and Ontario during the 1961-71 decade. The size of the age group will increase by 46 percent for the country as a whole and 54 percent for Ontario. The rapid growth is directly a function of the post-World War II baby boom.

But, in addition, college participation rates are also increasing. An increasing proportion of the students eligible for college and university attendance are in fact continuing with such post-secondary education. In addition, there is a burgeoning expansion in enrollment at the nation's centers of graduate study. The combination of expanding population and higher rates of college participation is expected to produce a 167 percent increase in undergraduate enrollment in Canada during the '60's; the com-

2-1. Canada and Ontario: Selected Statistical Indicators of Population and Undergraduate Enrollment in Colleges and Universities, Canada and Ontario, Selected Years, 1951 to 1971

	1951	1956	1961	1966	1971
Population, total					
Number (000)					
Canada	14009	16081	18238	19518	21643
Ontario	4598	5405	6236	6990	7898
Index (1961 = 1.000)					
Canada	.768	.882	1.000	1.070	1.187
Ontario	.737	.867	1.000	1.121	1.267
Ratio: Ontario/Canada	.328	.336	.342	.358	.365
Population, 18-21 years age group					
Number (000)					
Canada	851.8	895.1	1016.4	1222.6	1484.9
Ontario	264.3	282.5	316.7	418.6	487.6
Index (1961 = 1.000)					
Canada	.838	.881	1.000	1.203	1.461
Ontario	.835	.892	1.000	1.322	1.540
Ratio: Ontario/Canada	.310	.316	.312	.342	.328
Undergraduate college and university enrollment[a]					
Number (000)					
Canada	57.9	66.1	107.5	169.9	286.6
Ontario	18.2	20.0	29.5	57.9	107.1
Index (1961 = 1.000)					
Canada	.539	.615	1.000	1.580	2.666
Ontario	.617	.678	1.000	1.963	3.631
Ratio: Ontario/Canada	.314	.303	.275	.341	.374

[a]Non-veteran.

parable figure for Ontario is 263 percent.[a]

Clearly, these influences will produce increased pressures for the expansion of existing institutions in Ontario, as well as the establishment of new institutions. But how will these influences express themselves? How many students can be expected to start post-secondary educational studies during the decade and when? More particularly, what enrollment development pattern can Lakehead College, with its combination of programs in university and technical studies, expect?

The Consultants believe that the answer to these questions will depend upon several factors: the number of students likely to initiate post-secondary programs of study; the length of such programs offered by the Colleges; and the probable progression patterns of students as they proceed from beginning to completion of each prescribed course of study. As a first step, therefore, the Consultants undertook the quantification of the expansion pattern in first-year enrollment at the relevant branches of post-secondary education.

B. Enrollment in Post-Secondary Education

The requirements for entry into post-secondary education study programs vary with the character of the program and the institution offering the course of study. For purposes of this study, the completion of grade

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[a]The estimate of undergraduate college and university enrollment for Ontario is taken from Dr. R. W. B. Jackson's estimates of the expansion of post-secondary education in Ontario during the 10-year interval beginning in 1962. Dr. Jackson presented six estimates in his report; the Consultants selected Estimate 6, his highest, for use in this study.

13 was taken to be a normal pattern for students proceeding to university level programs of study, technical studies and nursing. The Consultants recognize that completion of grade 13 is not mandatory for entry to all post-secondary education programs; however, there is an increasing trend for students to complete grade 13 before going on to more advanced studies.

Dr. Jackson's statistical report, prepared for the Committee of Presidents of Provincially Assisted Universities, provided a number of estimates of the trends in enrollment in secondary schools. Paralleling general population developments, secondary school enrollment has been increasing during the past decade. Furthermore, it will continue to expand during the sixties. Total enrollment in grades 9 to 13 is expected to increase by 55 percent between 1961 and 1970; during the same interval, grade 13 enrollment will increase by 127 percent.

What are the implications for post-secondary education enrollment? A clue is provided by data available from the Provincial Department of Education concerning the pattern of retirements from secondary schools to further education at post-secondary school institutions. Table 2-3 summarizes the experience of the past decade. Thus, the number of students initiating post-secondary programs of study has been increasing in all branches of the educational structure.

Moreover, as shown in table 2-4, the patterns of retirements to further education for the Lakehead, particularly Thunder Bay, and the Province as a whole are quite similar. Universities account for 37.9 percent of all retirements to further education in the Province and 37.8 percent at the

2-2. Ontario: Secondary School Enrollment, Total and Grade 13, Selected Years, 1951 to 1970

Year	Enrollment: Number — Total, Grades 9-13	Enrollment: Number — Grade 13	Enrollment: Indexes: 1961 = 1.000 — Total, Grades 9-13	Enrollment: Indexes: 1961 = 1.000 — Grade 13
1951	133556	8827	.446	.411
1952	141091	8975	.472	.418
1953	148744	9472	.497	.441
1954	160166	9981	.535	.465
1955	174562	10799	.583	.503
1956	185605	11487	.620	.535
1957	203525	12547	.680	.584
1958	222075	14278	.742	.665
1959	237576	16267	.794	.757
1960	262775	18447	.878	.859
1961	299177	21482	1.000	1.000
1965	419624	41514	1.403	1.932
1970	462970	48720	1.547	2.268

N.B. Projections are from Dr. R. W. B. Jackson

2-3. Ontario: Secondary School Retirements to Further Education, 1951-61

Year	Retirements from Secondary School to Further Education: All	Post-Secondary Group	Universities	Business Schools	Schools of Nursing	Provincial Technical Institutes	Teachers' Colleges	Other[a]
				(number)				
1951	9384	6100	2955	n/a	1375	471	1087	212
1952	8824	7894	3034	1509	1360	493	1309	189
1953	9609	8434	3007	1384	1426	558	1403	656
1954	9828	9673	3477	2085	1567	643	1392	509
1955	10375	9146	3486	1595	1471	609	1483	502
1956	--	--	--	--	--	--	--	--
1957	12546	11069	4648	1793	1678	766	1707	477
1958	13482	12169	4711	1922	1724	809	2170	833
1959	14744	14056	4869	2051	1975	718	2799	1644
1960	16592	15993	5931	2306	2058	886	2929	1883
1961	18431	16856	6983	2164	2374	1336	3006	993
				(indexes: 1961 = 1.000)				
1951	.509	.362	.423	n/a	.579	.353	.362	.213
1952	.479	.468	.434	.697	.573	.369	.435	.190
1953	.521	.500	.431	.640	.601	.418	.467	.661
1954	.533	.574	.498	.963	.660	.481	.463	.513
1955	.563	.543	.499	.737	.620	.456	.493	.506
1956	--	--	--	--	--	--	--	--
1957	.681	.657	.666	.829	.707	.573	.568	.480
1958	.731	.722	.675	.888	.726	.606	.722	.839
1959	.800	.834	.697	.948	.832	.537	.931	1.656
1960	.900	.949	.849	1.066	.867	.663	.974	1.896
1961	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

[a]Including agricultural schools.

2-4. Ontario and Lakehead Region: Secondary School Retirements to Further Education, 1961

Category of Further Education	Total, Province	Lakehead			
		Kenora	Rainy River	Thunder Bay	Total
		(number)			
Private Schools	1006	--	3	9	12
Universities	6983	35	8	162	205
Business Schools	2164	10	5	44	59
Schools of Nursing	2374	19	18	62	99
Provincial Technical Institutes	1336	6	3	13	22
Private Trade Schools	569	--	1	1	2
Teachers' Colleges	3006	15	14	89	118
Agricultural Schools	237	--	--	--	--
Other	756	3	--	22	25
All further education	18431	88	52	402	542
		(percent of total for Province)			
Private Schools	5.46	--	.30	.89	1.19
Universities	37.89	.50	.11	2.32	2.94
Business Schools	11.74	.46	.23	2.03	2.73
Schools of Nursing	12.88	.80	.76	2.61	4.17
Provincial Technical Institutes	7.25	.45	.22	.97	1.65
Private Trade Schools	3.09	--	.18	.18	.35
Teachers' Colleges	16.31	.50	.47	2.96	3.93
Agricultural Schools	1.29	--	--	--	--
Other	4.10	.40	--	2.91	3.31
All further education	100.00	.48	.28	2.18	2.94
		(percent of total within each area)			
Private Schools	5.46	--	5.77	2.24	2.21
Universities	37.89	39.77	15.38	40.30	37.82
Business Schools	11.74	11.36	9.62	10.95	10.89
Schools of Nursing	12.88	21.59	34.62	15.42	18.27
Provincial Technical Institutes	7.25	6.82	5.77	3.23	4.06
Private Trade Schools	3.09	--	1.92	.25	.37
Teachers' Colleges	16.31	17.05	26.92	22.14	21.77
Agricultural Schools	1.29	--	--	--	--
Other	4.10	3.41	--	5.47	4.61
All further education	100.00	100.00	100.00	100.00	100.00

Lakehead. Schools of Nursing account for 12.9 percent of retirements to further education at the provincial level and 18.3 percent at the Lakehead. And Provincial Technical Institutes draw 7.3 percent of all secondary school retirements to further education in the Province and 4.1 percent at the Lakehead. There do no appear to be any reasons, either logical or statistical, to assume that influences substantially different from those operating across the Province will be in effect at the Lakehead. Therefore, projections of the probable ratio of expansion in retirements to post-secondary educational programs for the Province as a whole can be applied with reasonable confidence to the Lakehead, and Lakehead College in particular.

Table 2-5 shows the results of these efforts. Retirements to post-secondary education were expressed in index form and projected as a function of grade 13 enrollment. The estimating procedures produced different results for the several post-secondary education categories of interest in connection with Lakehead College; that is, universities, provincial technical institutes, and schools of nursing. All three categories are expected to grow less rapidly than grade 13 enrollment; in terms of relative magnitude, the ranking is as follows: grade 13 enrollment, universities, provincial technical institutes and schools of nursing. Between 1961-62 and 1975-76, grade 13 enrollment will increase 176 percent; during the same interval, retirements to post-secondary education will increase by 169 percent for universities, 154 percent for provincial technical institutes, and 121 percent for schools of nursing.

2-5. Ontario: Indexes of Secondary School Grade 13 Enrollment and Retirements to Selected Categories of Post-Secondary Education, Selected years, 1951-52 to 1970-71

Year	Grade 13 Enrollment	Retirements to Post-Secondary Education		
		Universities	Provincial Technical Institutes	Schools of Nursing
1951-1952	.411	.423	.353	.579
1952-1953	.418	.434	.369	.573
1953-1954	.441	.431	.418	.601
1954-1955	.465	.498	.481	.660
1955-1956	.503	.499	.456	.620
1956-1957	.535	a	a	a
1957-1958	.584	.666	.573	.707
1958-1959	.665	.675	.606	.726
1959-1960	.757	.697	.537	.832
1960-1961	.859	.849	.663	.867
1961-1962	1.000	1.000	1.000	1.000
1965-1966	1.932	1.892	1.814	1.642
1970-1971	2.268[b]	2.213	2.107	1.873
1975-1976	2.762[b]	2.687	2.539	2.213

[a]Not available.

[b]Estimated.

These growth factors could be applied to freshman enrollment in post-secondary institutions in 1961-62 to provide preliminary estimates of potential first-year enrollment at various years in the future. However, an additional stimulant to post-secondary education is being provided by the nation's economic development. The demands for skilled and trained personnel to meet the challenges of a modern society have been providing an added stimulus to the development of post-secondary educational programs for a number of years. Nor can these influences be expected to diminish in intensity in the next several decades. The proportion of the civilian labor force accounted for by technical and professional manpower has been increasing steadily. The magnitude of the change is such that it must be felt at the post-secondary educational level in the form of increased rates of participation in advanced programs of study. Table 2-6 presents estimates of the growth in the professional component of the labor force relative to all civilian workers. Between 1961 and 1976, it is expected that the total civilian labor force will increase by 44 percent; during the same interval, however, the professional component of the labor force will increase by 72 percent. In short, professional workers will expand 19 percent more rapidly than the total labor force.

A composite index of growth for first-year enrollment in post-secondary educational institutions can be obtained by combining the indexes of growth for secondary school retirements to further education with the index of trend variance in the growth of professional workers in the labor force. Under this approach, first-year enrollment in university level programs of study should increase 219 percent between 1961-62 and 1975-76. For the

2-6. Canada: Civilian Labor Force, Total and Professional Workers; Selected Years, 1931 to 1971

Year	Civilian Labor Force					
	Number		Indexes: 1961 = 1.000		Index of Trend Variance	
	Total	Professional Workers	Total	Professional Workers	Total	Professional Workers
	(000)					
1931	4151	200.7	.637	.383	1.000	.601
1941	4466	240.4	.685	.459	1.000	.670
1951	5217	302.6	.800	.577	1.000	.721
1961	6518	524.0	1.000	1.000	1.000	1.000
1966	7312	616.7	1.122	1.177	1.000	1.049
1971	8334	754.6	1.279	1.440	1.000	1.126
1976	9414	898.7	1.444	1.715	1.000	1.188

provincial technical institutes, the comparable figure should be 202 percent. Nursing programs should increase by 163 percent during the same interval. The composite indexes thus obtained can be used as a basis for projecting first-year enrollment in the various divisions at Lakehead College during the interval under study.

C. Enrollment at Lakehead College

The College, of course, presently offers programs in the three areas discussed above. There is the University Division, which offers both Arts and Applied Science programs. There is the Technology Division, which offers several programs of study that are recognized throughout the Province among the various provincial technical institutes. And the College also currently offers instruction to nursing students, although on an experimental basis and without commitment to a permanent program. In addition, the College has a program of course offerings in the University Division for part-time students.

The number of students enrolled in these various programs at the College and their pattern of development over the past decade are revealed in tables 2-7 and 2-8. Of the total of 220 full-time students enrolled in the College in 1961-62, 107 students were in the University Division and 113 students were in the Technology Division. In the University Division, the Arts program accounted for 86 students, 62 of whom were freshmen. The Applied Science program accounted for 21 students, all of whom were first-year students. In the Technology Division, 91 of the 113 students enrolled were in the first year of the programs. In addition, the College

2-7. Lakehead College of Arts, Science and Technology: Full-Time Enrollment, by Division, 1952-53 to 1962-63

Year	University Division			Technology Division	Total Full-Time Enrollment
	Arts	Applied Science	Total		
			(number)		
1952-1953	10	37	47	21	68
1953-1954	12	28	40	29	69
1954-1955	7	28	35	28	63
1955-1956	19	25	44	30	74
1956-1957	13	34	47	31	78
1957-1958	32	44	76	48	124
1958-1959	48	36	84	65	149
1959-1960	39	30	69	52	121
1960-1961	75	24	99	75	174
1961-1962	86	21	107	113	220
1962-1963	84	16	100	124	224
			(indexes; 1961-62 = 1.000)		
1952-1953	.116	1.762	.439	.186	.309
1953-1954	.140	1.333	.374	.257	.314
1954-1955	.081	1.333	.327	.248	.286
1955-1956	.221	1.190	.411	.265	.336
1956-1957	.151	1.619	.439	.274	.355
1957-1958	.372	2.095	.710	.425	.564
1958-1959	.558	1.714	.785	.575	.677
1959-1960	.453	1.429	.645	.460	.550
1960-1961	.872	1.143	.925	.664	.791
1961-1962	1.000	1.000	1.000	1.000	1.000
1962-1963	.977	.762	.935	1.097	1.018

2-8. Lakehead College of Arts, Science and Technology: Full-Time and Part-Time Enrollment, by Division, 1952-53 to 1962-63

Year	University Division			Technology Division	Nurses	TOTAL Enrollment
	Full Time	Part Time	Total	(Full Time)		
				(number)		
1952-1953	47	41	85	21	--	106
1953-1954	40	30	70	29	--	99
1954-1955	35	29	64	28	--	92
1955-1956	44	26	70	30	--	100
1956-1957	47	52	99	31	--	130
1957-1958	76	67	143	48	--	191
1958-1959	84	101	185	65	--	250
1959-1960	69	94	163	52	--	215
1960-1961	99	125	224	75	30	329
1961-1962	107	140	247	113	85	445
1962-1963	100	162	262	124	128	514
			(indexes: 1961-62 = 1.000)			
1952-1953	.439	.293	.344	.186	--	.238
1953-1954	.374	.214	.283	.257	--	.222
1954-1955	.327	.207	.259	.248	--	.207
1955-1956	.411	.186	.283	.265	--	.225
1956-1957	.439	.371	.401	.274	--	.292
1957-1958	.710	.479	.579	.425	--	.429
1958-1959	.785	.721	.749	.575	--	.562
1959-1960	.645	.671	.680	.460	--	.483
1960-1961	.925	.893	.907	.664	.353	.739
1961-1962	1.000	1.000	1.000	1.000	1.000	1.000
1962-1963	.935	1.157	1.061	1.097	1.506	1.155

offered instruction to 85 nursing students and 140 part-time students in the University Division. Thus, a total of 445 students were served by the College in 1961-62.

One further building block is required before the enrollment estimates can be completed. Although a basis has been established for estimating first-year enrollment in the various programs of the University and Technology Divisions, planning parameters are required for converting the estimates of first-year enrollment to total enrollment. Such parameters should reflect the expected progression patterns of students through the various study programs offered by the College, and will be a function of the length of the period of study in the various program areas as well as student competence and institutional standards.

It is expected that the College will begin to grant degrees in the University Division in 1965-66, implying that the present two-year Arts program will have expanded to a three-year program by that time. For purposes of this study, it is assumed that the Arts programs will continue to develop even after 1965-66 and that honors programs requiring four years of study will ultimately be introduced. By the same token, it is expected that the Applied Science program, which is presently one year in duration, also will be expanded. The College's indicated policy is to initiate such expansion in 1964-65 with the introduction of a second year of study. The full two-year program should be in full swing by 1965-66. However, it is not expected that the College will expand its offerings in Applied Science beyond the two-year program during the planning interval encompassed by this study. For the Technology Division, no significant changes in the

length or depth of the programs presently offered at the College are expected throughout the planning interval.

The coefficients for converting first-year enrollment to total enrollment were developed after an examination of patterns prevailing at other institutions in the Province and in Canada. The results of these studies are presented in table 2-9. For the Arts component of the University Division, the planning parameter for converting first-year enrollment to total enrollment under the three-year program is 2.50; when this program has been deepened and extends in scope to include honors courses, the conversion coefficient should rise to 3.64. In this study, it is assumed that the development of the Arts program and its elongation to four years should be achieved by 1971 and continued thereafter. In the Applied Science program, the planning parameter for converting first-year enrollment to total enrollment in a two-year program is 1.67. These planning parameters for the University Division programs are based upon an analysis of data presented in Appendix A for Canadian and Ontario institutions. For the Technology Division, the planning parameter for converting freshman enrollment under a two-year program is 1.68. This is based upon an analysis of the experience at the College itself during the past decade, and reflects the actual historical conditions characterizing the College's expansion in its Technology Division.

With these building blocks in hand, the enrollment projections for the various programs of the College over the next 15 years could be completed. A summary of the computational program for these estimates is presented in table 2-10. A year-by-year breakdown by enrollment category is presented

2-9. Lakehead College of Arts, Science and Technology: Planning Parameters for Converting First-Year Enrollment to Total Full-Time Enrollment Estimates, by Study Program

Program	Conversion Coefficient: First-Year Enrollment to Total Full-Time			
	One-Year Total	Two-Year Total	Three-Year Total	Four-Year Total
University Division				
Arts	1.00	a	2.50	3.64
Applied Science	1.00	1.67	a	a
Technology Division	1.00	1.68	a	a

[a]Not calculated for use in programming Lakehead College development pattern.

2-10. Lakehead College of Arts, Science and Technology: Projection of Enrollment, by Division and Program, Selected Years, 1961-62 to 1975-76

Item	Academic Year Ending in 1962	1966	1971	1976
Secondary school retirements to further education				
Indexes of growth: 1961-62 = 1.000				
Universities	1.000	1.892	2.213	2.687
Provincial Technical Institutes	1.000	1.814	2.107	2.539
Schools of Nursing	1.000	1.642	1.873	2.213
Professional workers in labor force				
Index of growth: 1961-62 = 1.000	1.000	1.177	1.440	1.715
Index of trend variance[a]	1.000	1.049	1.126	1.188
First-year enrollment in post-secondary education				
Indexes of growth: 1961-62 = 1.000				
Universities	1.000	1.985	2.492	3.192
Provincial Technical Institutes	1.000	1.903	2.372	3.016
Schools of Nursing	1.000	1.722	2.109	2.629
Lakehead College University Division, part-time enrollment				
Index of growth: 1961-62 = 1.000	1.000	1.096	1.237	1.405
Lakehead College enrollment				
First-year, full-time				
University Division	62	123	155	198
Arts program	21	42	52	67
Applied Science program	91	173	216	274
Technology Division				

(Continued)

2-10. (Continued)

Item	Academic Year Ending in 1962	1966	1971	1976
Lakehead College enrollment (continued)				
Conversion coefficients: total/first-year enrollment				
University Division				
Arts program	--	2.34	3.64	3.64
Applied Science program	--	1.67	1.67	1.67
Technology Division	--	1.68	1.68	1.68
Total, full-time				
University Division				
Arts program	86	288	564	721
Applied Science program	21	70	87	112
Technology Division	113	291	363	460
Other				
Nurses	85	146	179	223
University Division, part-time enrollment	140	153	173	197
Summary				
Total full-time enrollment	220	649	1014	1293
Total full-time enrollment plus nurses	305	795	1193	1516
Total full-time enrollment plus nurses and part-time enrollment	445	948	1366	1713

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[a]Relative to index of growth in total civilian labor force.

(Continued)

2-10. (Continued)

N.B. 1. Assumes first degrees are conferred in 1965-66.

2. Assumes second year of Applied Science program is introduced in 1964-65 and is in full swing by 1965-66.

3. Assumes no change in length or depth of Technology Division programs throughout planning period.

in table 2-11. Table 2-10 shows that first-year enrollment in the University and Technology Divisions was made a function of the growth of secondary school retirements to further education and the growth of the professional labor force. The first-year enrollment estimates were then converted to total enrollment by applying the planning parameters for the progression of students through the various study programs to be offered by these divisions. Enrollment in the program of study offered to student nurses was made a function of the projected growth in secondary school retirements to further education in schools of nursing, as modified by the professional labor force trend variant. Finally, the development of part-time University Division enrollment was made a function of the population growth expected for the Lakehead region.

By way of summary, total full-time enrollment at the College is projected to increase from 220 students in 1961-62 to 1293 students in 1975-76. Thus, the alternate target enrollments to be used for programming the development of the College, according to the terms of reference of this study, are clearly feasible. According to the projections, the 400-student enrollment should be approximated sometime during the 1963-64 or 1964-65 academic year. The 700-student enrollment can be expected about 1966-67. The 1200-student enrollment should be reached around 1973-74.

If nursing students are combined with full-time students, over-all enrollment should increase from 305 students in 1961-62 to 1516 students in 1975-76. If University Division part-time enrollment is added as well, the over-all number of students serviced by the College should increase from 445 persons in 1961-62 to 1713 persons in 1975-76.

2-11. Lakehead College of Arts, Science and Technology: Projection of Enrollment, by Program, 1961-62 to 1975-76

Year	University Division, Full-Time: Arts Program	University Division, Full-Time: Applied Science Program	Technology Division, Full-Time	Nurses	University Division, Part-Time	Total Enrollment: Full-Time	Total Enrollment: Full-Time plus Nurses	Total Enrollment: All Categories
				(number)				
1961-62	86	21	113	85	140	220	305	445
1962-63	109	24	173	94	143	306	400	543
1963-64	148	28	198	106	147	374	480	627
1964-65	213	47	245	126	150	505	631	781
1965-66	288	70	291	146	153	649	795	948
1966-67	339	73	306	153	157	718	871	1028
1967-68	395	77	321	160	161	793	953	1114
1968-69	454	82	339	168	165	875	1043	1208
1969-70	513	85	351	174	169	949	1123	1292
1970-71	564	87	363	179	173	1014	1193	1366
1971-72	593	92	381	188	177	1066	1254	1431
1972-73	622	97	402	196	183	1121	1317	1500
1973-74	655	102	420	205	187	1177	1382	1569
1974-75	688	107	440	214	192	1235	1449	1641
1975-76	721	112	460	223	197	1293	1516	1713
				(indexes: 1961-62 = 1.000)				
1961-62	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1962-63	1.267	1.143	1.531	1.106	1.021	1.391	1.311	1.220
1963-64	1.721	1.333	1.752	1.247	1.050	1.700	1.574	1.409
1964-65	2.477	2.238	2.168	1.482	1.071	2.295	2.069	1.755
1965-66	3.349	3.333	2.575	1.718	1.093	2.950	2.607	2.130
1966-67	3.942	3.476	2.708	1.800	1.121	3.264	2.856	2.310
1967-68	4.593	3.667	2.841	1.882	1.150	3.605	3.125	2.503
1968-69	5.279	3.905	3.000	1.976	1.179	3.977	3.420	2.715
1969-70	5.965	4.048	3.106	2.047	1.207	4.314	3.682	2.903
1970-71	6.558	4.143	3.212	2.106	1.236	4.609	3.911	3.070
1971-72	6.895	4.381	3.372	2.212	1.264	4.845	4.111	3.216
1972-73	7.233	4.619	3.558	2.306	1.307	5.095	4.318	3.371
1973-74	7.616	4.857	3.717	2.412	1.336	5.350	4.531	3.526
1974-75	8.000	5.095	3.894	2.518	1.371	5.614	4.751	3.688
1975-76	8.384	5.333	4.071	2.624	1.407	5.877	4.970	3.849

Clearly, there are many reservations and qualifications that can be attached to the estimates. In the main, these derive largely from the difficulty of evaluating the impact of broad forces affecting all areas of the Province and the nation upon a relatively small institution in a relatively isolated area of the country. The College is still sufficiently young so that it might through its own efforts significantly alter the validity of these estimates by developing status in some particular program of study or by modifying its policies with respect to the length, depth or timing of the various programs considered above. The Consultants believe that the projections represent reasonable estimates of the potential expansion of the College over the next 15 years.

It is possible that the estimates for the next few years will prove to be high relative to what is actually experienced; on the other hand, the fact that the College will begin to confer degrees in 1965-66 will have a considerable impact upon the public and attract greater numbers of student applications. The middle and later years of the projection period are likely to be characterized by a continuing acceleration and quickening of the pace of development, not unlike the experience of many other institutions during their early years. In addition, as the College expands and becomes more noted for its offerings, substantial enrollment by students outside the Lakehead region is likely to develop. There will be more students from other areas of Ontario, outside the Province and even outside the country. Thus, the timing and composition of enrollment may differ from the development pattern outlined above; however, the estimates provide a reasonable basis for planning and justify the consideration of the College's

physical plant and campus development requirements for the alternate target enrollments used in this study.

CHAPTER 3

INSTRUCTIONAL ACTIVITY AT ENROLLMENTS OF 400, 700 AND 1200 STUDENTS

The feasibility of reaching the target enrollments has been established. The analysis can now proceed to the elaboration of the instructional activity characteristics relevant to the determination of the physical plant requirements of the College at the alternate target enrollments. In this chapter, attention is directed to various aspects of this question, particularly, the student period workloads generated by each of the programs offered by the College at the target enrollments. An analysis is also included concerning the potential distribution of enrollment by geographic origin and the implied demand for residential facilities at the College.

A. Distribution of Enrollment by Study Program

The material presented in Chapter 2 suggested that the College would reach the target enrollments of 400, 700 and 1200 full-time students in the University and the Technology Division programs about 1963-64, 1966-67 and 1973-74, respectively. The 400-student enrollment is seven percent above the enrollment projected for 1963-64; the 700-student enrollment is 2.5 percent below the 1966-67 projection; and the 1200-student enrollment is two percent above the 1973-74 projection.

The distributions of enrollment by study program, as projected for the several years mentioned, were therefore adjusted in order to be consistent with the total full-time enrollment targets used for the study. These adjustments were applied uniformly to the projected enrollments in

the component programs of study identified in the estimating procedure. The remainder of the workload estimates and the delineation of the hypothetical activity structures associated with the alternate target enrollments were worked out on the basis of the adjusted enrollment figures. Thus, full-time enrollment in the University and Technology Divisions together with enrollments in the nursing and University Division part-time programs imply total student populations of 670 students, 1002 students and 1600 students at the three full-time enrollment targets of 400, 700 and 1200 students, respectively. These data are summarized in table 3-1.

B. Distribution of Enrollment by Class Year Level

The study programs of students in post-secondary institutions vary by year level. The programs vary not only in content, but also in the number of weekly hours of formal instruction in classroom and laboratory meetings. Furthermore, there is attrition in the progress of students through the full courses of study; all students who enroll in a program of study as freshmen do not necessarily complete the full course. Therefore, the distribution of enrollment by year level within each program is usually uneven.

For these reasons, the Consultants investigated the typical distributions of enrollment in post-secondary educational programs in the colleges and universities and technical institutes of Ontario. Data were developed concerning a number of institutions in the Province. These data revealed the historical enrollment structure by year level at a number of institutions offering the same programs that the College will be offering at the target enrollments. As might be expected, the data revealed great diversity among the several institutions. The class year distribution of enrollment may

3-1. Lakehead College of Arts, Science and Technology: Distribution of Enrollment at Alternate Target Enrollments, by Program

Program	Enrollment 400 Students	700 Students	1200 Students
Approximate date of realization	1963-64	1966-67	1973-74
Distribution at specified date (number of students)			
University Division			
Arts program	148	339	655
Applied science program	28	73	102
Technology Division	198	306	420
Nurses	106	153	205
University Division, part-time	147	157	187
Total, all categories	627	1028	1569
Distribution adjusted to target enrollment levels for full-time students (number of students)			
University Division			
Arts program	158	331	668
Applied science program	30	71	104
Technology Division	212	298	428
Nurses	113	149	209
University Division, part-time	157	153	191
Total, all categories	670	1002	1600

N.B. 1. Adjustment factor, 400-student enrollment: 400/374 = 1.070 of projected figures.

2. Adjustment factor, 700-student enrollment: 700/718 = .975 of projected figures.

3. Adjustment factor, 1200-student enrollment: 1200/1177 = 1.020 of projected figures.

even vary widely within the same institution from year to year. These variations may be attributed to a number of reasons: variations in the rate of entry into the freshman class; external forces such as economic or political conditions that cause early dropouts; shifts in the rate of transfer of students from one institution to another at different year levels; and a miscellany of other reasons. Nevertheless, the data reveal sufficiently strong central tendencies to permit the adoption of a typical distribution pattern for use in this planning study.

Table 3-2 summarizes the planning parameters used in this study for the distribution of enrollment in the full-time programs of the College. As mentioned earlier, the figures are based upon analyses of the experience of other Ontario institutions offering similar programs. Thus, by the time the College is offering a complete four-year Arts program, including honors courses, the freshman class will account for 39 percent of the enrollment, the second-year class will account for approximately 30 percent, the third-year class will consist of 24 percent of the total, and the honors students in the fourth year of study will account for 7.5 percent of all Arts program students.

Similar analyses produced typical enrollment distributions for the Applied Science program of the University Division and the Technology Division. Since the College will offer a maximum of two years of study in each of these programs during the planning interval under consideration, the year level distribution was confined to the first two years of study, although other institutions in the Province do offer programs in Applied Science and technical studies that extend beyond two years in duration. Insofar as the Applied Science program is concerned, the freshman class will

3-2. Ontario: Typical Distributions of Enrollment in Ontario Post-Secondary Education Programs by Study Program and Year Level

Program	Year Level				
	1st	2nd	3rd	4th	All
	(percent)				
Colleges and universities					
Arts	39.0	29.5	23.9	7.5	100.0
Applied Science[a]	59.9	40.1	--	--	100.0
Technical Institutes[a]	59.5	40.5	--	--	100.0

[a]The programs in Applied Science and technical studies in Ontario institutions are not usually limited to two years. However, the time dimensions of the Lakehead College expansion are such that programs extending beyond two years in duration are not likely to come into existence during the interval under consideration. For this reason, the distributional pattern for these two programs is expressed on a two-year organizational basis for use in calculations elsewhere in the report.

account for 59.5 percent of enrollment, with the remainder of the students at the second-year level. Similar figures were derived from the Technology Division; the freshman class will account for 59.5 percent of enrollment, while the second-year group will consist of 40.5 percent of the students.

These planning parameters were then applied to the total enrollment estimated for each study program at the alternate target enrollments. The resulting enrollment distributions are summarized in table 3-3. At the 400-student enrollment, there will be 244 full-time first-year students and 156 full-time second-year students. No enrollment is expected at the third- and fourth-year levels or at the second-year level of the Applied Science program since the 400-student target will be reached before these advanced levels of study are offered. By the time the 1200-student enrollment is realized, the year level distribution of enrollment will be as follows: 578 first-year students; 412 second-year students; 160 third-year students; and 50 fourth-year students. These full-time students will be distributed by study program in the following fashion: University Division, Arts program, 668 students; University Division, Applied Science program, 104 students; Technology Division, 428 students.

C. Instructional Workloads

One aspect of the composition of the instructional workload at the College is clarified by the estimated year level distribution of enrollment at the several targets. However, for various space planning purposes, the analyses must be carried further. The instructional workload characteristics must be expressed in terms of clock hours of meeting in each division by type of meeting, since physical plant requirements must take account of the

3-3. Lakehead College of Arts, Science and Technology: Projected Distribution of Full-Time Enrollment in University and Technology Divisions at Alternate Target Enrollments, by Study Program and Year Level

Program	Year Level 1st	2nd	3rd	4th	All
			400 Students		
Total	244	156	--	--	400
University Division					
Arts	88	70	--	--	158
Applied Science	30	--	--	--	30
Technology Division	126	86	--	--	212
			700 Students		
Total	349	247	79	25	700
University Division					
Arts	129	98	79	25	331
Applied Science	43	28	--	--	71
Technology Division	177	121	--	--	298
			1200 Students		
Total	578	412	160	50	1200
University Division					
Arts	261	197	160	50	668
Applied Science	62	42	--	--	104
Technology Division	255	173	--	--	428

kind of space involved and the number of hours of formal instruction to be accommodated therein.

As a step in this direction, the Consultants investigated the patterns prevailing in other institutions in Ontario with regard to the number of hours of formal instruction required in various programs of study at each year level. There is some uniformity in the general requirements of the Province for the award of degrees and diplomas in various programs of study, and there is a general consensus among educators concerning the requirements for completing various courses of study. Therefore, it is reasonable to expect that Lakehead College will follow a pattern of instructional meeting requirements that is consistent with the general patterns prevailing in other institutions in the Province, even though these programs may not be in full swing at the College for several years. Moreover, in the absence of indications to the contrary, it was necessary to assume that the College would adhere to the general patterns prevailing in the institutions across the Province with regard to course offerings not presently possible or available within the College curriculum.

Following is a brief description of the development of the instructional workload characteristics in the several programs of study under consideration.

1. University Division, Arts Program

The Arts program to be offered by the University Division will be the most comprehensive and manifest the greatest depth of all the programs of study that the College will offer during the planning interval. The baccalaureate degree programs in arts and sciences also are usually quite broad in range and scope of offering. To reflect these considerations, a standar-

dized enrollment distribution for University Division baccalaureate degree programs in arts and sciences was developed. The enrollment distribution reflects the conditions presently prevailing in the higher educational structure of the Province: first, that the pass program is three years in length, and that the honors program typically extends over a four-year period; second, that there is a broad division between science and general or non-science studies in the structure of the pass and honors programs.

Once again relying upon the experience of other Ontario universities and colleges, a typical pattern was evolved and expressed in terms of a 1000-student enrollment. The figures are presented in table 3-4. An examination of the table will reveal several characteristics of the typical distribution pattern. First, 92.5 percent of the students are in the first three years of study; 7.5 percent are accounted for by the fourth year of study. Second, 58.2 percent of the students are pursuing a three-year program of study; 41.8 percent are enrolled in honors programs that usually extend over four years. Third, students enrolled in science programs account for about 35 percent of all enrollment.

Estimates presented earlier in this study have shown the anticipated number of Arts program students at the several target enrollments. At the 400-student level, 158 persons are expected in the Arts program; at the 700-student level, Arts program enrollment is expected to be 331 students; at the 1200-student level, 668 students will be enrolled in the Arts program.

By applying the typical distribution pattern presented in table 3-4, a hypothetical distribution of enrollment among the various offerings within the Arts program may be obtained. These estimates are presented in table 3-5.

3-4. Lakehead College of Arts, Science and Technology: Standardized Enrollment Distribution for University Division Baccalaureate Degree Programs in Arts and Sciences, by Program and Year Level

Program	Year Level					
	1st	2nd	3rd	Years 1-3	4th	All
	(number)					
3-Year programs						
General	159	121	98	378	--	378
Science	86	65	53	204	--	204
Subtotal	245	186	151	582	--	582
Honors programs						
Non-science	94	71	58	223	49	272
Science	51	38	31	120	26	146
Subtotal	145	109	89	343	75	418
All programs	390	295	240	925	75	1000
	(percent)					
3-Year programs						
General	a	a	a	40.8	--	37.8
Science	a	a	a	22.1	--	20.4
Subtotal	a	a	a	62.9	--	58.2
Honors programs						
Non-science	a	a	a	24.1	65.3	27.2
Science	a	a	a	13.0	34.7	14.6
Subtotal	a	a	a	37.1	100.0	41.8
All programs	a	a	a	100.0	100.0	100.0

[a]Figure in column headed "Years 1-3" applies to first three columns as well.

3-5. Lakehead College of Arts, Science and Technology: Hypothetical Distribution of Enrollment in University Division Arts Program at Alternate Target Enrollments, by Degree Program and Year Level

Program	Year Level 1st	2nd	3rd	4th	All
			400 Students		
General	36	29	--	--	64
Science	19	15	--	--	35
Honors	(33)	(26)	--	--	(59)
Humanities and Languages	7	6	--	--	13
Social and Philosophical Studies	7	6	--	--	13
Commerce and Finance	7	5	--	--	12
Natural Sciences					
Mathematics, Physics, Chemistry	6	5	--	--	11
Biological and Earth	6	4	--	--	10
Total	88	70	--	--	158
			700 Students		
General	53	40	32	--	125
Science	28	22	18	--	68
Honors	(48)	(36)	(29)	(25)	(138)
Humanities and Languages	11	8	7	6	32
Social and Philosophical Studies	10	8	6	5	29
Commerce and Finance	10	7	6	5	28
Natural Sciences					
Mathematics, Physics, Chemistry	9	7	5	5	26
Biological and Earth	8	6	5	4	23
Total	129	98	79	25	331

(Continued)

(Continued)

Program	Year Level 1st	2nd	3rd	4th	All
			1200 Students		
General	106	80	65	--	253
Science	58	44	35	--	136
Honors	(97)	(73)	(59)	(50)	(279)
Humanities and Languages	21	16	13	11	61
Social and Philosophical Studies	21	16	13	11	61
Commerce and Finance	21	15	13	11	60
Natural Sciences					
Mathematics, Physics, Chemistry	18	13	11	9	51
Biological and Earth	17	13	10	8	48
Total	261	197	160	50	668

N.B. Items may not add to totals due to rounding.

By way of example, the 668 Arts program students at the 1200-student enrollment will be distributed as follows: three-year program, general course, 253 students; three-year program, science course, 136 students; four-year program, honors course, 279 students; and so on.

These figures are significant because the total number of meeting hours per week and the distribution of these meetings between classroom and laboratory sessions varies among programs and year levels. The extent of these variations is revealed very clearly in table 3-6. The table shows the number of clock hours of formal instruction required per week in university baccalaureate degree programs in arts and sciences in Ontario higher educational institutions, by program and year level. In general, the science programs emphasize laboratory meetings to a greater extent, in both absolute and relative terms; the honors programs tend to involve heavier workloads in formal classroom and laboratory meetings than do the three-year programs.

It is now possible to calculate the weekly instructional workloads generated by enrollment in the Arts program and the probable number of meeting hours per week in laboratory and classroom-type facilities. Combining the Arts program enrollment estimates presented in table 3-5 with the planning parameters for weekly clock hours of meeting shown in table 3-6, a hypothetical student period structure for the University Division Arts program can be developed. The results of these efforts are presented in table 3-7, where the numbers of student periods per week generated by the estimated enrollments in the Arts program are presented. The student period structure -- that is, the distribution by year level, type of meeting, and degree program -- is clearly indicated for each target enrollment. Thus,

3-6. Ontario: Weekly Clock Hours of Meeting Required in University Baccalaureate Degree Programs in Arts and Science, by Program and Year Level

Program	Year Level				
	1st	2nd	3rd	4th	All
	Lecture/Lab	Lecture/Lab	Lecture/Lab	Lecture/Lab	Lecture/Lab
General	16/4	13/4	13/4	--/--	41/12
Science	15/8	13/9	13/9	--/--	42/20
Honors					
Humanities and Languages	18½/--	17/--	16½/--	15/--	67/--
Social and Philosophical Studies	15/2	18/2	18/--	17/--	68/4
Commerce and Finance	17/--	16/--	17/--	16/--	66/--
Natural Sciences					
Mathematics, Physics, Chemistry	17/6	14/6	15/8	13/9	59/29
Biological and Earth	14/15	18/12½	15/11	12/12	59/50½

N.B. "Lecture" indicates lecture-classroom-type meetings; "Lab" indicates laboratory-type meetings.

3-7. Lakehead College of Arts, Science and Technology: Hypothetical Student Period Structure in University Division Arts Program at Alternate Target Enrollments, by Degree Program, Year Level and Type of Meeting

Program	Lecture - Classroom Year Level					Laboratory Year Level				
	1st	2nd	3rd	4th	All	1st	2nd	3rd	4th	All
					400 Students					
General	576	377	--	--	953	144	116	--	--	260
Science	285	195	--	--	480	152	135	--	--	287
Honors										
Humanities and Languages	130	102	--	--	232	--	--	--	--	--
Social and Philosophical Studies	105	108	--	--	213	14	12	--	--	26
Commerce and Finance	119	80	--	--	199	--	--	--	--	--
Natural Sciences										
Mathematics, Physics, Chemistry	102	70	--	--	172	36	30	--	--	66
Biological and Earth	84	72	--	--	156	90	50	--	--	140
Total	1401	1004	--	--	2405	436	343	--	--	779
					700 Students					
General	848	520	416	--	1784	212	160	128	--	500
Science	420	286	234	--	940	224	198	162	--	584
Honors										
Humanities and Languages	198	136	116	90	540	--	--	--	--	--
Social and Philosophical Studies	150	144	108	85	487	20	16	--	--	36
Commerce and Finance	170	112	102	80	464	--	--	--	--	--
Natural Sciences										
Mathematics, Physics, Chemistry	153	98	75	65	391	54	42	40	45	181
Biological and Earth	112	108	75	48	343	120	75	55	48	298
Total	2051	1404	1126	368	4949	630	491	385	93	1599

(Continued)

3-7. (Continued)

Program	Lecture -- Classroom Year Level					Laboratory Year Level				
	1st	2nd	3rd	4th	All	1st	2nd	3rd	4th	All
					1200 Students					
General	1696	1040	845	--	3581	424	320	260	--	1004
Science	870	572	455	--	1897	464	396	315	--	1175
Honors										
Humanities and Languages	378	272	215	165	1030	--	--	--	--	--
Social and Philosophical Studies	315	288	234	187	1024	42	32	--	--	74
Commerce and Finance	357	240	221	176	994	--	--	--	--	--
Natural Sciences										
Mathematics, Physics, Chemistry	306	182	165	117	770	108	78	88	81	355
Biological and Earth	238	234	150	96	718	255	163	110	96	624
Total	4160	2828	2285	741	10014	1293	989	773	177	3232

Arts program enrollment at the 400-student level will produce 2,405 student periods in lecture-classroom meetings and 779 student periods in laboratory meetings. At the 700-student level, 4,949 student periods of lecture-classroom meetings and 1,599 student periods of laboratory meetings are generated. Finally, at the 1200-student enrollment, the Arts program will involve 10,014 student periods per week in classroom meetings and 3,232 student periods per week in laboratory meetings. Further detail regarding the distribution by degree program and year level can be observed in table 3-7.

2. University Division, Applied Science Program

A similar pattern of analysis was followed in developing the student period structure associated with the Applied Science program. An examination of the data for Ontario higher educational institutions offering applied science programs provided a basis for establishing the typical pattern of weekly clock hours of meeting for the first two years of study. While there is some diversity, the typical requirement is approximately 30 hours per week of formal instruction. In the first year of the program, lecture-classroom meetings account for 16 hours, while laboratory meetings account for 14 hours. In the second year of study, lecture-classroom meetings account for 18 hours while laboratory meetings account for 12 hours. As a general rule, the first year of study is the same at most institutions and students do not begin to specialize in the several applied science disciplines until the second or third year of study. These data are summarized in table 3-8.

In table 3-9, hypothetical distributions of enrollment and student period structure in the Applied Science program are presented for the alternate target enrollments. The year-level distributions of enrollment (table

3-8. Ontario: Weekly Clock Hours of Meeting Required in University Baccalaureate Degree Programs in Applied Science at Selected Institutions, by Year Level and Type of Meeting

Institution	1st Year		2nd Year	
	Lecture-Classroom	Laboratory	Lecture-Classroom	Laboratory
Carleton	16	13	18	$9\frac{1}{2}$
Assumption	18	14	18-19	$8\frac{1}{2}$-$11\frac{1}{2}$
Toronto	15-16	13-18	14-20	$10\frac{1}{2}$-18
Use	16	14	18	12

3-9. Lakehead College of Arts, Science and Technology: Hypothetical Distribution of Enrollment and Student Period Structure in University Division Applied Science Program at Target Enrollments of 400, 700 and 1200 Students by Year Level

Enrollment Target	Enrollment		Hypothetical Student Period Structure			
			Lecture		Laboratory	
	1st year	2nd year	1st year	2nd year	1st year	2nd year
400 Students	30	--	480	--	420	--
700 Students	43	28	688	504	602	336
1200 Students	62	42	992	756	868	504

3-3) were combined with the planning parameters for the weekly clock hours of instruction in the Applied Science program (table 3-8) to obtain the hypothetical student period structures at the several target enrollments. As shown in table 3-9, a total of 480 student periods in lecture-classroom meetings can be expected at the 400-student enrollment; at the same time, 420 student periods may be expected in laboratory meetings. At the 1200-student enrollment, student periods in lecture-classroom meetings will increase to 1,748 in number, while laboratory meetings will account for 1,372 student periods.

3. Technology Division

Table 3-10 summarizes the hypothetical distribution of enrollment and student period structure in the Technology Division at the several targets. In this instance, an estimating procedure slightly different from that described above was utilized. It was assumed that the five programs of study presently offered in the Technology Division would continue to be offered in the future. However, it also was assumed that these programs would each be deepened and extended to two years in duration. It is possible that the College may introduce new programs, such as electronics or business studies; however, this will not have any marked effect upon the results of this analysis since the change would probably involve no more than a redistribution of the total enrollments projected for the Technology Division rather than a net addition to them.

The College already offers all of the programs of study included in the Technology Division. Therefore, the actual clock-hour requirements for classroom and laboratory meetings presently prevailing at the College were used

3-10. Lakehead College of Arts, Science and Technology: Hypothetical Distribution of Enrollment and Student Period Structure in Technology Division at Target Enrollments of 400, 700 and 1200 Students, by Program and Year Level

Program	Enrollment		Student Period Structure			
			Lecture-Classroom		Laboratory	
	1st Year	2nd Year	1st Year	2nd Year	1st Year	2nd Year
			400 Students[a]			
Forest Technology	42	29	630	522	714	319
Mining Technology	3	2	60	34	36	28
Engineering Technology	31	21	558	399	279	210
Engineering Technology (Ryerson)	34	23	714	437	204	230
Architectural Technology (Ryerson)	17	12	340	360	85	--
Total	126	86	2302	1752	1318	787
			700 Students[b]			
Forest Technology	59	40	885	720	1003	440
Mining Technology	4	3	80	51	48	42
Engineering Technology	43	29	774	551	387	290
Engineering Technology (Ryerson)	48	33	1008	627	288	330
Architectural Technology (Ryerson)	23	16	460	480	115	--
Total	177	121	3207	2429	1841	1102
			1200 Students[c]			
Forest Technology	85	58	1275	1044	1445	638
Mining Technology	5	3	100	51	60	42
Engineering Technology	62	42	1116	798	558	420
Engineering Technology (Ryerson)	70	48	1470	912	420	480
Architectural Technology (Ryerson)	33	22	660	660	165	--
Total	255	173	4621	3465	2648	1580

[a]Index of growth, 1st year: 1.273; .681 progress to year 2.

[b]Index of growth, 1st year: 1.788; .681 progress to year 2.

[c]Index of growth, 1st year: 2.576; .681 progress to year 2.

in estimating the student period structure likely to be generated at the several target Technology Division enrollments. At the 400-student level, lecture-classroom meetings will account for 4,054 student periods per week, while laboratory meetings will account for 2,105 student periods. At the 1200-student level, student periods in classroom meetings will increase to 8,086; student periods in laboratory meetings will total 4,248.

4. Nursing Program and University Division Part-Time Programs

Table 3-11 presents the estimates of the student periods generated by the nursing and the University Division part-time programs at the alternate target enrollments.

For the nursing program, all students were treated as first-year students since only one year of study is presently offered. Nor is this likely to be changed during the interval considered in this report. However, the Consultants have assumed a slight deepening in the offerings within the program and have adopted planning parameters of 14 hours per week of lecture-classroom meetings and 6 hours per week of laboratory meetings for use in calculating the student period workloads generated at the target enrollments. At the 400-student enrollment, 1,582 student periods per week may be expected in classroom meetings and 678 student periods per week may be expected in laboratory meetings. At the 1200-student level, the classroom-laboratory meeting workload is expected to increase to 2,926 student periods and 1,254 student periods per week, respectively.

The University Division part-time enrollment estimates were presented earlier. Clearly, the total weekly student periods generated by part-time

3-11. Lakehead College of Arts, Science and Technology: Hypothetical Student Period Structure in Nurses' Program and University Division Part-Time Students' Program at Alternate Target Enrollments[a], by Type of Meeting

	Enrollment[a]		
	400 Students	700 Students	1200 Students
Nurses			
Number of students	113	149	209
Lecture - classroom meetings			
Hours per student per week[b]	14	14	14
Total student periods per week	1582	2086	2926
Laboratory meetings			
Hours per student per week[b]	6	6	6
Total student periods per week	678	894	1254
University Division: part-time			
Number of students	157	153	191
Lecture - classroom meetings			
Hours per student per week[c]	3	3	3
Total student periods per week	471	459	573
Laboratory meetings			
Hours per student per week[c]	0.5	0.5	0.5
Total student periods per week	79	77	96

[a]Full-time target enrollments used for planning.

[b]This is not the present program, but a target arrangement.

[c]In 1962-63, there were 160 course registrations by part-time students. They produced an estimated 459 weekly student periods in classroom meetings and 63 weekly student periods in laboratory meetings, or 2.87 periods per student and .39 periods per student, respectively. These averages have been rounded upward for purposes of calculation, as indicated in the table.

enrollment can vary widely. There is also no basis for estimating the distribution between lecture and laboratory meetings other than the actual experience of the College. For these reasons, the 1962-63 data were analyzed and averages of three hours of classroom meetings per student per week and one-half hour of laboratory meeting per student per week were adopted for use in estimating the number of student periods generated by the part-time student group. For the 400-student level, this procedure produced an estimate of 471 student periods in classroom meetings and 79 student periods in laboratory meetings. At the 1200-student level, the figures increase to 573 student periods in classroom meetings and 96 student periods in laboratory meetings.

D. Instructural Workloads: Summary

The student period structures estimated for the several study programs to be offered by the College provide a basis for evaluating the over-all instructional workloads that can be expected at the target enrollments. These over-all summaries are presented in tables 3-12 to 3-14. At the 400-student level, 8,992 student periods in classroom meetings and 4,061 student periods in laboratory meetings may be expected. The comparable figures for the 700-student enrollment are 14,322 student periods in classroom meetings and 6,451 student periods in laboratory meetings. By the time the 1200-student enrollment is reached, classroom meetings will account for 23,347 student periods and laboratory meetings will reach 10,182 student periods. The full-time students will account for 85 percent of all student classroom periods and 87 percent of all student laboratory periods at the 1200-student enrollment.

3-12. Lakehead College of Arts, Science and Technology: Hypothetical Student Period Structure at Target Enrollment of 400 Students, by Year Level and Type of Meeting

	Year Level				
	1st	2nd	3rd	4th	All
Lecture, classroom meetings					
University Division					
Arts	1401	1004	--	--	2405
Applied Science	480	--	--	--	480
Technology Division	2302	1752	--	--	4054
Subtotal: student periods	4183	2756	--	--	6939
Nurses	1582	--	--	--	1582
University Division, part time	471	--	--	--	471
Total: student periods	6236	2756	--	--	8992
Laboratory meetings					
University Division					
Arts	436	343	--	--	779
Applied Science	420	--	--	--	420
Technology Division	1318	787	--	--	2105
Subtotal: student periods	2174	1130	--	--	3304
Nurses	678	--	--	--	678
University Division, part time	79	--	--	--	79
Total: student periods	2931	1130	--	--	4061

3-13. Lakehead College of Arts, Science and Technology: Hypothetical Student Period Structure at Target Enrollment of 700 Students, by Year Level and Type of Meeting

	Year Level				
	1st	2nd	3rd	4th	All
Lecture, classroom meetings					
University Division					
Arts	2051	1404	1126	368	4949
Applied Science	688	504	--	--	1192
Technology Division	3207	2429	--	--	5636
Subtotal: student periods	5946	4337	1126	368	11777
Nurses	2086	--	--	--	2086
University Division, part time	459	--	--	--	459
Total: student periods	8491	4337	1126	368	14322
Laboratory meetings					
University Division					
Arts	630	491	385	93	1599
Applied Science	602	336	--	--	938
Technology Division	1841	1102	--	--	2943
Subtotal: student periods	3073	1929	385	93	5480
Nurses	894	--	--	--	894
University Division, part time	77	--	--	--	77
Total: student periods	4044	1929	385	93	6451

3-14. Lakehead College of Arts, Science and Technology: Hypothetical Student Period Structure at Target Enrollment of 1200 Students, by Year Level and Type of Meeting

	Year Level				
	1st	2nd	3rd	4th	All
Lecture, classroom meetings					
University Division					
Arts	4160	2828	2285	741	10014
Applied Science	992	756	--	--	1748
Technology Division	4621	3465	--	--	8086
Subtotal: student periods	9773	7049	2285	741	19848
Nurses	2926	--	--	--	2926
University Division, part time	573	--	--	--	573
Total: student periods	13272	7049	2285	741	23347
Laboratory meetings					
University Division					
Arts	1293	989	773	177	3232
Applied Science	868	504	--	--	1372
Technology Division	2648	1580	--	--	4228
Subtotal: student periods	4809	3073	773	177	8832
Nurses	1254	--	--	--	1254
University Division, part time	96	--	--	--	96
Total: student periods	6159	3073	773	177	10182

E. Students in Residence

Enrollment at the College will not consist entirely of students who commute on a daily basis. Some students will be interested in and require dormitory facilities on campus. The College has already recognized this and built the first student residential unit on campus. It is likely that the number of students that would require accommodation will increase from the present dormitory capacity of 50 students. But the extent to which such dormitory capacity is required or must be provided is a matter of policy and can be controlled by the College.

In 1961, 43 percent of all freshman students in Ontario universities were residents of other countries, other provinces, or sections of Ontario other than the cities or suburban areas in which the universities were located. At Lakehead College, 21 percent of the freshmen in 1961 had home addresses other than the university city or suburban area. The predominately local nature of the College and the lack of student accommodations on campus probably account for the disparity between the College and all universities in the Province in regard to the proportion from out of town.

As mentioned above, the Consultants believe that the number of students provided with residential accommodation on campus is a matter of policy. However, the terms of reference of this study include the development of a master plan for campus development; therefore, a conservative estimate of the distribution of students between commuter and non-commuter status was adopted for planning purposes. The pattern as adopted is roughly consistent with the distribution of freshmen by home address in the College in 1961.

Thus, for planning purposes, it was assumed that 25 percent of the students would not be commuter students and would require some kind of residential accommodation on campus. Of these, it was assumed that 75 percent would be male students and 25 percent would be female students. The latter distribution is roughly consistent with the projections of full-time male and female enrollment at higher educational institutions over the next decade. Thus, the planning parameters imply a total of 100 students in residence at the 400-student target, 175 students in residence at the 700-student target and 300 students in residence at the 1200-student enrollment. Tables 3-15 and 3-16 present these data in greater detail.

3-15. Ontario Universities: Home Addresses of Freshmen Enrolled in October, 1961

	All Universities		Lakehead College	
	Number	Percent	Number	Percent
University city	3230	36.6	69	40.8
Suburban area	1035	11.7	54	32.0
Elsewhere in Ontario:				
Total	(3802)	(43.1)	(36)	(21.3)
Remainder of county or district	287	3.2	14	8.3
Other cities in Ontario	2386	27.0	19	11.2
Other counties or districts in Ontario	1129	12.8	3	1.8
Other provinces	419	4.7	9	5.3
Outside Canada	345	3.9	1	.6
Total	8831	100.0	169	100.0

3-16.. Lakehead College of Arts, Science and Technology: Requirements for Residential Accommodation at Alternate Target

	Typical Distribution: Percent	Enrollment 400 Students	700 Students	1200 Students
Enrollment category				
Total	100.0	400	700	1200
University city and suburban area	75.0	300	525	900
Non-commuter enrollment	25.0	100	175	300
Residence requirements				
Total (non-commuter enrollment)	100.0	100	175	300
Male	75.0	75	132	225
Female	25.0	25	43	75

CHAPTER 4

TEACHING STATION REQUIREMENTS: CLASSROOMS AND TEACHING LABORATORIES

The requirements for the classroom and teaching laboratory components of the College's physical plant are dependent upon several factors. Among them are the aggregate contact or clock hours of classroom and laboratory meetings projected, the typical section sizes of these meetings, the number of hours available in the teaching week, and the effectiveness with which classroom and teaching laboratory capacity is used. The remainder of this chapter explains the procedure used in estimating the number of classrooms and laboratories required and the number of student stations to be included therein at the alternate target enrollments.

A. Instructional Load: Clock Hours

In order to determine how much teaching space capacity is needed, it is necessary to convert the instructional load data presented in the form of total student registrations into corollary estimates reflecting the number of clock hours of classroom and teaching laboratory meeting time required. To this end, planning parameters regarding the typical sizes of instructional meeting groups in lecture-classroom and laboratory meetings must be developed; this will permit the conversion of the weekly student period workloads into weekly meeting group workloads. The last is the more appropriate workload figure for evaluating the number of hours of faculty time required in formal instructional meetings.

As a general rule, student groups in classroom and laboratory meetings decline in size as the students progress through the various programs of

study. This occurs for a number of reasons. For one, faculty generally prefer smaller meeting groups as the teaching material becomes more advanced and difficult to deal with. For another, the number of specialized course offerings tends to increase as the students progress to the more advanced levels of instruction and there are fewer students taking the same courses. As a result, the average number of students per course tends to decline as the number of students decreases and the number of courses increases. This is corroborated by evidence concerning practice at other institutions, and is consistent with the declared preferences of the College faculty as revealed in interviews with departmental chairmen held at the outset of this study.

For lecture-classroom meetings, the maximum sizes of meeting groups adopted as planning parameters for use in this study were as follows: first year, 40 students; second year, 30 students; third year, 25 students; fourth year, 20 students. However, while these figures represent the maximum sizes of the student meeting groups, the typical size meeting group will vary downward from the acceptable maximum. The extent of variation will vary from institution to institution. However, the Consultants believe that there are reasonable standards with respect to the effectiveness with which student station capacity can be utilized and that a standard of 75 percent should be adopted by the College when evaluating the needs for classroom station capacity.[a]

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[a]Student station utilization represents the proportion of available student station capacity that is utilized during periods when teaching stations are scheduled and in use. Thus, a 100-station classroom used ten hours per week with an average of 50 stations in use during these ten hours would have a student station utilization rate of 50 percent.

Therefore, the typical size of student meeting groups in classroom meetings is 25 percent lower than the maximum size mentioned above.

A similar analysis may be conducted for laboratory teaching stations. In general, the maximum size of laboratory meeting groups is lower than that of classroom meeting groups at the same year level. However, a slightly higher planning parameter for student station utilization is appropriate in laboratory meetings. Table 4-1 summarizes the data and derivation of the planning parameters for the typical sizes of instructional meeting groups in lecture-classroom and laboratory meetings by year level.

With these planning criteria in hand, the number of clock hours of meetings per week in lecture-classroom and laboratory meetings at each target enrollment may be estimated. The procedure involves the division of the estimated instructional workloads per week, expressed in terms of student periods, by the planning parameter for the typical size of meeting group for the year level and type of meeting in question. Thus, at the 400-student enrollment 6,236 student periods per week in classroom meetings are projected for the first-year level of enrollment. The typical size of classroom meeting groups at this year level is 30 students. Dividing the number of student periods by the typical size of the classroom meeting group yields an estimate of 208 clock hours of classroom-type meetings per week generated by first-year students. The same procedure was applied at each target enrollment for each year level of enrollment and type of meeting.

By way of summary, the 8,992 classroom student periods projected for the 400-student enrollment yield a total of 318 clock hours of classroom meetings per week, while the 4,061 laboratory student periods yield a total

4-1. Lakehead College. Planning Parameters for Typical Sizes of Instructional Meeting Groups in Lecture-Classroom and Laboratory Meetings, by Year Level

Item	Year Level 1st	2nd	3rd	4th
Lecture, classroom meetings				
Maximum size of meeting group	40	30	25	20
Student station utilization planning parameter	.75	.75	.75	.75
Typical size of meeting group				
Calculated	30	23	19	15
Use	30	25	20	15
Laboratory meetings				
Maximum size of meeting group	36	24	24	12
Student station utilization planning parameter	.80	.80	.80	.80
Typical size of meeting group				
Calculated	29	19	19	10
Use	30	20	20	10

of 155 clock hours of laboratory meetings per week. By the time the 1200-student enrollment is reached, the weekly clock-hour workload in lecture-classroom meetings increases to 887 hours, while the comparable clock-hour workload in laboratory meetings totals 416 hours.

B. Teaching Station Requirements

The next step in the analysis was the conversion of the clock-hour workload estimates into the number of classrooms and laboratories required at the alternate target enrollments. Two further types of information were needed in order to work out the underlying functional relationship. First, a planning parameter was required with respect to the number of hours of teaching time available per week in classroom and teaching laboratory facilities. Second, planning assumptions were needed with regard to the intensity with which teaching station capacity would be used at the alternate target enrollments.

The length of the teaching week may be expressed as the number of hours during which classes might normally be scheduled during the course of the week. Classes at the College presently begin at 9:00 AM and extend to 6:00 PM in the evening. It is assumed that this basic daily schedule will continue to be used in the future, that no classes will be scheduled during the Saturday morning hours and that one hour of effective utilization will be lost each day as a result of luncheon requirements. On this basis, the gross teaching week totals 40 hours of available time per teaching station.

Another important variable in determining how many teaching stations are required is the intensity with which classroom and laboratory facilities

4-2. Lakehead College of Arts, Science and Technology: Estimated Clock-Hour Instructional Workload per Week at Alternate Target Enrollments, by Type of Meeting and Year Level

Item	Year Level 1st	2nd	3rd	4th	All
			400 Students		
Lecture, classroom meetings					
Student periods per week	6236	2756	--	--	8992
Typical size of meeting group	30	25	--	--	--
Clock hours of meeting per week	208	110	--	--	318
Laboratory meetings					
Student periods per week	2931	1130	--	--	4061
Typical size of meeting group	30	20	--	--	--
Clock hours of meeting per week	98	57	--	--	155
			700 Students		
Lecture, classroom meetings					
Student periods per week	8491	4337	1126	368	14322
Typical size of meeting group	30	25	20	15	--
Clock hours of meeting per week	283	173	56	25	537
Laboratory meetings					
Student periods per week	4044	1929	385	93	6451
Typical size of meeting group	30	20	20	10	--
Clock hours of meeting per week	135	96	19	9	259
			1200 Students		
Lecture, classroom meetings					
Student periods per week	13272	7049	2285	741	23347
Typical size of meeting group	30	25	20	15	--
Clock hours of meeting per week	442	282	114	49	887
Laboratory meetings					
Student periods per week	6159	3073	773	177	10182
Typical size of meeting group	30	20	20	10	--
Clock hours of meeting per week	205	154	39	18	416

can be scheduled. Several possibilities were considered. For classroom facilities, room utilization criteria[a] ranging from 50 to 70 percent were used in calculating the number of teaching stations required. For teaching laboratories, room utilization rates ranging from 30 to 50 percent were used.

The Consultants believe that room utilization rates of 70 percent in classroom facilities and 50 percent in laboratory facilities represent reasonable standards of operation and should be adopted as targets that the College will aim to achieve in the operation of its physical plant. However, the Consultants recognize the difficulty of attaining these levels of operating effectiveness when over-all enrollment is lower than 1200 students and when there may be a requirement for specialized facilities that cannot be justified solely in terms of the workloads they satisfy. Therefore, a sliding scale has been adopted for estimating the room utilization standards applicable at the various target enrollments. For classrooms, a room utilization rate of 50 percent is assumed for the 400-student enrollment, rising to 70 percent by the time the 1200-student enrollment is reached. For teaching laboratories, the room utilization rate posited for the 400-student enrollment is 30 percent, and it rises to the target level of 50 percent by the time the 1200-student enrollment is realized.

By dividing the clock-hour workload per week by the adjusted total of available teaching hours per week (the gross teaching week modified by the projected room utilization rate), the number of teaching stations required

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[a]Room utilization criteria refer to the proportion of available teaching hours that teaching stations are actually in use. For example, use of a 70 percent utilization criterion and a 40-hour teaching week would imply an average room use of 28 hours.

to service the specified workload may be obtained. For example, consider the number of classrooms required at the 400-student enrollment. The total clock-hour workload for classroom-type meetings is 318 hours. The teaching week totals 40 hours, but when adjusted for a 50 percent room utilization rate is effectively only 20 hours per week per station. Dividing the total clock-hour workload by the effective teaching week per station (318/20) yields a total requirement for 16 classroom-type teaching stations. The same procedure applied at the several target enrollments yields the following estimates: 22 classrooms for 700 students; 32 classrooms for 1200 students; 13 teaching laboratory stations for 400 students; 16 teaching laboratory stations for 700 students; and 21 teaching laboratory stations for 1200 students. These data are presented in detail in table 4-3.

C. Summary

In this chapter, estimates have been presented of the teaching stations required by the College to service the target enrollments. The total capacity required in classroom and teaching laboratory facilities has been indicated. The calculations, however, have been confined to the number and size distribution of rooms required for group meetings. The general capacity needs of the teaching space complex have been noted. The actual program specifying the number of square feet of space required is presented in a later chapter, as are the actual classroom size distribution and space planned.

4-3. Lakehead College of Arts, Science and Technology: Classroom and Laboratory Teaching Station Requirements at Alternate Target Enrollments

Item	Enrollment 400 Students	700 Students	1200 Students
Classrooms			
Clock-hour workload per week	318	537	887
Teaching week: number of hours available per teaching station			
Gross total	40	40	40
Room utilization rate (percent)	50	60	70
Adjusted total	20	24	28
Number of teaching stations required	16	22	32
Laboratories			
Clock-hour workload per week	155	259	416
Teaching week: number of hours available per teaching station			
Gross total	40	40	40
Room utilization rate (percent)	30	40	50
Adjusted total	12	16	20
Number of teaching stations required	13	16	21

CHAPTER 5

STAFF REQUIREMENTS

Having considered the instructional workloads and teaching station requirements implied by the alternate target enrollments, it is appropriate to turn to questions associated with the staff population of the College. The estimates of staff requirements will represent a useful link in determining the space requirements of the College at the target enrollments.

A. Faculty Requirements

Two broad approaches were used in estimating the faculty requirements of the College at the target enrollments. In the first approach, faculty requirements were taken to be a function of the clock-hour workloads generated at the target enrollments in the form of classroom and laboratory meetings. In the second approach, faculty requirements were estimated as a function of the student/staff ratio appropriate to the several categories of enrollment at the College.

Consider the first approach. In order to make faculty requirements a function of the total clock-hour workload per week, it is necessary to adopt a planning parameter with respect to the average weekly teaching load per faculty member. It is well known that this varies widely among and within institutions. A figure commonly used as an upper limit for college and university faculty is 12 clock hours of teaching per faculty member per week. However, in practice the average tends to be closer to 9 hours per week.

The problem is further complicated by the difficulty of defining a clock hour of instruction. Everyone agrees that an hour of laboratory instruction requires a different kind of preparation than an hour of classroom instruction. It also is generally agreed that a laboratory hour of instruction is not the equivalent of a lecture hour of instruction in terms of actual workload. But the way in which this difference is taken into account varies. In order to arrive at an equivalent clock-hour workload total at the alternate target enrollments, a planning parameter was adopted under which one laboratory hour was treated as the equivalent of half a lecture hour. Thus, the projected total equivalent clock-hour workloads at the 400-, 700- and 1200-student enrollments are 396 hours, 667 hours and 1,095 hours, respectively.

Two estimates were then prepared of the faculty requirements at the alternate target enrollments. Under Estimate 1, the equivalent clock-hour workload was divided by an average weekly teaching load per faculty member of 12 hours per week. The estimated faculty requirements under this procedure range from 33 persons at the 400-student enrollment to 91 persons at the 1200-student enrollment. Under Estimate 2, the 9-hour teaching load per faculty member was used. The resulting projections of faculty requirements range from 44 persons at the 400-student enrollment to 122 persons at the 1200-student level.

Because of the difficulties associated with these procedures, the Consultants investigated another approach to the problem of estimating faculty requirements. In this second approach, emphasis is placed upon the student/staff ratio, a figure often used in budgeting. The procedure involves

the division of the number of students in a particular enrollment category by a planning parameter for the number of students per staff member appropriate to that enrollment category to obtain the number of faculty members required. By way of example, an enrollment of 100 students divided by a planning parameter of 10 students per staff member would yield a requirement for 10 faculty members.

The projected number of students in each enrollment category has already been estimated. Only the planning parameters for the student/staff ratio appropriate to each enrollment category are needed to complete the faculty requirement estimates. A variety of sources were used for developing the appropriate ratios. For the University Division, data reflecting conditions at Canadian institutions of higher education were examined. For institutions in Central Canada, the student/staff ratio has declined from 16.0:1 in 1951-52 to 13.5:1 in 1961-62. A very pronounced downward trend is in evidence. The Consultants believe the trend will continue, but in somewhat retarded fashion, and have adopted as a planning parameter a student/staff ratio of 13.0:1.[a]

In a similar manner, an appropriate planning parameter was developed for the student/staff ratio in the Technology Division. Data for Ontario technical institutes for the past several years indicated an average student/staff ratio of 16.6:1. No definite trend could be established on the basis of the available data. Therefore, the Consultants adopted

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[a]This is approximately consistent with the material presented in the study prepared by the Committee of Presidents of Provincially Assisted Universities on post-secondary education in Ontario.

a student/staff planning parameter of 16:1 for use in estimating the faculty requirements of the Technology Division.

Using the student/staff ratio approach for calculating faculty requirements, the following estimates of faculty were obtained for the alternate target enrollments: at 400 students, 38 faculty; at 700 students, 64 faculty; at 1200 students, 105 faculty.

The data involved in the development of the alternate faculty requirement estimates are presented in table 5-1. For purposes of the remainder of this study, Estimate 3, the faculty estimate based upon the student/staff ratio approach, was adopted. This approach yields results that are more consistent with general experience and the probable course of development than are the other estimates outlined above.

One further aspect of the faculty picture should be discussed. For use elsewhere in this report in connection with financial considerations, an estimate of the faculty structure by rank is useful. Therefore, an investigation was conducted into the prevailing conditions in Canadian higher educational institutions with respect to distribution of full-time faculty by rank. Analysis of the data yielded the following weighted average distribution: professors, 28.3 percent; associate professors, 21.7; assistant professors, 26.3 percent; lecturers and instructors, 23.6 percent. The results of applying this distributional pattern to the total faculty estimate at the alternate target enrollments are presented in table 5-2.

5-1. Lakehead College of Arts, Science and Technology: Alternate Estimates of Faculty Requirements at Alternate Target Enrollments

Item	Enrollment 400 Students	700 Students	1200 Students
Clock-hour workload per week			
Lecture, classroom meetings	318	537	887
Laboratory meetings			
Number	155	259	416
Equalized	78	130	208
Total equivalent clock hours	396	667	1095
Estimate 1			
Average weekly teaching load per faculty member	12	12	12
Faculty requirements	33	56	91
Implied ratio: students per staff member	12.1	12.5	13.2
Estimate 2			
Average weekly teaching load per faculty member	9	9	9
Faculty requirements	44	74	122
Implied ratio: students per staff member	9.1	9.5	9.8
Estimate 3			
Enrollment			
University Division	188	402	772
Technology Division	212	298	428
Other[a]	144	180	247
Ratio: students per staff member			
University Division	13	13	13
Technology Division	16	16	16
Other	13	13	13
Faculty requirements			
University Division	14	31	59
Technology Division	13	19	27
Other	11	14	19
Total	38	64	105
Recapitulation: faculty requirements			
Estimate 1	33	56	91
Estimate 2	44	74	122
Estimate 3	38	64	105

N.B. Estimate 3 adopted for use in planning.

[a]All nurses plus one-fifth of part-time students in University Division.

5-2. Lakehead College of Arts, Science and Technology: Faculty Requirements at Alternate Target Enrollments, by Rank

Rank	Percentage Distribution	Enrollment 400 Students	700 Students	1200 Students
All ranks	100.0	38	64	105
Professor	28.3	11	18	29
Associate professor	21.7	8	14	23
Assistant professor	26.3	10	17	28
Other	23.6	9	15	25

B. Total Staff Requirements

Budgetary considerations and institutional structure will largely determine the extent to which the College faculty is supplemented by various classes of supporting personnel, as well as the distribution of non-faculty personnel among broad departmental groups. Table 5-3 presents an estimate of the potential structure of the over-all staff of the College at the alternate target enrollments. These estimates are approximations only; they do not reflect the results of a detailed evaluation of the course of personnel development in each component of the College. More reliable estimates of the characteristics of future personnel expansion for each administrative unit can be developed only after a type of study that goes beyond the scope of the Consultants' responsibilities in this project. However, the data were developed on the basis of the Consultants' experiences at other institutions and provide a useful reference benchmark in dealing with various aspects of the campus development program. As may be seen in the table, total staff requirements at the several target enrollments are as follows: at the 400-student level, 100 persons; at the 700-student level, 168 persons; at the 1200-student level, 276 persons.

These figures may be considered as upper limits. Somewhat lower totals were used as the basis for the estimate of parking requirements in Chapter 9.

5-3. Lakehead College of Arts, Science and Technology: Hypothetical Structure of Total Staff Requirements at Alternate Target Enrollments

	Percentage Distribution	Enrollment 400 Students	700 Students	1200 Students
All departments	1000	100	168	276
Faculty and other professional	47.0	47	79	130
Supporting staff	53.0	53	89	146
Academic departments	45.5	46	76	126
Faculty and other professional	38.0	38	64	105
Supporting staff	7.5	8	13	21
Non-academic departments	54.5	54	92	150
Faculty and other professional	9.0	9	15	25
Supporting staff	45.5	45	76	126

N.B. Items may not add to totals due to rounding.

CHAPTER 6

ACADEMIC SPACE REQUIREMENTS

In this chapter the requirements for academic space will be presented. Academic space is defined to include classrooms, laboratories, other space used by academic departments and faculty office space. Administrative office space is considered in the next chapter. In both Chapters 6 and 7 space is considered only in terms of net area. Gross area building requirements are first considered in Chapter 8.

A. Classroom-Type Space

This category comprises lecture theaters, classrooms and seminar rooms. The Consultants believe that these facilities should be considered as available on a College-wide basis, rather than allocated to specific departments. Higher utilization rates may be achieved if classrooms are assigned interchangeably among divisions and other elements of the academic organization.

1. Classroom Capacity Distribution

The number of classrooms required at each enrollment level has been calculated in Chapter 4. For 400 students 16 rooms (or teaching stations) will be required; for 700 students the total is 22 rooms; and for 1200 students the total is 32 rooms. The next step is the determination of the distribution of classroom sizes within these totals or, expressed in other terms, the number of student stations by capacity size group.

During the field survey phase of the project the Consultants solicited information from the administration and faculty of the College concerning the desired maximum and typical section sizes preferred for each course. This information was used in Chapter 3 as a basis for determining the number of clock hours of instruction required for the target enrollments in classroom work. The preponderant choice of course section size was in the 25-40 group, except for nurses' courses. However, it would be inadvisable to restrict the classroom sizes to such a narrow range. Over time the range of section sizes may prove in fact to be considerably wider than was expressed by the faculty currently. For example, heavily attended lecture courses may consist of one or two hours of meeting as a single, large section. A third hour might break down this large group into several small recitation sections or seminars. In any case the Consultants feel it wise to build in a margin of safety by increasing the range of classroom sizes and the number of student stations as well. The recommended distribution of classrooms and seminar rooms is presented in table 6-1. Over 1,800 stations are available for 1200 full-time students plus nurses. This is probably in excess of any likely load on the facilities. On the other hand the 300-station lecture theatre can be justified by its use for extra-curricular activities as well. A classroom to hold all first-year Arts students in a single section will require about 200 seats.

2. Space Standards for Classrooms and Seminars

The area of the projected classrooms may be determined by multiplying the number of student stations in each by the number of square feet per station, as indicated in table 6-1. The square feet per station will vary

6-1. Lakehead College of Arts, Science and Technology: Space Requirements for Classroom-Type Rooms

Category	Number of Units Enrollment[a] 700	1200	Area per Unit	Total Area Enrollment[a] 700	1200
			(square feet)		
Lecture rooms					
Capacity: 300	--	1(300)	11.5	--	3450
Capacity: 225	1(225)	1(225)	12	2700	2700
Capacity: 140	1(140)	1(140)	12	1600	1680
Capacity: 100	--	1(100)	12	--	1200
Subtotal				4380	9030
Classrooms					
Capacity: 60	5(60)	7(60)	12.5	3750	5250
Capacity: 40	9(40)	13(40)	14	5040	7280
Subtotal				8790	12530
Seminar rooms					
Capacity: 16	6(16)	8(16)	20	1920	2560
Total	22	32	--	15090	24120

[a]For a student enrollment level of 400, assume one classroom @ 140 stations, three @ 60 stations, eight @ 40 stations and four @ 16 stations. This will imply a total area of 9,690 square feet.

inversely with the capacity of the room, as the percentage of aisle space diminishes in larger rooms. The student station in all classrooms is assumed to be a tablet arm chair. The chairs are arranged in rows three feet two inches back-to-back and two feet on centers. A space of seven feet six inches multiplied by the width of the room is recommended to accommodate circulation and the instructor's desk at the front. Aisles extending from the front to the rear are at least two in number and are a minimum of three feet in width. A typical room is illustrated in plate 2.

The unit area for seminar rooms is 20 square feet per person, providing 24 linear inches of table per student and permitting the arrangement of tables to form a circle or a polygon. Plate 2 also shows this arrangement.

B. Departmental Space

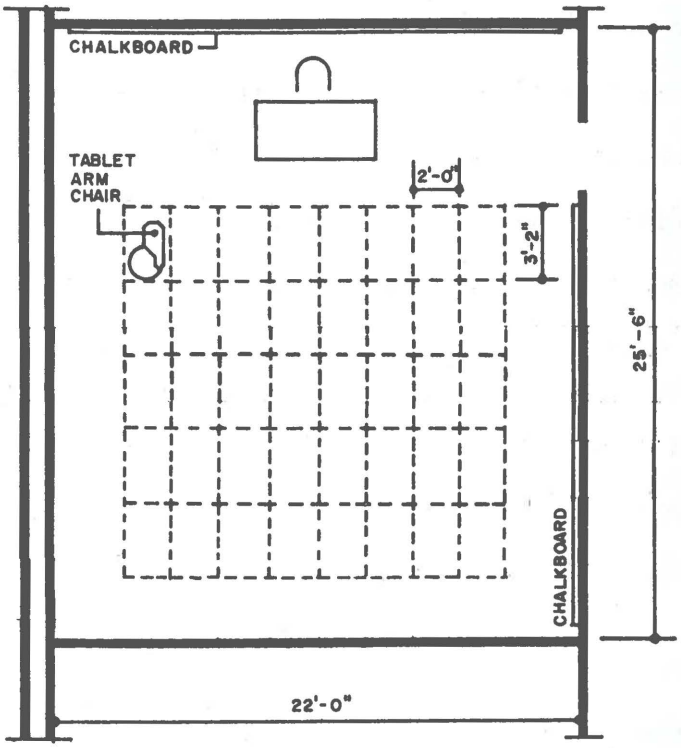
The balance of the academic space may be designated as departmental space in that each room may be assigned to a particular department. However, only a few departments, all in the field of science, merit separate consideration as such for purposes of programming space. For example, the humanities and social sciences, with only a few exceptions[a], require nothing but classroom and faculty office space. As the former have already been programmed, subsuming the requirements of these disciplines, no special

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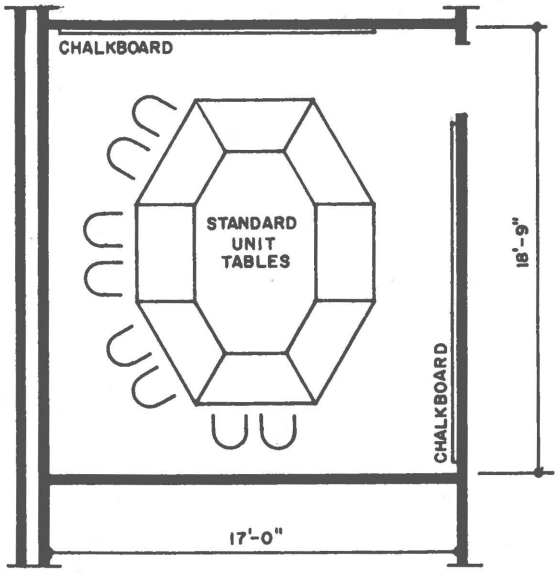
[a]The exceptions are the Department of Psychology, which may develop as a middle ground between the social and the natural sciences, the language laboratory and a map room for work in History.

PLATE 2

PLANNING STANDARDS AND UNIT AREA ALLOCATIONS CLASSROOMS AND SEMINAR-CONFERENCE ROOMS



TYPICAL CLASSROOM: 40 SEATS; AREA=560 SQ.FT; 560/40 = 14 SQ. FT. PER STATION



TYPICAL SEMINAR-CONFERENCE ROOM; AREA=320 SQ. FT.; 320/16 = 20 SQ. FT. PER STATION
16 SEATS



consideration of English, Political Science and so forth as departments is required.

The space programs presented in this chapter are organized as follows. The four departments with the widest variety of facilities requirements are presented first. These are the three basic sciences, Biology, Chemistry and Physics, and the Department of Psychology. A table of interdepartmental science facilities follows. Then the balance of the laboratory and special purposes areas for both science and non-science departments is listed. Finally, academic space requirements, including faculty office space, are summarized for all enrollment levels.

1. Department of Biology

This department, including botany and zoology, will offer a major and also provide service courses for students in other departments. Table 6-2 indicates a potential development of this Department's facilities. The main groupings are office space, teaching laboratories, research space and miscellaneous facilities. The number of stations in elementary laboratories is based on the section size preferences of the faculty. The area per unit or per station reflects the amount of bench space required by the individual student.

2. Department of Chemistry

This Department's space program (table 6-3) follows the outline of the Department of Biology. Separate laboratories are listed for elementary work and for analytical, organic and physical chemistry. Organic chemistry

6-2. Lakehead College of Arts, Science and Technology: Space Requirements for the Department of Biology

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Office space					
Faculty	4	5	100	400	500
Assistant	1	2	50	50	100
Subtotal				450	600
Teaching laboratories					
Elementary	2(24)	2(24)	40	1920	1920
Advanced	20	20	50	1000	1000
Advanced	16	20	50	800	1000
Preparation and storage	--	--	--	500	800
Subtotal				4220	4720
Research space					
Faculty	2	3	110	220	330
Undergraduate	6	8	60	360	480
Subtotal				580	810
Miscellaneous space					
Animal quarters	--	--	--	325	450
Darkroom	--	--	--	80	80
Glassware storage	--	--	--	50	50
Chemical storage	--	--	--	60	60
Media preparation and autoclave	--	--	--	75	75
Transfer room	--	--	--	50	50
Herbarium	--	--	--	60	100
Subtotal				700	865
Subtotal				5950	6995
Storage	--	--	--	300	355
Total				6250	7350

6-3. Lakehead College of Arts, Science and Technology: Space Requirements for the Department of Chemistry

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Office space					
Faculty	4	5	100	400	500
Assistant	2	3	50	100	150
Subtotal				500	650
Teaching laboratories					
Elementary	2(24)	2(24)	40	1920	1920
Analytical	20	20	45	900	900
Organic	20	20	50	1000	1000
Physical	8	10	65	520	650
Preparation and storage	--	--	--	800	1100
Balance rooms	--	--	--	370	370
Subtotal				5510	5940
Research space					
Faculty	2	3	110	220	330
Undergraduate	3	5	60	180	300
Subtotal				400	630
Miscellaneous space					
Stockroom	--	--	--	450	500
Special chemicals	--	--	--	100	100
Subtotal				550	600
Subtotal				6960	7820
Storage	--	--	--	355	395
Total				7315	8215

will probably be taken by Biology and pre-medical majors as well as by those specializing in Chemistry. Two elementary laboratories, totalling 48 stations, are listed. These might function to accommodate three groups of 16 students, each group led by a teaching assistant. Overflow from these laboratories could be accommodated in the room for analytical chemistry, which will probably have a low utilization rate.

3. Department of Physics

Whether or not a major is offered in Physics, it will probably be essential to provide one elementary and two advanced laboratories. Students in Applied Science will probably take two years of Physics before the 1200-student enrollment is reached.

4. Department of Psychology

It is assumed that this Department will, in the not too distant future, follow the prevailing pattern of offering experimental work. In time this may imply working with small animals. The inclusion of an audition laboratory for experiments in hearing and speech is, of course, conjectural; however, some specialized space of comparable size will probably be needed before 1974.

5. Interdepartmental Science Facilities

A number of auxiliary science facilities can be shared by two or more departments. Table 6-6 lists two groups of these facilities. The first consists of a series of small areas which are attached to the principal science lecture-demonstration room. The second consists principally of

6-4. Lakehead College of Arts, Science and Technology: Space Requirements for the Department of Physics

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Office space					
Faculty	2	3	100	200	300
Assistant	1	1	50	50	50
Subtotal				250	350
Teaching laboratories					
Elementary	24	24	40	960	960
Advanced	8	12	60	480	720
Advanced	6	12	80	480	960
Preparation and storage	--	--	--	250	345
Darkrooms	2	2	50	100	100
Subtotal				2270	3085
Research space					
Faculty	1	2	110	110	220
Undergraduate	3	5	60	180	300
Subtotal				290	520
Miscellaneous space					
Battery room	--	--	--	100	100
Subtotal				2910	4055
Storage	--	--	--	145	205
Total				3055	4260

6-5. Lakehead College of Arts, Science and Technology: Space Requirements for the Department of Psychology

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Office space					
Faculty offices	2	3	100	200	300
Subtotal				200	300
Teaching laboratories					
Experimental	16	16	55	880	880
Assembly area	16	16	20	320	320
Audition laboratory	--	--	--	--	150
Subtotal				1200	1350
Research space					
Faculty	2	3	110	220	330
Storage	--	--	--	75	125
Subtotal				295	455
Miscellaneous space					
Animal quarters	--	--	--	120	150
Animal experiment area	--	--	--	200	200
Shop	--	--	--	100	100
Subtotal				420	450
Subtotal				2115	2555
Storage	--	--	--	110	130
Total				2225	2685

6-6. Lakehead College of Arts, Science and Technology: Space Requirements for Interdepartmental Science Facilities

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Lecture demonstration areas					
Biology	--	--	--	75	75
Chemistry	--	--	--	75	75
Physics	--	--	--	160	160
General	--	--	--	100	100
Subtotal				410	410
Miscellaneous areas					
Shop	--	--	--	400	500
Darkroom (photographic)	--	--	--	150	150
Tracer laboratory	--	--	--	600	600
Instrument room	--	--	--	300	400
General office	--	--	--	150	150
Subtotal				1600	1800
Total				2010	2210

rooms containing scientific apparatus. The largest of these, a laboratory for isotope work, will probably not be needed until the enrollment has passed 700. It can serve Biology and Chemistry and possibly Physics as well.

6. Miscellaneous Laboratories and Special Purpose Areas

The listing in table 6-7 indicates some space for courses not presently offered. These are an electronics laboratory for work in Electronics Technology and an accounting laboratory for courses in Business Administration, probably at the technology level. The inclusion of these facilities is viewed as a future likelihood. Both attract large numbers of students at other institutions. However, even if these particular subject areas are not offered, some expansion of facilities based on broadened courses of study in technology is likely. Thus, at the 1200-student enrollment level the total number of laboratories has been raised from 21, as projected in Chapter 3, to 24, including those in tables 6-2 through 6-5 and table 6-7. These include a calculator room suitable as a laboratory in such course areas as statistics, biometrics, psychology and business accounting. Space for Forestry, Geology and Mining follows current practice. A testing laboratory and drafting rooms will relate to Engineering Technology and Applied Science programs. The number of drafting boards required is more significant than the number of drafting rooms. At the 1200-student enrollment level 1,320 student period hours of drafting per week will be scheduled for courses in Technology and Applied Science. Assuming 24 scheduled hours per week, 55 boards will be needed. However, non-scheduled use of these boards for assignment is also needed, so that 100 boards have

6-7. Lakehead College of Arts, Science and Technology: Space Requirements for Miscellaneous Laboratories and Special Purpose Areas

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Science and Technology areas					
Drafting (three rooms)	65	100	35	2275	3500
Electronics	35	35	35	1225	1225
Forestry	30	30	35	1050	1050
Geology	35	35	35	1225	1225
Materials testing	25	25	40	1000	1000
Mining	12	18	45	540	810
Preparation and storage space[a]	--	--	--	1095	1320
Subtotal				8410	10130
Non-science areas					
Accounting	40	40	18	720	720
Calculator room	20	25	25	500	625
Language laboratory	16	24	30	480	720
Auxiliary space	--	--	--	150	200
Map room	--	--	--	200	250
Storage	--	--	--	125	200
Subtotal				2175	2715
Total				10585	12845

[a]This item is computed at 15 percent of the listed Science and Technology laboratory space.

been programmed. Similar calculations formed the basis of the estimates at the other target enrollment levels.

7. Summary

The summary of academic space requirements is presented in tables 6-8 and 6-9. The totals of 70,585, 51,730 and 29,125 net square feet of academic space for the 1200-, 700- and 400-student enrollment levels may be calculated also as net area per full-time student. The corresponding figures are then 59, 74 and 73 square feet per student. Thus, the 1200-student level, although providing the greatest variety of facilities, proves the most efficient and economical of the three target enrollments in respect to required academic space per student. A parallel situation is found to obtain with regard to non-academic space, as described in the next chapter.

8. Space Standards for Laboratories, Research Space and Offices

The unit area per station in teaching laboratories varies with the complexity and type of apparatus used. Rooms with fewer stations generally require more square feet per student, as the proportion of circulation space is necessarily greater. Preparation rooms associated with the laboratories are estimated at 15 percent of the area of the laboratory proper. In science departments the item in the tables labelled storage has been calculated at five percent of all other space. This is additional to storage which may be included in the allowance for preparation space.

In the basic science departments research space is programmed for the

6-8. Lakehead College of Arts, Science and Technology: Summary of Academic Space Requirements

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Classroom-type space	--	--	--	15090	24120
Faculty office space[a]	52	89	100	5200	8900
Departmental space:					
Biology	--	--	--	6250	7350
Chemistry	--	--	--	7315	8215
Physics	--	--	--	3055	4260
Psychology	--	--	--	2225	2685
Interdepartmental science facilities	--	--	--	2010	2210
Miscellaneous laboratories	--	--	--	10585	12845
Total				51730	70585

[a]The number of units in this category is derived by subtracting from the total required full-time equivalent faculty the number of faculty listed separately under the Departments of Biology, Chemistry, Physics and Psychology.

6-9. Lakehead College of Arts, Science and Technology: Academic Space Required at the 400-Student Enrollment Level

Category	Total Area (square feet)
Classroom-type space	9690
Faculty office space	3800
Laboratories:	
Biology (2)	1920
Chemistry (2)	2920
Drafting (2)	1750
Forestry (1)	1050
Geology (1)	1225
Materials (1)	1000
Mining (1)	540
Physics (2)	1440
Language (1)	630
Subtotal	12475
Preparation rooms and miscellaneous departmental facilities	3160
Total	29125

faculty and for advanced student work. For faculty an allocation at 110 square feet is made on an individual basis. This area will provide 12 to 15 linear feet of laboratory bench or suitable open space for free-standing apparatus. For students in honors or other independent work an allocation of 60 square feet is provided implying eight to ten linear feet of bench.

In Chapter 5 the number of faculty at each enrollment level was projected on a full-time equivalent basis; it is proposed that faculty office space be allocated in the same manner. Thus, two half-time instructors would receive the same allocation of space as one full-time instructor. The basic premise in regard to the faculty office is that it should afford privacy, both for the instructor's own pursuits and for conferences with individual students. A private office should logically result in greater faculty productivity than will shared space. It is suggested that a private office of 100 square feet represent the basic allocation for the faculty.

CHAPTER 7

SPACE REQUIREMENTS FOR NON-ACADEMIC ACTIVITIES

This chapter describes the space requirements for all facilities required by the College other than those which have been considered in the preceding chapter. The various elements are described in alphabetical order.

A. Administrative Office Space

Under this heading are included the offices for academic, business and general administration, as well as those offices concerned with external affairs and certain auxiliary functions. (See table 7-1.)

The set of unit space standards used in programming these administrative offices differs from those in the preceding chapter relative to faculty offices.[a] The deans and directors of the principal units are allocated 200 and 150 square feet, respectively, because of the frequent conferences and number of visitors associated with administration. Professional level assistants are assigned to private offices of 120 square feet. Other categories of personnel are assigned to non-private office areas, where the space per person includes a desk, a chair, sometimes a side chair and circulation space.

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[a]Where the number of personnel in a particular unit is estimated, no distinction is made between part-time and full-time staff. For administrative components as small as in liberal arts colleges, it is likely that the space requirements of part-time employees are almost the same as would be employed by an equivalent number of full-time personnel.

7-1. Lakehead College of Arts, Science and Technology: Space Requirements for Administrative Offices and Related Space

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Principal	1	1	300	300	300
Administrative assistant	1	1	100	100	100
Secretary	1	2	75	75	150
Files, etc.	--	--	--	60	75
Reception	--	--	--	125	150
Subtotal				660	775
Dean of Arts	1	1	200	200	200
Secretary	1	1	75	75	75
Reception	--	--	--	60	100
Subtotal				335	375
Dean of Science and Technology	1	1	200	200	200
Secretary	1	1	75	75	75
Reception	--	--	--	60	100
Subtotal				335	375
Dean of Students	1	1	150	150	150
Assistant	--	1	120	--	120
Secretary	1	2	75	75	150
Reference (placement)	--	--	--	150	200
Subtotal				375	540
Registrar	1	1	150	150	150
Assistant	--	1	120	--	120
Secretary	1	1	75	75	75
Files	--	--	--	50	75
Subtotal				275	420
Director of Admissions	1	1	150	150	150
Assistant	--	1	120	--	120
Secretary	1	2	75	75	150
Files	--	--	--	75	100
Reception	--	--	--	175	200
Subtotal				475	720
Comptroller[a]	--	1	180	--	180
Bursar	1	1	120	120	120
Cashier	1	1	100	100	100
Secretary	1	1	75	75	75

(Continued)

7-1. (Continued)

Category	Number of Units, Enrollment 700	Number of Units, Enrollment 1200	Area per Unit	Total Area, Enrollment 700	Total Area, Enrollment 1200
			(square feet)		
Comptroller (continued)					
Vault	--	--	--	60	75
Files	--	--	--	75	100
Counter	--	--	--	100	125
Reception	--	--	--	60	75
Punched cards equipment:					
026	--	1	50	--	50
082	--	1	50	--	50
402	--	1	80	--	80
Miscellaneous	--	--	--	--	75
Subtotal				590	1105
Director of Development and Public Relations	1	1	150	150	150
Alumni Secretary	--	1	120	--	120
Secretary	1	1	75	75	75
Files	--	--	--	60	90
Reception	--	--	--	50	70
Work space	--	--	--	75	120
Subtotal				410	625
Administrative service unit:					
Mimeograph	1	1	80	80	80
Multilith	1	1	125	125	125
Duplicator	1	1	65	65	65
Graphotype	1	1	50	50	50
Addressograph	1	1	75	75	75
Work tables	--	--	--	100	120
Files and plates	--	--	--	40	75
Miscellaneous	--	--	--	50	75
Postage meter	--	--	--	50	50
Desks (typing)	1	2	60	60	120
Storage	--	--	--	75	100
Subtotal				770	935
Miscellaneous space					
Conference room	16	16	20	320	320
Inactive records	--	--	--	200	300
Staff common room	--	--	--	150	200
Faculty common room	--	--	--	300	450
Subtotal				970	1270

(Continued)

7-1. (Continued)

Category	Total Area Enrollment 700	1200
	(square feet)	
Summary		
Principal	600	775
Dean of Arts	335	375
Dean of Science	335	375
Dean of Students	375	540
Registrar	275	420
Admissions	475	720
Comptroller[a]	590	1105
Development and Public Relations	410	625
Service Unit	770	935
Miscellaneous	970	1270
Total	5195	7140

[a]The head of this office may be designated as Vice Principal-Administration.

1. Office of the Principal

For the Principal a suite of rooms is envisaged. These offices should have their own reception area, space for one or two secretaries (depending on the enrollment level) and a private office for an administrative assistant.

2. Office of the Dean of Arts

For the Dean of Arts, in addition to his private office, spaces are listed for a secretary and for reception; however, in practice it is likely that this reception area will be combined with those listed under related offices, such as the Dean of Students and the Registrar.

3. Office of the Dean of Science and Technology

As the College develops it is expected that the academic program will be administered by two deans, one in charge of the work in the arts and one responsible for science and technology. Their space and supporting staff will be similar.

4. Office of the Dean of Students

As the College approaches the 700-student enrollment level it will be desirable to separate the responsibility for academic affairs from the responsibility for student life and activities. In charge of the second category will be a Dean of Students. This office will be responsible for the vocational guidance and placement functions of the College. A reference room where material on careers can be housed is a desirable adjunct.

5. Office of the Registrar

For this office, in addition to the Registrar, space is listed for an assistant (at the 1200-student enrollment level), a secretary and files. No reception area is listed as it is assumed that the Registrar will share reception space with the Dean of Arts and the Dean of Students.

6. Office of the Director of Admissions

In addition to staff space, this office must provide a reception area large enough to provide comfortable seating for two or three groups of applicants and their families.

7. Office of the Comptroller (or Vice Principal-Administration)

The Comptroller is one of the principal officers of the College. It is assumed that he will be assisted eventually by a Bursar and a Cashier. Together they will be responsible for the business management and accounting functions of the institution, as well as for such tasks as maintaining a student bank. Recent experience at liberal arts colleges indicates that even small institutions may benefit by the acquisition of punched card equipment and that such equipment may serve to depress the number of personnel required. In this report it is not necessary or possible to justify in specific terms the acquisition of such equipment. As only approximately 250 square feet will be necessary, it is thought wise to program space for punched card machines. If the equipment is not acquired, it is quite likely that an additional staff member will then be necessary sometime after the 700-student enrollment level is attained. This additional

person, with files and miscellaneous equipment, will then need a considerable part of the space listed in the table for the equipment.

8. Office of the Director of Development and Public Relations

Under this heading will be the personnel concerned with what may be termed the external affairs of the College. At the 1200 enrollment level the functions of the principal fund raiser and of the Alumni Secretary are separated.

9. Administrative Service Unit

It is recommended that the complex of clerical services which are auxiliary to the administrative activities of the College be consolidated into one office. This office will then include mimeograph, multilithing and other types of duplicating, all addressing and mailing and the central typing pool. In all likelihood the personnel used in typing and the other functions can be interchangeable. The space program provides for sufficient equipment for these purposes, if modern high speed models are acquired. Under the heading "files and plates" will be the addressograph plates for all College functions. One duplicator, such as the Xerox 914, can serve all College offices, including the Registrar's requirements for copying student transcripts and other records. It is considered better practice to provide this type of equipment centrally rather than to disperse duplicating services on a departmental basis.

10. Miscellaneous Facilities

This last group of administrative facilities includes four elements.

The first is a conference room for administration use, such as will be required for faculty or administrative committees or committees of the Board of Governors. The second is a room for files or inactive records. The source of these records might be the Registrar's office, the Deans' offices or any of the administrative units described up to this point in the chapter. Finally, two common rooms are indicated, one for faculty and a second for non-professional staff attached to the administrative offices. The two common rooms might share a small kitchenette for use in preparation of lunches or tea.

B. Food Service Facilities

Food service facilities comprise areas for dining, for food preparation and storage, and for administration. The peak load on these facilities will be at the lunch hour, when it is expected that almost the entire student body plus a proportion of the faculty and staff will require space. The comparative isolation of the College suggests that few students will leave the campus at this time. Table 7-2 programs seating for one-third of the student body plus 25 percent of the faculty and staff. Thus, three separate seatings are necessary for the campus population to be fed at lunch. A considerable number of students may bring at least part of their own lunches, but this will not affect the amount of seating required.

The program listed in table 7-2 is a purely functional one, assuming a single kitchen and only one dining room; however, a snack bar, separate from the dining room, is indicated. The relation of this program to the existing dual food service facilities is explored in the next chapter.

7-2. Lakehead College of Arts, Science and Technology: Space Requirements for Food Service Facilities

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Office and staff space					
Director	1	1	120	120	120
Assistant	--	1	100	--	100
Secretary and files	1	1	--	75	100
Men's lockers and toilet	--	--	--	120	150
Women's lockers and toilet	--	--	--	150	200
Subtotal				465	670
Dining space	270	450	12	3240	5400
Food preparation and service					
Kitchen	270	450	2.5	675	1125
Bakery	--	--	--	250	250
Serving	--	--	--	500	700
Subtotal				1425	2075
Storage and miscellaneous space					
Dry stores	--	--	--	400	700
Refrigerated stores	--	--	--	250	400
Receiving	--	--	--	150	200
Dish and ware washing	--	--	--	200	300
Utensils, etc.	--	--	--	100	125
Waste disposal	--	--	--	75	100
Subtotal				1175	1825
Snack bar					
Preparation	--	--	--	125	150
Serving	--	--	--	150	200
Seating	60	100	10	600	1000
Storage	--	--	--	100	150
Subtotal				975	1500
Summary					
Office and staff space				465	670
Dining space				3240	5400
Food preparation and service				1425	2075
Storage and miscellaneous space				1175	1825
Snack bar				975	1500
Total				7280	11470

C. Library

The development of a space program for the library involves questions which are distinct from the pattern of presenting requirements for other types of buildings. Whereas almost all construction at the College is a function, directly or indirectly, of the size and composition of enrollment, the growth of the library's collection is much more a function of time. That is, the collection would continue to grow even if enrollment were constant. Reading space, however, is a function of curriculum and enrollment, while staff space is influenced by both the size of the collection and the intensity of student use. These factors condition the discussion which follows.

The library of Lakehead College presently contains about 30,000 volumes. In order to award degrees in June, 1966, the College should have a library of at least 60,000 volumes. At present the library is undertaking what amounts to a crash program to meet this target. In order to gain perspective on the desirable growth of the library collection beyond the 60,000 volume figure, an examination was made of the libraries at a number of the other colleges and universities. There are very few comparable situations in Canada as most Canadian institutions are considerably larger than the target enrollment of 1200 students which forms the limit point of this study. Therefore, the principal source of relevant information is contained in the listing of United States college libraries published annually by the U. S. Office of Education. Table 7-3 lists data on 14 institutions whose enrollment varies from 588 students to 961 students. These institutions approximate in over-all size the intermediate target enrollment level of

7-3. United States: Data on Selected College and University Libraries, 1960-61; Enrollment under 1000 Students

Name	Enrollment[a]	Collection			Operating Expenditures in Dollars				Expenditure Ratio[b]
		Number of Volumes	Number Added during Year	Percent Added during Year	Total	Total per Student	Books and Materials	Books and Materials per Student	
Kenyon	588	152949	3871	2.5	63612	108	23531	40	5.5
Reed	817	134160	7810	5.8	69310	85	27880	34	5.5
Goucher	759	109204	3611	3.3	64439	85	19218	25	4.8
Earlham	909	102843	6615	6.4	72671	80	31205	34	4.9
Whitman	880	102803	3067	3.0	46525	53	12073	14	--
University of the South	698	100745	3714	3.7	53003	76	14363	20	4.7
Sweet Briar	559	100120	2907	2.9	57145	102	16544	30	5.9
Knox	961	96389	3417	3.5	50088	52	15230	16	3.4
Randolph Macon	688	92127	2285	2.5	45369	66	11274	16	3.7
Kalamazoo	675	86400	7390	8.6	62000	92	24000	36	5.0
Agnes Scott	646	80956	3500	4.3	52311	81	21251	33	4.1
Hiram	667	73553	3189	4.3	35178	53	10024	15	3.7
Hollins	692	68520	3463	5.1	49016	71	22376	32	3.8
Ripon	671	64958	1947	3.0	29399	44	9843	15	3.5
Average				4.2		75		26	4.5

Source: U. S. Office of Education, Library Statistics of Colleges and Universities, 1960-1961.

[a]Enrollment = all degree students (full-time and part-time).

[b]Expenditure ratio is expressed as percent of all educational and general expenditures.

700 students at Lakehead. They also correspond roughly to the component of the 1200-student total which is accounted for by the Arts, as distinguished from the Technology program. It may be noted that the average increment to the collection in the year 1960-61 amounted to 4.2 percent of the total collection for the 14 institutions. Table 7-4 lists seven institutions whose enrollment ranges from 1014 students to 1377 students. These colleges correspond in over-all size, approximately, to the 1200-student level at Lakehead. Here the average increment to the collection in the year 1960-61 was 3.6 percent. It should be noted that only institutions with strong academic reputations have been included in these tables.

The typical pattern for the libraries associated with new colleges is for the growth rate of the collection to decline over time to an increment of about four percent per year. Table 7-5 indicates the probable growth of the collection annually if this pattern is followed. Thus, in 1973-74, when the enrollment will first reach 1200, the collection will comprise about 97,000 bound volumes. This may be compared to the total of 90,000 volumes which Carleton University possessed in 1962 after 15 years of awarding degrees. Table 7-5 also shows a continuation of the projection of the growth of the collection until 1980, at which time a total of over 150,000 volumes is indicated.

If, instead of looking at the typical growth pattern of college libraries, one considers the particular character of Lakehead in relation to library use, then it seems clear that the projected growth shown on table 7-5 provides some margin in meeting the needs of the College. Of the 1200 students projected for Lakehead, over 400 will be in the Technology Division,

7-4. United States and Canada; Data on Selected College and University Libraries, 1960-61
Enrollment over 1000 Students

Name	Enrollment[a]	Collection			Operating Expenditures in Dollars				
		Number of Volumes	Number Added during Year	Percent Added during Year	Total	Total per Student	Books and Materials	Books and Materials per Student	Expenditure Ratio[b]
Amherst	1014	348201	9594	2.8	164236	162	58012	57	4.9
Williams	1127	264876	5909	2.2	131585	177	39832	35	4.5
Colby	1177	224485	5101	2.3	77308	66	23000	20	5.1
Carleton C.	1176	178205	6242	3.5	26859	64	27764	24	3.4
Grinnell	1148	144943	6938	4.8	80926	70	26592	23	4.5
Albion	1377	104544	4232	4.0	64924	47	21226	15	5.0
(Carleton U.)[c]	(1553)	(90000)	(8500)	(9.4)	--	--	--	--	--
Lawrence	1064	89085	4948	5.5	66290	62	23956	23	4.0
(Assumption U.)[c]	(1400)	(80000)	(4884)	6.1	--	--	--	--	--
Average				3.6		93		28	4.5

Source: U. S. Office of Education, Library Statistics of Colleges and Universities, 1960-1961.

[a]Enrollment = all degree students (full-time and part-time).

[b]Expenditure ratio is expressed as percent of all educational and general expenditures.

[c]Canadian data is approximate only and excluded from averages. Carleton University source is President's report for 1961-62. Assumption University source is President's report for 1960-61.

7-5. Lakehead College of Arts, Science and Technology: Estimated Growth of the Library Collection

Year	Increment		Total Collection
	Percent	Volumes	
1961-1962[a]	--	--	23500
1962-1963[a]	--	--	32000
1963-1964[a]	--	--	41000
1964-1965[a]	--	--	50000
1965-1966[a]	--	--	60000
1966-1967	10	6000	66000
1967-1968	10	6600	72600
1968-1969	9	6534	79134
1969-1970	9	7122	86256
1970-1971	8	7100	93350
1971-1972	8	7468	100818
1972-1973	7	7057	107875
1973-1974[b]	7	7551	115426[c]
1974-1975	6	6926	122352
1975-1976	6	6341	128693
1976-1977	5	6435	135128
1977-1978	5	6756	141884
1978-1979	4	5675	147559
1979-1980	4	5902	153461

[a]For these years the growth of the collection has been estimated by interpolating between the 1961-1962 total and the 1965-1966 goal of 60,000 volumes, which it is assumed will be attained. It is expected that bachelor's degrees will first be awarded in 1965-1966.

[b]It is estimated that in this year the enrollment of the College will rise to 1200 students.

[c]The Consultants also estimated the growth of the collection on the basis of dollars expended per student. On this basis, averaging the experience of other institutions, the collection would comprise 116,000 volumes in 1973-1974.

where library requirements on a per capita basis will be lower than for degree candidates. Furthermore, a number of major fields which are common to most of the colleges listed in tables 7-3 and 7-4 will in all likelihood continue to be omitted at Lakehead. For example, no academic work in art or music history or religious literature is envisioned. Each of these fields, if offered, must be represented by a considerable number of library books. In comparing Lakehead to Carleton University it should be recalled that Carleton is a multi-faculty institution offering doctoral degrees, whereas at Lakehead it is anticipated that only the first degree and honors work in Arts will be offered.

Next to shelving for books, the largest category of space in a library is seating for readers. The most accurate gauge of reader requirements is the study of existing patterns of reading space utilization. Thus, it may be observed whether library seating is fully utilized, under-utilized or inadequate. At Lakehead no such data is available, although it appears that the library is rarely, if ever, completely full. At present the library has 70 places for readers, representing about 30 percent of the student body, exclusive of nursing students. However, even if statistics were available for the current year, the figures would not be very meaningful as the library at times serves also as a study hall and common room. This is due to the lack of other facilities which more properly can serve such non-academic needs of the students, for example those with a free hour between classes. When the University Centre is occupied in the fall of 1963, there may well be a shift in the pattern of library occupancy, including less use by students of nursing at free periods.

It is recommended that, based on the nature of the institution and on experience elsewhere, the library be constructed initially with a seating capacity representing 20 percent of the enrollment of the 1200 students. For the first few years of its use the total of 240 seats will accommodate a considerably higher proportion of readers. During these years the number of readers should be recorded carefully, daily and hourly. If necessary, as the College approaches the 1200 students, additional reading space can be added, but in the opinion of the Consultants this development is unlikely.

D. Physical Education and General Assembly

Where no formal academic program for physical education is contemplated, as is the case at Lakehead, it is difficult to determine what comprises suitable athletic facilities in terms of either the extent of student use or the amount of money that should be committed to these functions. Table 7-7 shows facilities for a minimum and for a full program for indoor athletics. These programs correspond to some extent to the target enrollment levels of 700 and 1200 students, respectively. However, it is possible that the smaller program could satisfy the higher enrollment target if the College felt that athletics need play only a minimal role in College life. This minimum program, with a main gymnasium of 7,000 square feet, would permit the use of only one full-size basketball court at a time. If divided into two smaller gymnasiums by a folding partition separate activities might take place in either half simultaneously; however, neither half could then accommodate a regulation basketball court. Under the full program, 12,500 square feet is available for the main gymnasium. This area could accommodate two separate basketball games simultaneously or, alternately, could be subdivided for men's and women's activities.

7-6. Lakehead College of Arts, Science and Technology: Space Requirements for the Library

Category	Number of Units, Enrollment 700	Number of Units, Enrollment 1200	Area per Unit	Total Area, Enrollment 700	Total Area, Enrollment 1200
			(square feet)		
Office and staff space					
Librarian	1	1	120	120	120
Assistant	1	1	120	120	120
Secretary	1	1	75	75	75
Bookkeeping and acquisition	--	--	--	150	200
Processing	--	--	--	250	300
Catalog and classification	--	--	--	200	250
Office supplies	--	--	--	75	75
Files	--	--	--	45	60
Shipping and receiving	--	--	--	300	400
Temporary storage	--	--	--	125	150
Duplicating	--	--	--	100	100
Staff common room	--	--	--	150	200
Subtotal				1710	2050
Reading and reference space					
Main reading room	55	90	22	1210	1980
Browsing room	16	30	25	400	750
Periodicals	16	30	25	400	750
Reference and bibliography	15	25	25	375	625
Night study	16	30	25	400	750
Carrells	25	40	30	750	1200
Faculty study	4	6	50	200	300
Display	--	--	--	150	200
Subtotal				3885	6555
Book shelving					
Stack space	70000	150000	.08	5600	12000
Files	20	30	11	220	330
Subtotal				5820	12330
Miscellaneous space					
Coatroom	--	--	--	200	300
Control desk	--	--	--	150	200
Typing room	6	10	35	210	350
Staff common room	--	--	--	150	200
Seminar room	16	16	20	320	320
Subtotal				1030	1370

(Continued)

7-6. (Continued)

Category	Total Area Enrollment 700	1200
	(square feet)	
Summary		
Office space	1710	2050
Reading and reference space	3885	6555
Book shelving	5820	12330
Miscellaneous space	1030	1370
Total	12445	22305

7-7. Lakehead College of Arts, Science and Technology: Space Requirements for Physical Education and General Assembly

Category	Number of Units: Minimum Program	Number of Units: Full Program	Area per Unit	Total Area: Minimum Program	Total Area: Full Program
			(square feet)		
Athletic facilities					
Main gymnasium	--	--	--	7000	12500
Bleachers	--	--	--	1000	--
Auxiliary gymnasium	1	2	1200	1200	2400
Squash courts	3	6	550	1650	3300
Subtotal				10850	18200
Miscellaneous facilities					
Locker rooms: men	100	150	4	400	600
Locker rooms: women	30	50	7	210	350
Showers and dressing: men	--	--	--	300	400
Showers and dressing: women	--	--	--	275	350
Staff facilities (visitors)	--	--	--	200	300
Storage	--	--	--	300	400
Issue and tote baskets	--	--	--	400	600
Subtotal				2085	3000
Assembly facilities					
Stage	--	--	--	1000	1500
Lobby	--	--	--	400	600
Dressing rooms	--	--	--	100	200
Storage	--	--	--	200	500
Subtotal				1700	2800
Summary					
Athletic				10850	18200
Miscellaneous				2085	3000
Assembly				1700	2800
Office				100	200
Total				14735	24200

The amount of money implied by the construction of a gymnasium can more easily be justified when the gymnasium is also used by the community and as a place of general assembly for the College. The larger gymnasium could serve as an assembly area for the entire student body at the 1200 enrollment level, whereas the 7,000 square foot room could only accommodate about 900 students at any one time. With the exception of the gymnasium floor, no space for groups of over 300 persons is programmed at the College. In order to make this space even more productive, stage and dressing room facilities are indicated in the table, although these are also listed under section G of this chapter, describing University Centre facilities.

E. Physical Plant Administration and Maintenance

Under this heading is programmed the office space associated with the College maintenance shops, garages and general storage facilities. All are listed in table 7-8. Excluded are such dispersed facilities as the electrical substation and other utility installations.

At this time it is not certain at what future date the College will install a central heating plant. Nevertheless, the probable space requirements of such a plant are listed in this table as a guide to construction requirements that may actually be implemented after the 1200-student enrollment target is attained.

It is anticipated that the Director of Buildings and Grounds will function as the College purchasing agent.

7-8. Lakehead College of Arts, Science and Technology: Space Requirements for Physical Plant Administration and Maintenance

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Office space					
Director	1	1	120	120	120
Assistant	1	1	100	100	100
Secretary	1	1	75	75	75
Plan file	1	2	35	35	70
Drafting board	1	1	50	50	50
Miscellaneous equipment	--	--	--	75	100
Subtotal				455	515
Maintenance shops (including stock)					
Carpentry	--	--	--	600	800
Electrical	--	--	--	200	300
Painting and spraying	--	--	--	350	500
Plumbing	--	--	--	350	500
Shop office	--	--	--	100	100
Subtotal				1600	2200
Heating plant[a]					
Boiler area	2	3	650	1300	1950
Auxiliary equipment	--	--	--	600	600
Office	--	--	--	100	100
Subtotal				2000	2650
Garage					
Vehicles	4	6	250	1000	1500
Maintenance	--	--	--	350	350
Subtotal				1350	1850
Storage and miscellaneous space					
Maintenance stores	--	--	--	350	500
Building materials	--	--	--	450	600
Furniture and equipment	--	--	--	300	500
Shipping and receiving	--	--	--	450	450
Housekeeping	--	--	--	75	75
Linen storage	--	--	--	150	200
Key shop	--	--	--	75	100
Locker room	--	--	--	200	250
Subtotal				2050	2675

(Continued)

7-8. (Continued)

Category	Total Area Enrollment 700	1200
	(square feet)	
Summary		
Office space	455	515
Maintenance shops	1600	2200
Heating plant	2000	2650
Garage	1350	1850
Storage and miscellaneous space	2050	2675
Total	7455	9890

[a]Assumes central heating system for the campus at some future date.

F. Residential Facilities

It has been shown previously that there will be a demand for residential facilities on the part of 25 percent of the student population, representing the component of enrollment whose place of origin is outside the Lakehead area. This, of course, does not imply responsibility on the part of the College to provide residential space for these students on the campus in College-owned housing. It may well be that such students will find accommodations in the community. However, this material is included to apprise the College of the extent of residential facilities that would be required if such students were to be housed on the campus. These requirements are shown in table 7-9. The College might in fact build a part or none of the space listed in this table. Likewise, the demand for College-owned faculty housing is difficult to determine at this juncture. If such housing is desired and, if it can be financed on a self-sustaining or self-liquidating basis, it may be erected at some time in the future.

Residential space is noted in the summary tables but is not included in the totals of either physical plant or financial requirements.

G. University Centre Facilities

Under this heading are the various facilities which are associated with the extra-curricular activities of the students, exclusive of food service and athletics. In an institution where the great majority of students are non-resident, it is advantageous to combine these functions and facilities into a single building. The principal types of space are described below:

7-9. Lakehead College of Arts, Science and Technology: Space Requirements for Student Residence, per 100 Students

Item	Percent of Total Space	Area per Unit	Total Area
		(square feet)	
80 rooms, single occupancy	--	115	9200
10 rooms, double occupancy	--	190	1900
Subtotal			11100
Space distribution[a]			
Living quarters	71	--	--
Toilets and showers	10	--	--
Recreational and service	19	--	--
Net area requirements			
Living quarters	--	--	11100
Toilets and showers	--	--	1565
Recreational and service	--	--	2965
Total			15630
Gross area requirements[b]	--	--	23445
Gross area per student	--	234	--

[a]Source: United States Office of Education

[b]Net area is converted to gross area for this type of space by using an index of 1.5.

1) Student organization space consists of meeting rooms and space for student publications.

2) Recreation space comprises two types of rooms, a large common room which may be used for informal talk, television and other passive recreation and a games room for table games such as ping-pong.

3) A bookstore is an important adjunct to the student's academic as well as his recreational interests. The function of the bookstore is to provide in one easily accessible location the books that the student requires for his formal assignments and for his general reading. Such a store may, as a matter of convenience, also stock such items as gifts, clothing, prints, records, drugs and sundries. The extent to which the store may become involved in items other than books depends partly on the philosophy of the institution in organizing such a retail establishment and also on the extent to which the lines of merchandise may be profitable in relation to the space they occupy. The space program in table 7-10 is oriented primarily to a bookstore per se.

4) Although the projected academic program of the College does not include any work in art, music or drama, nevertheless, it is considered desirable to provide for and stimulate interest in these fields, on behalf of both the College student and the community. One art studio is programmed, primarily for painting; however, it might also serve for small-scale sculpture or other media. In the field of music space is programmed for a record collection, for individual listening rooms and for small private practice rooms. In theatre presentation, it is assumed that provision should be made for the production of plays on an extra-curricular basis. This requires, in addition to auditorium space, a stage, a shop adjacent to the

7-10. Lakehead College of Arts, Science and Technology: Space Requirements for University Centre Facilities

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Student organization space					
Meeting room	1	2	400	400	800
Publications office	1	2	150	150	300
Files	--	--	--	75	100
Subtotal				625	1200
Recreation space					
Commom room	--	--	--	2000	3000
Games room	--	--	--	2000	3000
Subtotal				4000	6000
Bookstore					
Office	--	--	--	120	150
Sales area	--	--	--	800	1000
Stockroom	--	--	--	400	600
Receiving	--	--	--	120	175
Subtotal				1440	1925
Performance and lobby space					
Art studio	--	--	--	600	800
Storage	--	--	--	150	200
Music areas					
Record collection	--	--	--	100	150
Listening rooms	3	5	50	150	250
Practice rooms	2	3	90	180	270
Drama areas					
Stage	--	--	--	1000	1000
Shop	--	--	--	1500	1500
Storage, properties, etc.	--	--	--	400	600
Dressing rooms	2	2	200	400	400
Hobby rooms	1	2	400	400	800
Subtotal				4880	5970
Miscellaneous areas					
General storage	--	--	--	400	600
Coat room	--	--	--	300	450
Subtotal				700	1050
Summary					
Student organization space				625	1200
Recreation space				4000	6000
Bookstore				1440	1925
Performance and hobby space				4880	5970
Miscellaneous				700	1050
Total				11645	16145

stage where sets may be constructed, storage for properties and at least two dressing rooms. The auditorium itself can be a lecture room of three hundred seat capacity described in the preceding chapter. For amateur dramatics there are advantages to repeating performances in a small theatre, as opposed to offering a single performance in a larger hall.

5) Finally, hobby rooms are also listed in table 7-10. These cannot be programmed in any detail, but very likely one may be a shop for "ham" radio work and one might be a photographic darkroom. The stage shop might also be used for general hobby purposes when it is not occupied with production work.

H. Summary

1. 700- and 1200-Student Enrollment Levels

A summary of non-academic space at these two enrollment levels is included in table 7-11.

2. 400-Student Enrollment Level

The following comments apply to non-academic space requirements at the 400-student enrollment level.

a. Administrative Office Space

At this level the offices of the Registrar and the Director of Admissions might be consolidated and the Dean of Students omitted. Storage, file and service space would be somewhat smaller. A total of 4,000 square

7-11. Lakehead College of Arts, Science and Technology: Space Requirements for Non-Academic Facilities

Category	Total Area Enrollment		
	400	700	1200
	(square feet)		
Administrative offices	4000	5195	7140
Food service	7800	7280	11450
Library	10000	12445	22305
Physical education	14000	14735	24200
Physical plant administration	5000	7455	9890
Residential facilities[a]	(11200)	(28750)	(58000)
University Centre facilities	7800	11645	16145
Total	48600	58755	91130

[a]Residential facilities are not included in total.

feet would still be desirable.

b. Food Service

Planning kitchen and storage space for 400 students as an interim enrollment target would, of course, be uneconomical. It is estimated that 75 percent of the space required for 700 students would be required for an enrollment of 400 students, except for dining space, which would be prorated. Thus, 7,800 square feet would represent the needs for this enrollment level.

c. Library

The question of library planning for an enrollment of 400 and a target year such as 1964 or 1965 is unrealistic. However, for completion of the statistical picture, we may assume 100 seats for readers, space for shelving 60,000 books and proportionate staff and service space. On this basis, about 10,000 square feet will be required.

d. Physical Education and Public Assembly

The minimum program listed in table 7-7 would be applicable to 400 students, except for slightly smaller locker and shower space. A total of 14,000 square feet is estimated.

e. Physical Plant Administration and Maintenance

The workload implied by the 400-student program would not be substantially lower than that called for by a student body of 700. Eliminating the central heating plant and reducing storage requirements would yield a

space requirement of 5,000 square feet.

f. Residential Facilities

Residential facilities for 25 percent of 400 students would require 25,000 gross square feet.

g. University Centre Facilities

In this category two-thirds of the space required at the 700-student enrollment level, or 7,800 square feet, would be applicable to a College of 400 students.

h. Summary

Based on the foregoing, the total non-academic space required for the enrollment target of 400 students is 48,600 square feet, exclusive of residences, representing 83 percent of the comparable total for a student body of 700. The non-academic space requirements for this enrollment level are also shown in table 7-11, subject to the general comments on enrollment targets presented in Chapter 1.

CHAPTER 8

BUILDING PROGRAMS AND OCCUPANCY PATTERNS

A. General

Up to this point in the study physical plant requirements have been expressed only in terms of the net area needed for a particular function, without reference to the organization of these areas into buildings, either existing or to be constructed.. Table 8-1 summarizes these requirements.

The next stage of the study is the development of building programs and occupancy patterns based on these space requirements. This step calls for the allocation of space in existing buildings and in new structures.

The requirements for the College at the 1200-student enrollment level will be described first, as this represents the ultimate target of the study. The procedural framework is viewed as the formulation of a program for this enrollment level, organized so that the interim steps of development can be fitted into the long-range target as self-contained stages in a continuing process. Some suggestion of development beyond the 1200 level is indicated, though not described in detail or expressed in any of the tables.

One of the principal criteria in the formulation of these building programs is the question of construction economy. An attempt has been made to minimize the extent of required alterations both in the existing buildings and in new buildings. Although the enrollment has been presented as a series of annual increments to the student body, it is not economically feasible to organize construction in the same terms. Inevitably, where a steady growth

8-1. Lakehead College of Arts, Science and Technology: Summary of Net Area Requirements

Building	Total Area Enrollment 400	700	1200
		(square feet)	
Academic space	29125	51730	70585
Non-academic space	48600	58755	91130
Residential space[a]	(15600)	(27300)	(46800)
Total[b]	77725	110485	161715

[a]Residential space is not included in total.

[b]Net area per student for the three enrollment levels is: 400 level, 194 square feet; 700 level, 158 square feet; 1200 level, 135 square feet, (exclusive of residential space).

in activities and physical plant is anticipated, the construction program must proceed in a series of steps or plateaus (see plate 1). At the same time enrollment may be controlled so that a smooth transition from year to year is achieved. Thus, for brief cyclic intervals, the capacity of the physical plant may exceed the requirements of the institution. Obviously, this is preferable to an alternative where the requirements of the institution exceed the available space.

In the programs developed for Lakehead the point of balance is reached at the target enrollment level of 1200 students. To eliminate the excess capacity that will appear at interim stages over the next decade would imply building in smaller units and undertaking more frequent alterations. In economic terms, this is much less satisfactory than the program described in the balance of this chapter.

B. Building Program -- 1200-Student Enrollment Level

At this enrollment level the College will require space for academic activities, a library, a gymnasium, a University Centre (students' union) and a maintenance plant. Residential facilities are excluded from this discussion until the end of the chapter, for reasons given previously.

1. Academic and Administrative Office Space

Academic and administrative office space are considered as a unit, partly because in terms of work flow they are closely connected, and partly because, for purposes of planning, the administrative offices form a rather small element for consideration as a separate structure. Previously, it

had been shown that 77,725 net square feet are required for academic and administrative office space. The existing academic building (including the wing under construction in the summer of 1963) contains 36,230 net square feet. It is assumed that this building will continue as an academic building, as any basic change of use would be extremely wasterful.

The deficit of 41,495 net square feet can be met by a combination of means. About 4,000 square feet can be absorbed by the large classroom (auditorium) already available in the University Centre and a seminar room which should be located in the library. Of the balance, 32,275 net square feet will be housed in a new building for academic and administration use. Finally, an addition of 3,810 net square feet to the existing building will be required. This addition will permit the use of the existing building as a largely self-contained center for science and technology, whereas the new building will then become the center for administration plus academic work in arts, humanities and social science.

The reasons for utilizing the existing building for science and technology are inherent in the character of the structure and its equipment. The building already contains a number of special purpose science facilities which would be expensive to duplicate anew. These include the Chemistry laboratories, the elementary Biology laboratory and its auxiliary spaces, the science lecture-demonstration room and a number of small areas representing investment in cabinet work or other built-in equipment relating to science teaching materials. Another factor, equally important is the basic

arrangement of space in the present building. The distance from the corridor to the window ranges from 24 to 28 feet throughout most of this structure. This dimension is quite suitable for science laboratories. It is much less suitable for the type of department which would comprise small classrooms and a large proportion of office space. Indeed, there are presently some offices which are disproportionate in depth, resulting in loss of effective space or else loss of privacy. The principal items of cost required for conversion of the present building to a science and technology center for the 1200-student enrollment level are the addition of Chemistry laboratories on the second floor, the conversion of the squash court space through the construction of a mezzanine and the addition of a wing running north and south. This last will serve to complete the building in the form of a quadrangle and connect the Biology portion of the first floor to the wing presently under construction.

The conversion of the squash courts and the addition of an intermediate level in those areas would be in order in any case during the development of the College over the next decade. The addition of the Chemistry laboratories will not be difficult technically in view of the flexibility in construction built in by the architect. With the exception of Chemistry the laboratories' principal utilities requirements are for additional electrical power. This may be introduced into the building without major alterations. A number of changes in partitioning would be required, whether the building is to be used for science or non-science departments.

The classroom space that will become available after these changes are made will approximate the requirement for lectures in science and tech-

nology courses. However, there is no reason why some such lectures, at least those which do not require demonstration apparatus, cannot be given in the other, proposed academic building. As will be seen in the next chapter, it is intended that the two academic buildings be connected underground so that students and faculty may proceed from one to the other without going outdoors.

If this general pattern of occupancy were not followed and, instead, the non-science departments were to be located in the present building, the results would be much less satisfactory. The non-science requirements including their share of classroom space amount to only about 20,000 square feet. Therefore, to utilize the existing building completely would imply that some science and technology activities continue to be housed there. Thus, the end result would encompass a split in the science and technology work between the existing building and the proposed building. Furthermore, the proposed building would become more expensive to construct as it would have to be designed to provide utilities and mechanical services for science laboratories on a flexible basis. Under the recommended scheme, with the exception of some space for Psychology, very few specialized services are required for the new academic building.

The gross area of the new academic building is 59,030 square feet. This estimate is based on the schematic plan illustrated in this chapter. A note on the purpose and character of the schematic plans is presented in Section G of this chapter. The new academic building is envisioned as a three-story building built around a courtyard. This plan must be considered only as a suggestion and by no means as an attempt to fix a particular

8-2. Lakehead College of Arts, Science and Technology: Distribution of Classroom Space by Building at 1200-Student Enrollment

Category	Total Required Number	Number of Classrooms per Building			
		Science and Technology	New Academic Building	Library	University Centre
Lecture rooms					
Capacity: 300	1	--	--	--	1
Capacity: 200	1	--	1	--	--
Capacity: 140	1	1	--	--	--
Capacity: 100	1	--	1	--	--
Classrooms					
Capacity: 60	7	2	5	--	--
Capacity: 40	13	6	6	--	--
Seminar rooms					
Capacity: 16	8	3	5	1	--
Total	32	12	18	1	1

architectural form. However, the reasoning behind the courtyard scheme may be worth noting. Because of the requirement for many small rooms (the faculty offices), this building requires a great deal of outside wall and window area. A compact plan would not provide such area, unless the building were constructed as a tower with comparatively small floor area at each level. Such a building would be quite awkward from the standpoint of work flow and operational convenience. By constructing the building around a court each office or classroom may receive natural light and ventilation. It seems likely that alternate schemes, if they could not provide such natural ventilation, would require air conditioning. For a building of this type the expense of air conditioning is considered unnecessary.

2. Library

The library for the 1200-student enrollment follows the program presented in the preceding chapter. It is a self-contained building including no other elements than those listed in this program. Its gross area as shown on the schematic plans is 36,300 square feet. Although the seating and many of the other areas correspond to the target enrollment level of 1200 students which will be attained in the academic year 1973-74, space for the book collection has been planned for almost 40,000 bound volumes in excess of the total anticipated for that year. This excess represents the accessions for the years 1974-80 and requires an additional 3,000 square feet of net area. The rationale of this additional bookstack capacity is based on two points.

a) The collection may exceed the projected growth calculated in the preceding chapter, if available funds so permit. The Consultants

do not believe such a development is necessary, but feel that it is wise to provide some margin in case it occurs.

b) Provision for 150,000 volumes gives some promise that the library building as planned will serve the College for at least ten and possibly fifteen years after its projected completion in the fall of 1965, before any addition is required. This is partially dependent, of course, on the adequacy of the space provided for readers. Eventually, probably between 1975 and 1980, a wing must be added to the library. However, this is equally true of the academic building. In neither case need the additional construction imply any special architectural difficulties.

The Consultants believe that architects for the library should be engaged at once and that a target date of September, 1965 be established for occupancy of the building. The existing library space will be hard pressed to function for even two more years and will even in that interval overflow to other areas of the science and technology building. When first completed the proposed library will have considerable excess capacity, much of which can be turned to good account as temporary academic space. This topic is enlarged on in later sections of this chapter.

The schematic plans for the library indicate a three-story building of square shape, 110 feet long on each side. The main floor (middle level) contains the bulk of the reading rooms and staff activities space. The lower and upper floors are devoted primarily to stack space but include carrells and some miscellaneous areas. If the building were two stories in

height instead of three, there might be some advantage in a larger main floor which would permit open stacks adjacent to the reading areas. However, this is less significant than the advantages of the three-story scheme. A three-story scheme would permit assigning one whole floor initially for classroom and faculty office space without interfering seriously with the library operation per se. Most important, as the library expands past the time framework of this report, the three-story scheme will permit a more compact, closely controlled scheme than a two-story scheme. The later conversion of a two-story scheme to a three-story scheme is considered to be difficult and undesirable.

The library should be air conditioned to permit use of interior space, to assure proper humidity for the collections and, perhaps, to encourage summer use by the community. If not air conditioned, the plan might have to take quite a different form, either construction around a court or a more attenuated shape. In either case the additional outside wall and greater complexity would tend to offset any savings deriving from the omission of air conditioning.

3. University Centre

The University Centre requirements for a student body of 1200 can easily be contained within the existing University Centre building. This building provides about 20,000 net square feet - exclusive of food service space and the auditorium proper. Table 6-10 calls for only 16,145 square feet at the 1200-student enrollment level. Therefore the University Centre building is adequate for an even larger enrollment than is under consideration

in this study. When the enrollment reaches 1200 students, it is assumed that all academic activities will have been vacated from this building and that, except for occasional academic use of the auditorium, the building will be given over entirely to students' recreation and extra-curricular activities. The only exception will be the inclusion of dining space in the building for students and other members of the College community.

The present building will not, however, be able to provide complete food service facilities for the 1200 enrollment level or even for 700 students. As originally planned, the building contains a dining room of about 3,600 square feet plus a small (300 square feet) room serving as a snack bar service area. No provision is made in the building for a kitchen or food service, preparation, storage or administration consistent with an enrollment of 1200 students. It is assumed that, like most institutions, Lakehead will be interested in providing a balanced diet for its students, both resident and non-resident. Thus, it will be desirable to provide at least hot lunches and, perhaps, suitable breakfasts and dinners as well. To do this will almost certainly require the facilities described in table 7-2, Food Service Facilities. At this point it would be inadvisable to count on a completel automated self-service vending machine operation to achieve these objectives. In order to provide the food service space listed in the preceding chapter it will be necessary to build a one-story addition to the University Centre, adjoining the room designated for dining. This addition will contain 3,175 gross square feet. The dining room as shown in the schematic plan will accommodate about 260 persons at one time. If three sittings are programmed, the total capacity at lunch time will be 780, far short of the enrollment of the College. Therefore, it is likely that four

sittings will be required and that, in addition, the College will continue to use the small dining room (capacity: 65) attached to the existing student residence. The four sittings which will be required at lunch do not imply any serious problems. It is certainly possible, when food is served cafeteria style, to eat in 30 minutes. If the lunch schedule is coordinated with the academic schedule, two hours can be used for the turnover of four groups of students, faculty and staff. The dining room in the residence may then be converted to a snack bar and vending machine operation, while the more conventional cafeteria-type service will be limited to the larger facilities in the University Centre.

4. Gymnasium

The gymnasium is in some ways less essential to the successful operation of the College than any of the buildings described up to this point. It is assumed that, because of the higher priority attached to the library and to academic space, the gymnasium will not be built until the enrollment of the College has reached approximately 700 students. At that time, if funds are available, it is recommended that a building corresponding to the full program (see table 6-8) be constructed. Because of the nature of gymnasium space it would be extremely difficult to construct a building corresponding to the minimum program and then, at some later date, build an addition. The building for the full program has the added advantage of satisfying the College's requirements for an enrollment level in excess of 1200 students, probably up to something over 1500 students. This would also apply to the use of the building as a place of general assembly for the College. For enrollment in excess of 1200 it may be necessary to add to the

locker room space, but this could be done at comparatively little expense without disturbing the basic structure of the building.

Schematic plans show the gymnasium as a two-story structure. The upper floor, presumably trussed or vaulted, is essentially one large room with a stage at one end. Moveable bleachers are recommended, so that the space they occupy when extended can be used for recreation and athletics during peak load periods. Extended, these can seat at least 1200 persons and still permit exhibition basketball to take place in the central area of the gymnasium floor. The lower level of the building contains locker and shower rooms, two auxiliary gymnasiums and six squash courts.

5. Maintenance Building

The maintenance building is the last of the construction elements required for the College at the 1200-student enrollment level. This building can easily be built in stages, the first stage corresponding to the requirements of the College at the 400 - 700 enrollment level. Additional maintenance shop, storage and service space can be added as required, over time. It will be possible to add a central heating plant, if at any point it is determined that such a plant will be advantageous in terms of operating efficiency. The schematic plans of this building omit the central heating plant area for the plans corresponding to the 700-student enrollment level and include this facility for the higher target enrollment. However, the Consultants are unable to state definitely that the central plant will not be desirable at an earlier stage or, on the other hand, that its implementation should not be delayed even beyond the 1200 enrollment target.

C. Building Program - 700-Student Enrollment Level

1. Academic and Administrative Office Space

At the 700-student enrollment level the science and technology building will be fully utilized as an academic building, although it will serve both the Arts program as well as the work in science and technology. In order to provide for all the classrooms and laboratories required it will be essential to move the central College administration out of this building and to erect for administration a new structure which, in turn, can become part of the new academic building. This first section of the new academic building will contain 19,075 gross square feet. In addition to administrative offices it will contain one classroom of 60 seats and one seminar room. (See schematic plans.) The balance of the academic space required at this enrollment level must then be found in the library and the University Centre. Table 8-3 shows the distribution of classroom and faculty office space among the various buildings on the campus which will exist from the time the enrollment passes 400 to the time the enrollment reaches 700 students. During this interval the lower level of the library will have two classrooms, a seminar room and 34 faculty offices. The creation of classroom space at this level does not involve any great excess expenditure. The cost of faculty offices should be held to a minimum even at some expense of privacy, as the space they occupy will, before 1973, be restored to library use.

2. Library

The two upper floors of the library will contain excess capacity for

8-3. Lakehead College of Arts, Science and Technology: Distribution of Classroom Space by Building at 700-Student Enrollment

Category	Total Required Number	Number of Classrooms per Building			
		Science and Technology	New Academic Building[a]	Library	University Centre
Lecture rooms					
Capacity: 300	--	--	--	--	1
Capacity: 200	1	--	--	--	--
Capacity: 140	1	1	--	--	--
Capacity: 100	--	--	--	1	--
Classrooms					
Capacity: 60	5	2	1	1	--
Capacity: 40	9	6	--	--	3
Seminar rooms					
Capacity: 16	6	3	1	2	--
Total	22	12	2	4	4

[a]Only the administration wing of the proposed academic building will be available at this enrollment level.

books, readers and staff for several years. As suggested earlier, such a condition is viewed as inevitable, the only alternative being excessive investment in alterations.

3. Other Buildings

At this enrollment level the University Centre will be utilized as shown on the schematic plans, which indicate the retention of four rooms in this building for classroom use. The construction of the gymnasium cannot yet be justified; the first stage of the maintenance building is essential.

D. Building Program - 400-Student Enrollment Level

1. Academic and Administrative Office Space

The 400-student enrollment level is likely to be passed in the academic year 1964-65. It is virtually impossible for the proposed library building to be ready by September, 1964, and yet additional space will be necessary at that date for many kinds of facilities, such as faculty offices, library shelving and administrative offices. A second laboratory for elementary biological science and other academic facilities may be required. The only solution appears to be the construction of the proposed west wing of the existing academic building, transforming that structure from a "C" plan to a quadrangle. This addition may be built between the end of classes in the spring of 1964 and the beginning of classes in September, 1964. It will contain 3,850 net square feet, sufficient to meet the deficit in space obtaining until the projected completion of the library in September, 1965.

8-4. Lakehead College of Arts, Science and Technology: Distribution of Classroom Space by Building; 400-Student Enrollment

Category	Total Required Number	Number of Classrooms per Building	
		Science and Technology	University Centre
Lecture rooms			
Capacity: 300	--	--	1
Capacity: 140	1	1	--
Classrooms			
Capacity: 60	3	2	--
Capacity: 40	8	6	3
Seminar rooms			
Capacity: 16	4	3	--
Total	16	12	4

The new space can, in 1964-65, contain 1) the Geology laboratory, thus permitting the conversion of the present Geology laboratory to Biology; 2) additional faculty office space; 3) additional classroom space, permitting the temporary use of existing classrooms adjacent to the library as bookstack and library service areas. In order to conserve funds a few faculty may be located for 1964-65 in this wing at desks in open areas, obviating the need for temporary construction. Or, alternately, movable partitions may be acquired and relocated to the lower level of the library building in September, 1965. The gross area of the proposed addition is 7,000 square feet.

It must be stated that this addition is clearly justifiable in long-range terms as well. At the 1200-student enrollment level the addition will be utilized as shown in the schematic plans. However, in addition to providing required net area, this wing, by forming a closed quadrangle, will greatly improve the interior circulation in the building. For example, the distance from the present Biology laboratory to the main lecture-demonstration theatre will be reduced from 420 feet to 250 feet.

At this enrollment level temporary provision must be made for administrative offices. It is recommended that the common room at the south end of the existing academic building be partitioned as shown on the schematic plans and that its use be restricted to administration. For example, the Bursar might occupy the existing corner room of the area (presently a student hobby room). The Principal would retain his present quarters until the administrative wing of the proposed academic building is completed in 1966.

8-5. Lakehead College of Arts, Science and Technology: Distribution of Faculty Office Space by Building at 400-, 700-, and 1200-Student Enrollment Levels

Enrollment Level	Number of Offices Required	Number of Office Units per Building[a]			
		Science and Technology	New Academic Building	Library	University Centre
400	38	38[b]	--	--	--
700	64	30	--	34	--
1200	105	30	75	--	--

[a]A few offices in the science and technology building will be semi-private. All others will be private.

[b]Eight of these offices will represent temporary faculty office stations in 1964-65 until transfer to the library.

8-6. Lakehead College of Arts, Science and Technology: Space Requirements for a New Academic Building

Category	Number of Units Enrollment 700[a]	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Classroom-type space					
Lecture rooms					
Capacity: 200	1(200)	1(200)	12	2400	2400
Capacity: 100	--	1(100)	12	--	1200
Capacity: 60	3 (60)	5 (60)	12.5	2250	3750
Capacity: 40	4 (40)	6 (40)	14	2240	3360
Seminar rooms					
Capacity: 16	2 (16)	5 (16)	20	640	1600
Subtotal				7530	12310
Departmental space					
Language laboratory	16	24	30	480	720
Auxiliary space	--	--	--	150	200
Accounting laboratory	40	40	18	720	720
Calculator room	20	25	25	500	625
Psychology[b]	--	--	--	2225	2685
Map room	--	--	--	200	250
Subtotal				4275	5200
Faculty office space	35	75	100	3500	7500
Administration space	--	--	--	4860	6765
Storage				400	500
Total				20565	32275

[a]At the 700-student enrollment level temporary space in the library and University Centre is substituted for new construction as a means of partially satisfying the space requirements. (See tables 8-3 and 8-5). The balance of 11390 square feet forms the program for the administration wing of the proposed academic building.

[b]See table 6-5.

[c]See table 7-1.

8-7. Lakehead College of Arts, Science and Technology: Space Requirements for an Addition to the Science and Technology Building

Category	Number of Units Enrollment 700	Number of Units Enrollment 1200	Area per Unit	Total Area Enrollment 700	Total Area Enrollment 1200
			(square feet)		
Classroom-type space					
Lecture rooms					
Capacity: 60	--	1(60)	12.5	--	750
Capacity: 40	--	1(40)	14	--	560
Seminar rooms					
Capacity: 16	--	2(16)	20	--	640
Subtotal				--	1950
Departmental space					
Geology laboratory	35	35	35	1225	1225
Auxiliary space	--	--	--	175	175
Subtotal				1400	1400
Faculty offices	5	5	100	500	500
Total				1900	3850 [a]

[a] Construction is recommended to correspond to the net area total for the 1200-student enrollment.

8-8. Lakehead College of Arts, Science and Technology: Occupancy Characteristics of Existing and Proposed Buildings, 400-, 700-, and 1200-Student Enrollment Levels

	Enrollment Level		
	400 Students	700 Students	1200 Students
Existing Buildings and Additions			
Science and Technology Building			
Existing building	Academic, administration, library	Academic (Science and Technology only)	Academic (Science and Technology)
West wing addition	Academic and miscellaneous	Academic (Science and Technology only)	Academic (Science and Technology)
Student Residence	Residence, dining	Residence, snack bar	Residence, snack bar
University Centre			
Existing building	Auditorium, bookstore, classrooms, dramatics, snack bar, students' union	Auditorium, bookstore, classrooms, dining, dramatics, fine arts, students' union	Auditorium, bookstore, dining, dramatics, fine arts, students' union
Kitchen wing	--	Food service	Food service
Proposed Buildings			
Library	--	Library, academic space (lower level only)	Library (includes one seminar room)
Academic and administrative office building			
Administration (west) wing	--	Administration, academic space, non-science laboratories	West wing integrated with remainder of building: first floor, administration; second and third floors, academic space
Gymnasium	--	--	Athletics, public assembly
Maintenance	--	Maintenance administration, shops, storage	Maintenance administration, shops, storage, heating plant

8-9. Lakehead College of Arts, Science and Technology: Gross Area of Construction, Existing and Proposed

Building	Total Area Enrollment Level 400	700	1200
		(square feet)	
Existing buildings			
Science and Technology	52315	52315	52315
University Centre	42225	42225	42225
Residence	17645	17645	17645
Subtotal	112185	112185	112185
Proposed			
Science and Technology wing	7000	7000	7000
Library	--	36300	36300
Administration wing	--	20075	19075
Academic building	--	--	39955
Gymnasium	--	--	33900
Maintenance building	--	7800	12800
Residence	11200	28750	58000
University Centre wing	--	3175	3175
Subtotal	18200	103100	210205
Total[a]	130385	215285	322390
Total, all buildings excluding student residences	101535	168890	246745
Total, proposed buildings excluding student residences	7000	74350	152205

[a]Gross area per student (including residences) at the 400-student enrollment level is 335 square feet; at the 700-student level, 307 square feet; at the 1200-student level, 269 square feet. Excluding student residence, the comparable figures are 254, 242 and 206 square feet, respectively.

2. Other Buildings

At this enrollment level the only new construction which is recommended is the first phase of the maintenance building. However, it is unlikely that this structure could be completed until September, 1965, at the earliest, so that this building is identified with the intermediate enrollment target of 700 students.

E. Enrollment beyond 1200 Students

The study does not provide detailed information on activity levels at the College or on space requirements after the 1200-student enrollment target is reached. Nevertheless, some consideration must be given to the implications of continuing growth.

The same factors which are operative through the academic year 1973-74, when the enrollment will reach 1200, will continue to influence the development of the institution. It is expected that the enrollment will continue to rise, although no attempt will be made here to estimate the rate of growth. Therefore, elements of physical plant which have been directly related to enrollment will require additional space. These are the academic facilities (classrooms, laboratories and faculty offices) and much of the library space. Indirectly, this growth will require expansion of utilities and maintenance facilities and also of the central College administration. Student service facilities, except for food service, may be somewhat less sensitive to enrollment pressures, depending on the patterns of use which have been developed in such areas as athletics, student organizations, etc.

Lakehead College will require additions to the science and technology building and to the new academic and administrative office building shortly after the enrollment passes the 1200 mark. The additions might initially be constructed on the Oliver Road (or northeast) side of these buildings. Additions to the academic building might take the form of a "C", thus forming a second and even a third court. Additions to the library might initially be built to the southeast and to the southwest. The additions should also be three stories in height. On this basis, for example, staff space could first extend to include the areas designated on the schematic plans as "reference" and "microreading". Additional space for readers could then be incorporated in the southeast addition.

As indicated earlier in this report, the University Centre provides greater space for extra-curricular activities than will be required by an enrollment of 1200 students. Perhaps the building would remain adequate for 1500-1800 students. However, the problem of food service, not very satisfactorily solved for the enrollment of 1200, would become critical for higher enrollments. More space will be required for seating and for kitchen and service areas. The building is not designed to permit expansion of food service by incorporating adjacent areas on the same level. Possibly a one-story addition could be added directly east of the present building.

In long-range terms it may prove true that the College would have been best served by the construction of a separate food service building at some point in the development. However, the commitment of over 3,500 square feet for dining in the existing University Centre appears to justify adding

kitchen facilities when warranted by increased enrollment, as programmed for the 700-student level. Then this added investment tends to fix food service facilities in the University Centre. Dual and separate food service facilities are wasteful and inefficient, particularly in relation to kitchen personnel.

The gymnasium, as programmed for 1200 students, will probably be adequate for a larger number. It is difficult to anticipate the character of the athletic program at the College. The severe climate tends to focus these activities indoors. On the other hand the isolation of the College tends to limit athletic competition to intramural sports. If the use of the gymnasium were carefully scheduled, it might well serve a student body of 1800-2000, subject to the provision of additional locker room space.

The maintenance building and heating plant space shown in the schematic plans will be adequate for up to 2000 students, depending on the number of dormitories to be erected.

F. Alterations

To clarify the question of alterations, a resume is presented here of the alterations called for by the three building programs associated with the particular enrollment targets.

For the existing academic building a continuing program of alterations will be required until the enrollment reaches the 1200-student total. This is an inevitable consequence of the expansion of laboratory facilities and the withdrawal of non-laboratory departments in this building. In the im-

mediate future the existing student common room must be converted to administrative office space. This can be done by erecting partitions as shown on the schematic plans. Although the room use designations on the plan reflect activities at the 1200-student level, the rooms themselves can serve for the Bursar, Registrar and other administrative personnel for a few years. The present bookstore space will also become available for other use in September, 1963. Subsequent changes can take place in anticipation of added courses or increased enrollment, within the general framework shown on the schematic plans. The provision of a second Biology laboratory in the room presently housing Geology has already been mentioned. Advanced work in Chemistry can be housed in the existing second-floor drafting rooms, after addition of mechanical and electrical services. The existing library may be converted to new drafting room space as soon as the proposed library building is occupied. Some of the changes anticipated are very simple in character and will probably be accomplished by maintenance personnel.

In the University Centre most of the changes involved over the next decade concern room designation rather than alteration of partitions or other elements of the building. The rooms which will temporarily serve as classrooms are the same rooms which will eventually revert to student extra-curricular space, as originally planned. The Consultants believe the bookstore space was understated in the original plans, but no great expense is needed to remedy this situation within the total available space in the building.

The kind of continuing architectural change which has been and, to some extent, will remain the pattern in the existing academic building can be

avoided in large measure with the proposed buildings. The two areas where alterations will be necessary are the lower level of the library, discussed previously, and the administration wing of the new academic building. If this wing is erected prior to the balance of the building, the offices it contains should be redistributed, principally to the ground floor of the larger, completed structure. It should be noted that the basic core facilities, such as stairs, toilets and corridors will not change as the second stage of the building is erected.

This building, and indeed all subsequent construction, should be designed on a modular basis so that the principal changes which will occur will be demolition and relocation of the walls which run at right angles to the corridors. It is recommended that these walls be constructed of masonry units, such as concrete blocks, and be left unfinished or painted but not plastered. The use of demountable metal partitions results in excessive costs which are unwarranted. If funds are available initially for the construction of the entire academic-administrative complex rather than only the administration wing, then alterations can be eliminated. However, this implies far more available capacity in 1967 than the College could absorb at that time.

No changes are anticipated for the gymnasium during the period under study. For the maintenance facilities a few minor changes, resulting from the two stages of construction, will be required.

G. Schematic Plans

Following the text of this chapter are schematic plans of the principal

existing and proposed buildings required by the College over the next decade. The intent in presenting these drawings should be clearly understood, for these plans serve very limited objectives. First, they define the gross area required, whereas in Chapters 6 and 7 the study has been directed to determining net area. Estimating gross area without drawings, basing the estimate on rules of thumb, is too crude a procedure to provide a basis for realistic evaluation or action. It is gross area, of course, which is the key factor in the preparation of cost estimates. Secondly, the plans, by defining both area and the number of floors, indicate the amount of land required for new construction, essential information for the development of the master plan.

Plans of existing buildings, showing changes both in use and physical arrangements, serve to indicate the extent to which these buildings can absorb the program requirements. Therefore, these plans by implication support the recommendations for new construction by showing the limitations of the present facilities.

Despite the inclusion of considerable detail, these plans are not intended to be as definitive or as comprehensive as an architect's preliminary drawings. The emphasis is on justifying the quantitative aspect on the space programs rather than in establishing exact spatial relationships or specific room assignments. Though it is believed that the basic arrangements shown are valid, it is expected that changes in partitioning and room location will occur when architectural drawings are actually developed for both new construction and alterations.

The plans show construction requirements for each enrollment, where significant changes occur between the target levels. In the science and technology building, where alterations will be required on a continuing basis, the presentation emphasizes the ultimate arrangement for 1200 students. Some indication is given of room use at interim levels as well.

The Consultants wish to emphasize again their recognition of the desirability of leaving the determination of the form of the proposed buildings to the College's architects. The schematic drawings are illustrative of a possible scheme but do not exhaust the design possibilities. As a case in point, gymnasiums have been built recently as round, domed structures lower in cost than the conventional rectangular, trussed type shown here. The domed structure presents some minor difficulties in terms of sub-dividing the main area, but in any case should be seriously considered as an alternative.

In referring to the plans the following points should be noted.

1) New construction, existing construction and demolition are distinguished from one another by indications shown on the legend preceding the drawings.

2) Lettering indicates, to the extent graphically feasible, the use or occupancy of each room. Some of the indications are abbreviated and, where necessary, are explained in the list following the text of this chapter.

3) In existing buildings there are a number of variations between the

programmed area for a particular space and the area shown on the plans. This reflects the fact that the cost of alterations required to tailor the existing space exactly to the program may be out of scale to the value of the area recovered. In the case of the proposed buildings the area as programmed conforms very closely to the area as drawn.

4) The plans are schematic in that they attempt to present only a general scheme to highly stylized indications. For example, in the proposed buildings windows and doors are omitted, as are many other architectural elements which do not affect the total quantity of space.

ABBREVIATIONS AND SYMBOLS USED IN THE DRAWINGS

ABBREVIATIONS

ADM	ADMINISTRATIVE
ADV	ADVANCED
ASST	ASSISTANT
BLDG SERV[a]	BUILDING SERVICE
CL-40[b]	CLASSROOM
CONF	CONFERENCE
C R	COMMON ROOM
DK RM	DARK ROOM
DR RM	DRESSING ROOM
ELEM	ELEMENTARY
JC	JANITORS CLOSET
KIT	KITCHENETTE
LAB	LABORATORY
M	MEN
MAINT	MAINTENANCE
O-F	FACULTY OFFICE
PREP	PREPARATION
PROJ	PROJECTION BOOTH
RECVG	RECEIVING
RM	ROOM
SECY	SECRETARY
SEM	SEMINAR
STOR	STORAGE
W	WOMEN

a-INCLUDES AREA FOR MECHANICAL AND ELECTRICAL EQUIPMENT

b-DENOTES CAPACITY

SYMBOLS

EXISTING CONSTRUCTION TO REMAIN

EXISTING CONSTRUCTION TO BE DEMOLISHED

NEW CONSTRUCTION REQUIRED

TOILET FACILITIES

TELEPHONE BOOTH

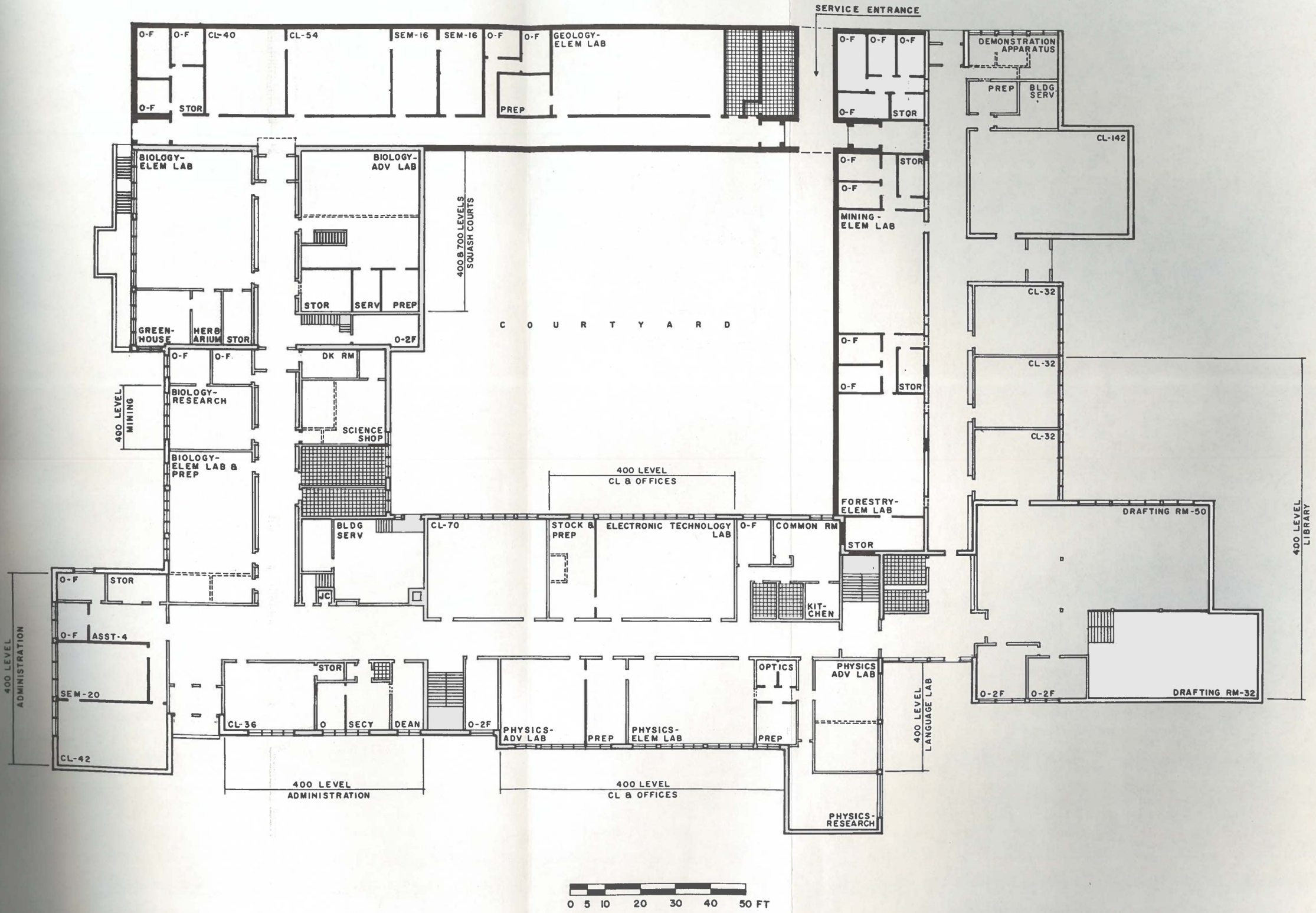
SCHEMATIC PLANS

EXISTING BUILDINGS AND REQUIRED ADDITIONS

SCIENCE & TECHNOLOGY

ENROLLMENT LEVELS: 400, 700 & 1200, EXCEPT AS NOTED

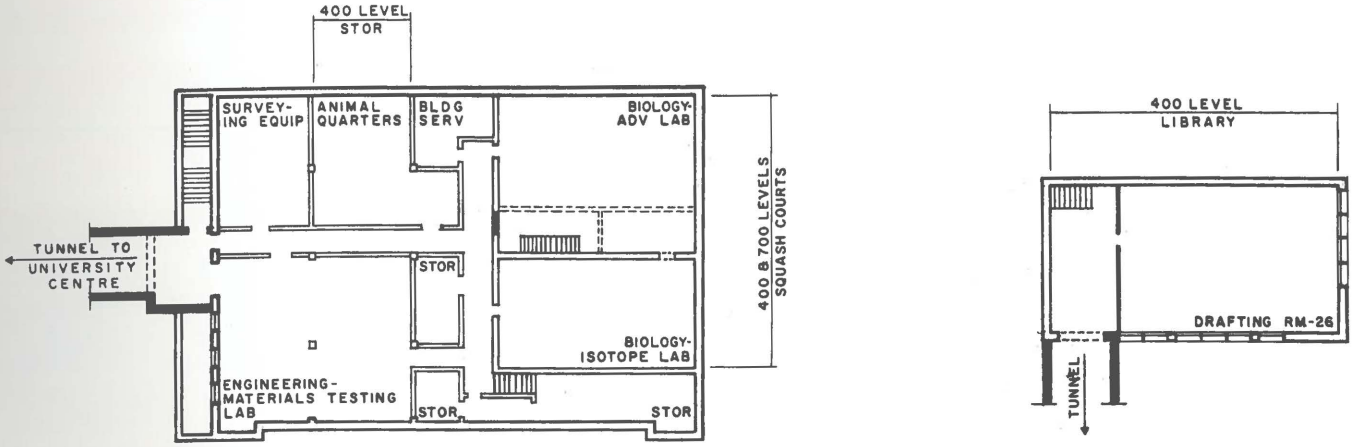
GROUND FLOOR



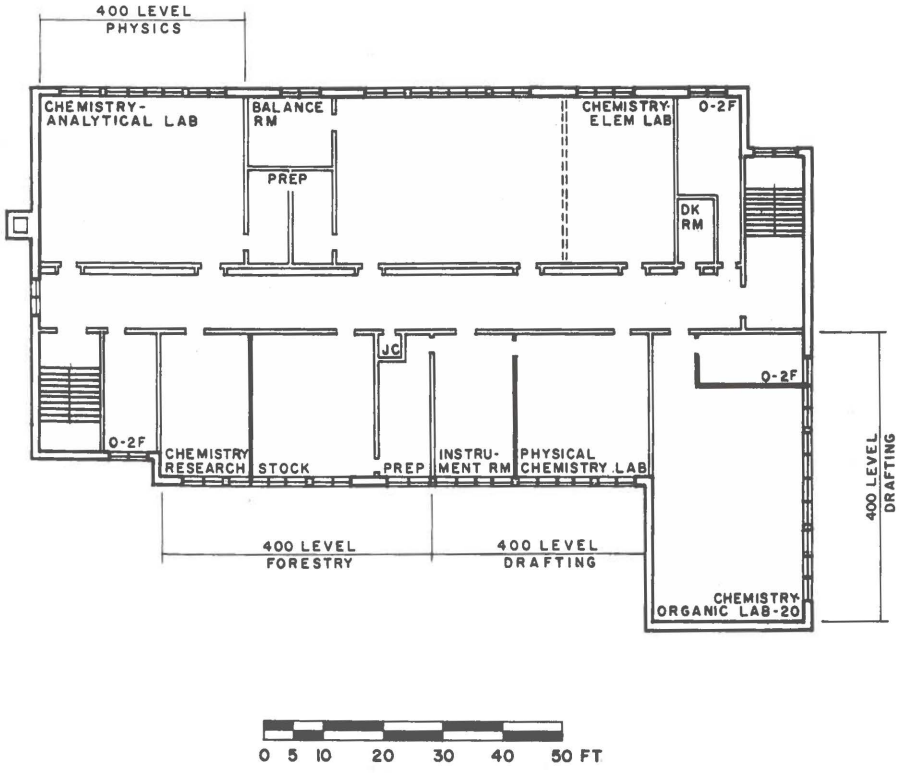
SCIENCE & TECHNOLOGY

ENROLLMENT LEVELS: 400,700 & 1200, EXCEPT AS NOTED

BASEMENT



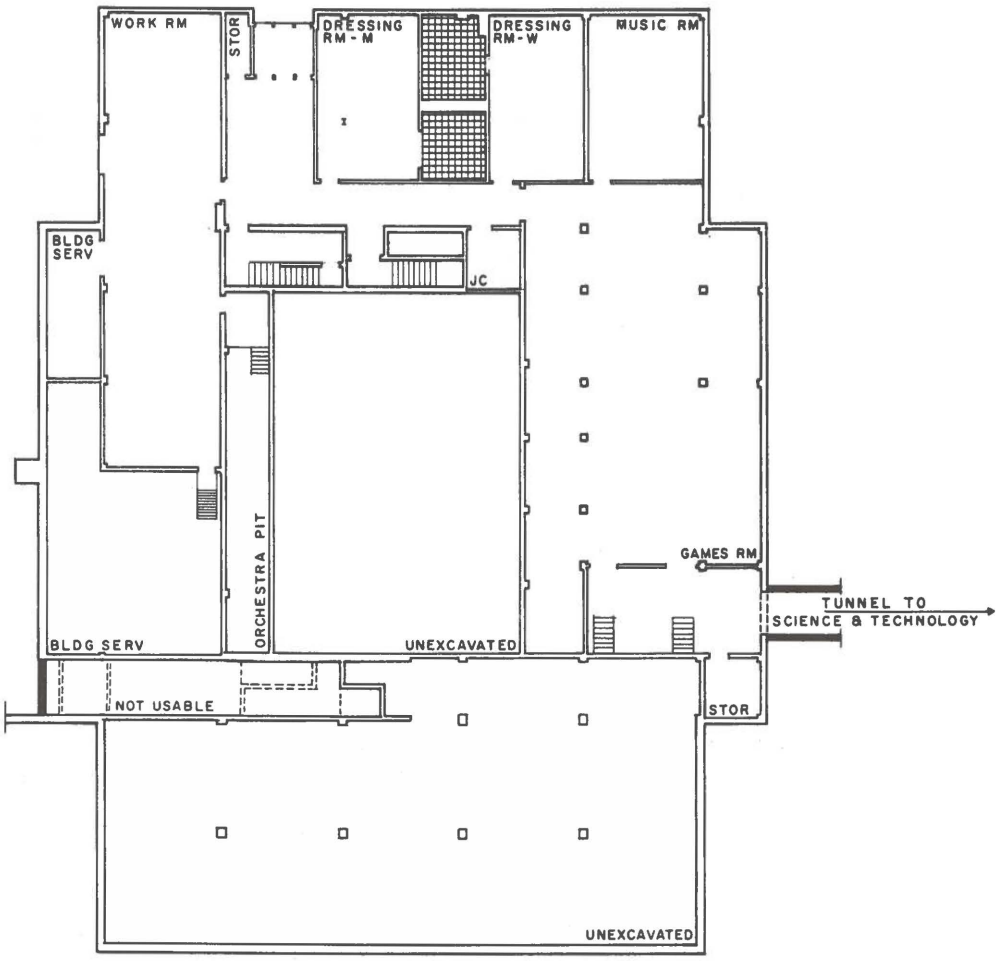
SECOND FLOOR





UNIVERSITY CENTRE
ENROLLMENT LEVELS: 400, 700, 1200

BASEMENT



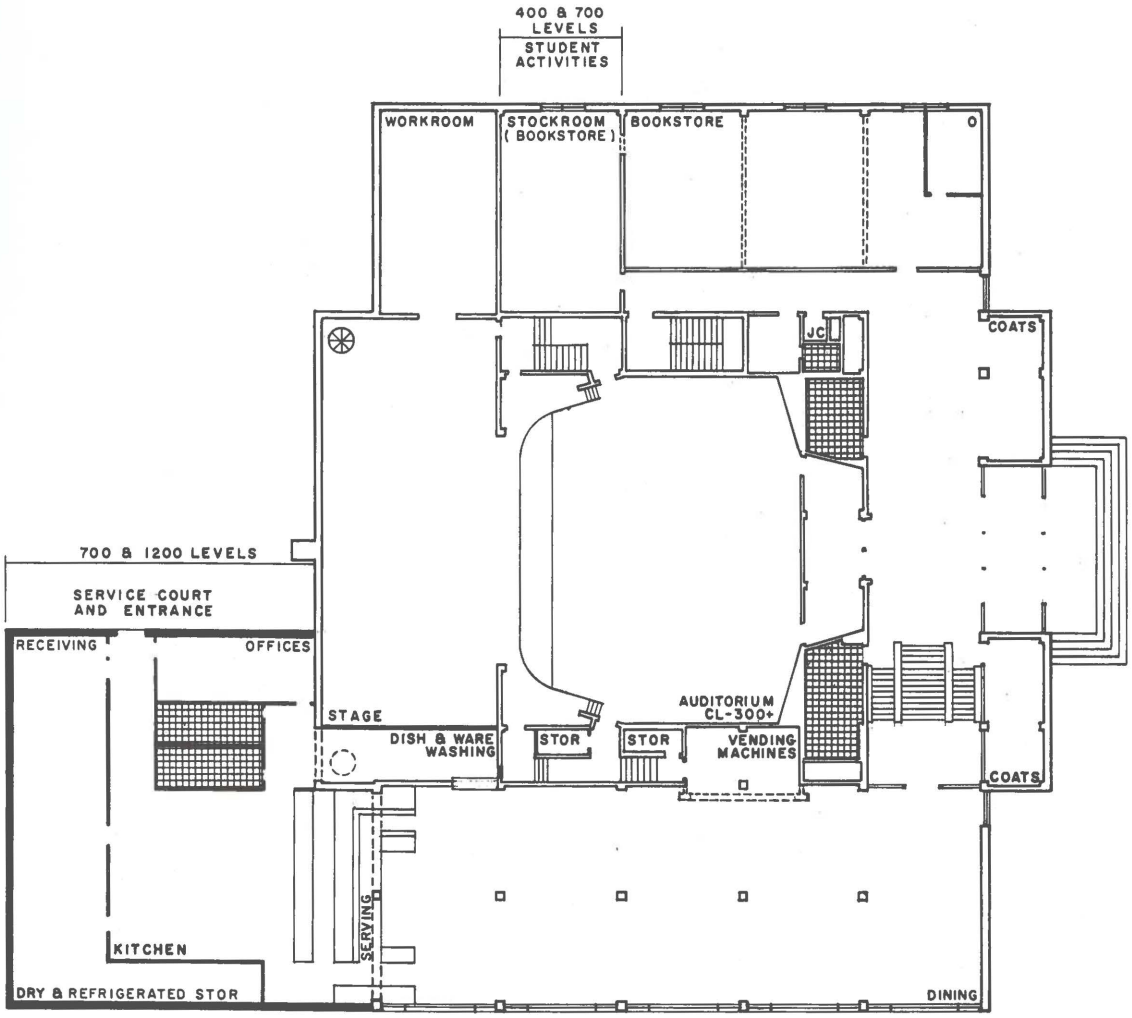




UNIVERSITY CENTRE

ENROLLMENT LEVELS: 400, 700, 1200

GROUND FLOOR

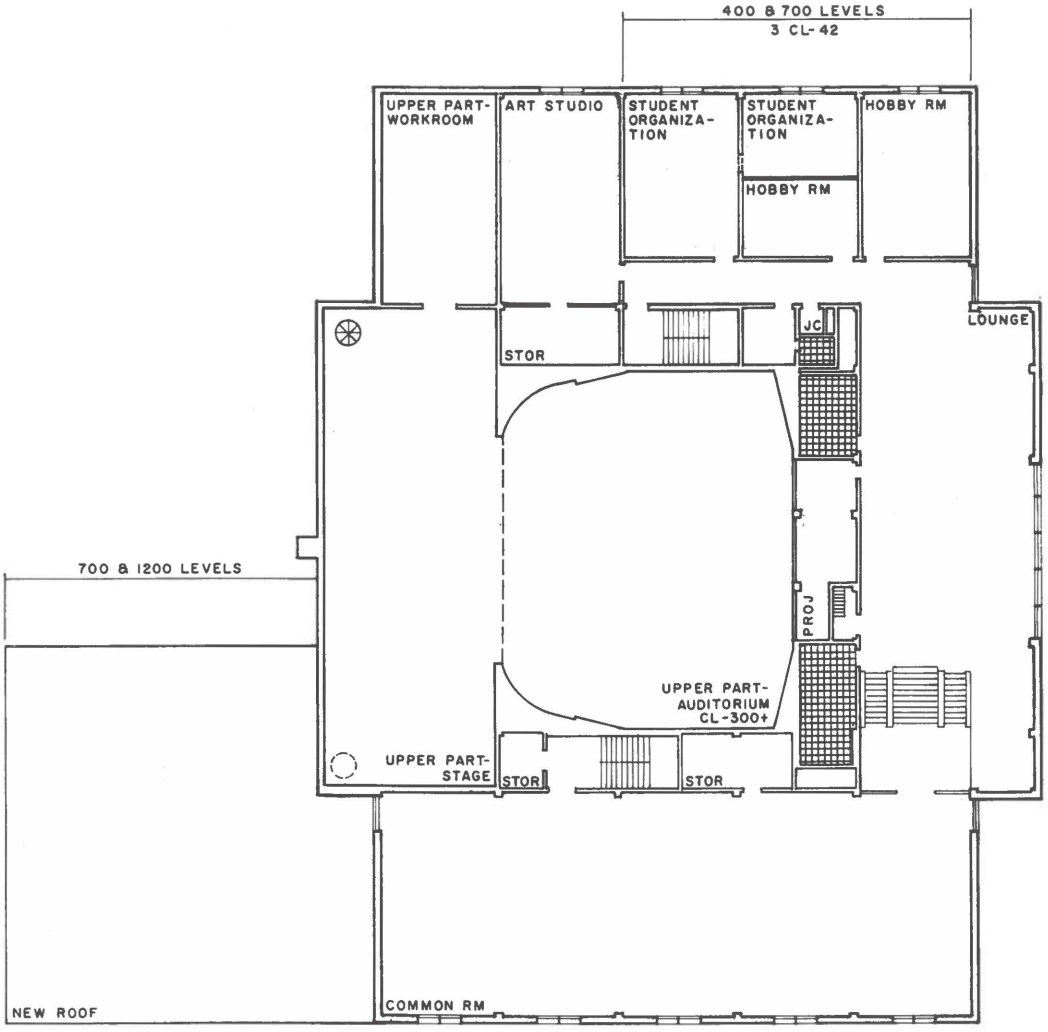






UNIVERSITY CENTRE
ENROLLMENT LEVELS: 400,700,1200

SECOND FLOOR



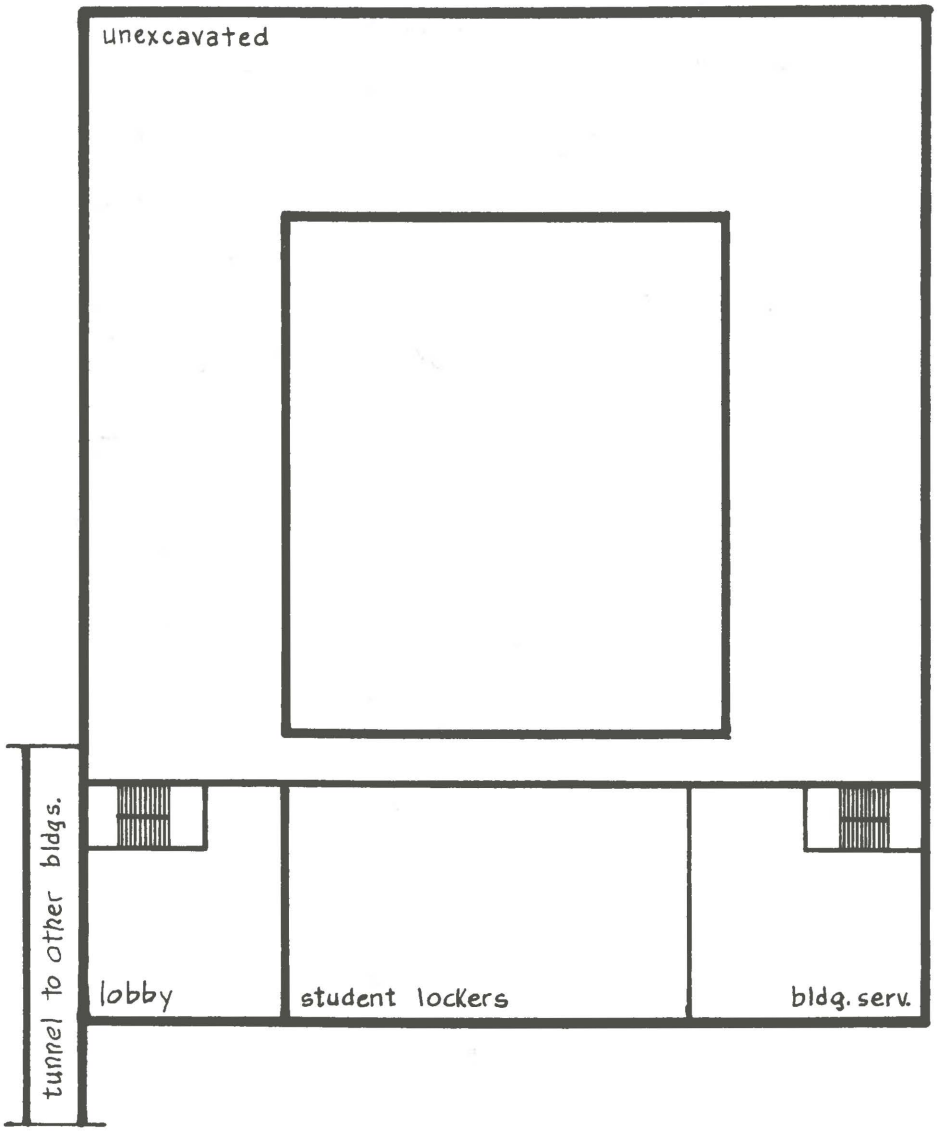
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SCHEMATIC PLANS

PROPOSED BUILDINGS

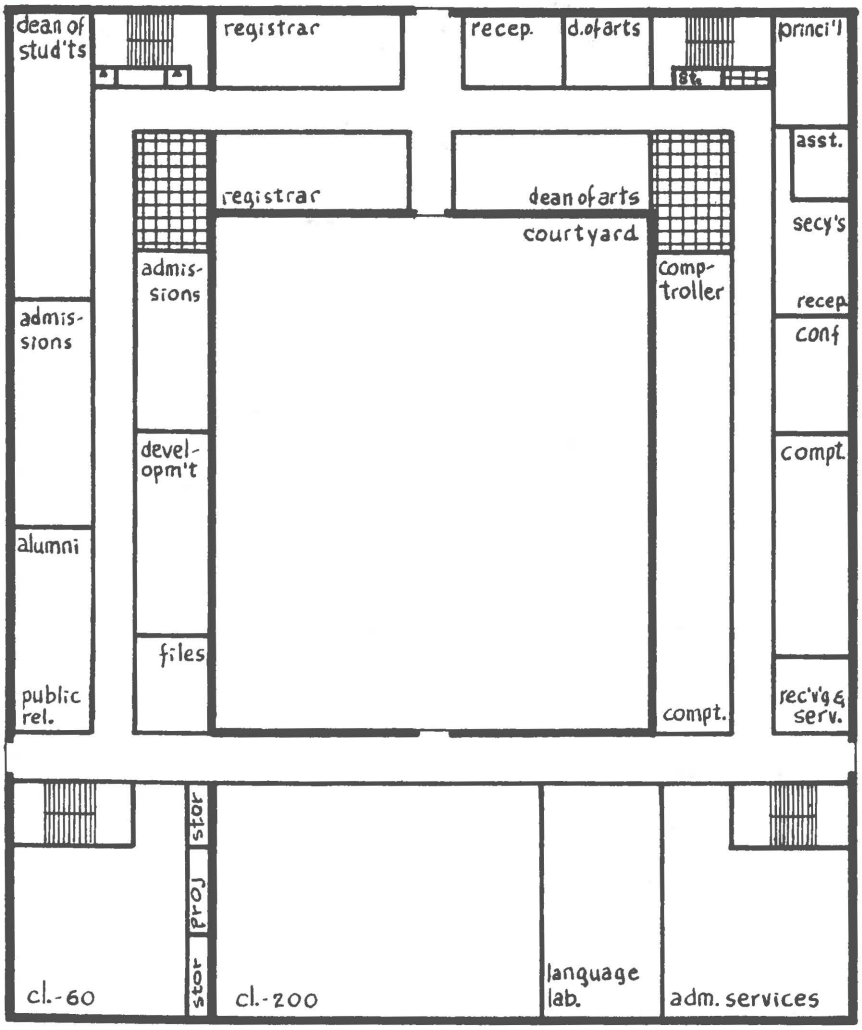
ACADEMIC BUILDING
ENROLLMENT LEVEL: 1200

BASEMENT



ACADEMIC BUILDING
ENROLLMENT LEVEL: 1200

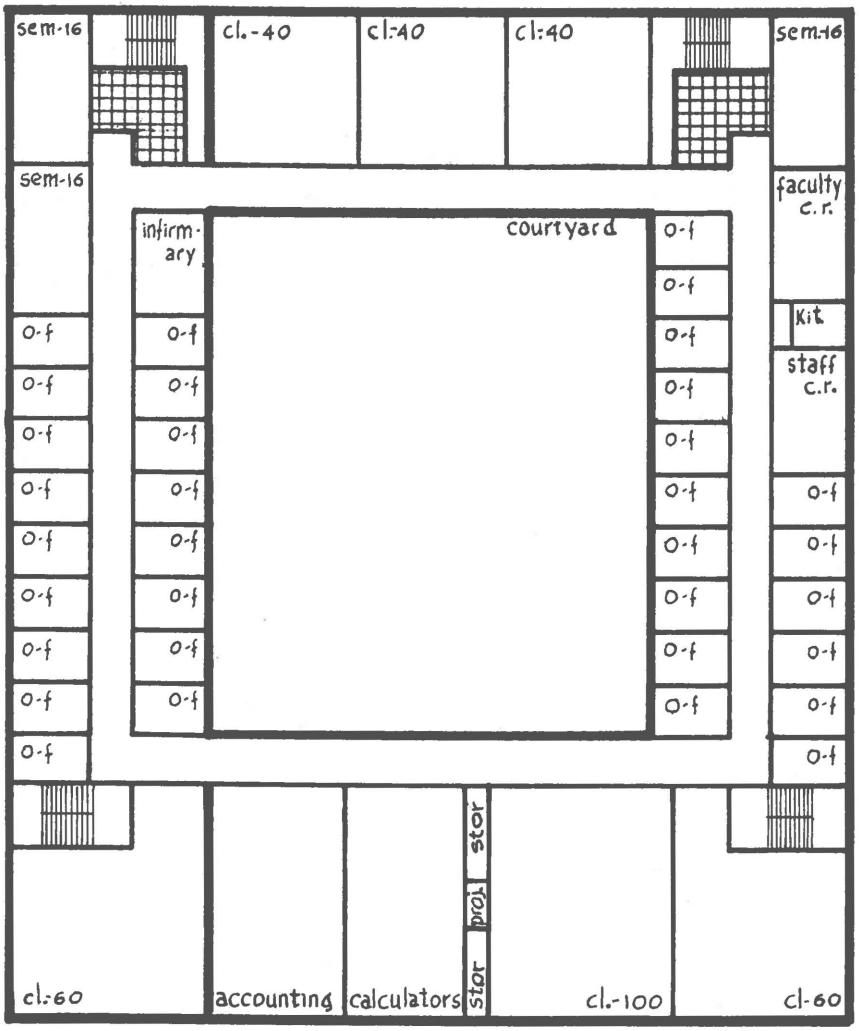
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ACADEMIC BUILDING
ENROLLMENT LEVEL: 1200

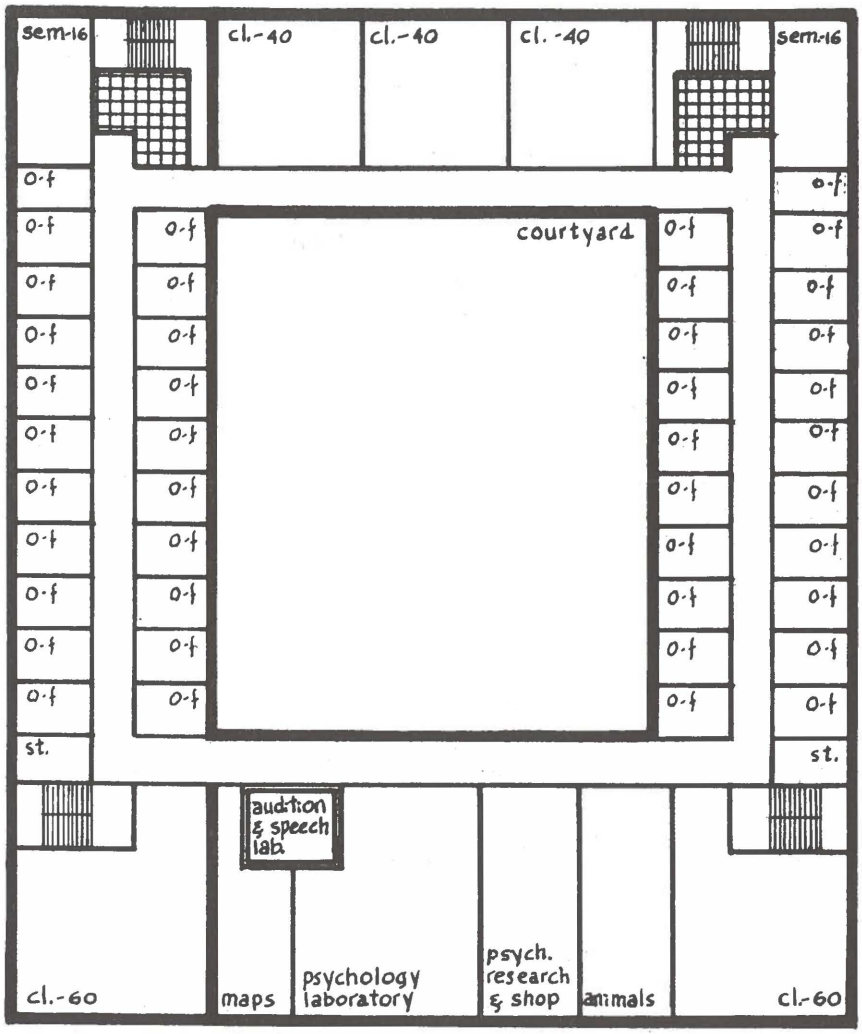
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ACADEMIC BUILDING
ENROLLMENT LEVEL: 1200

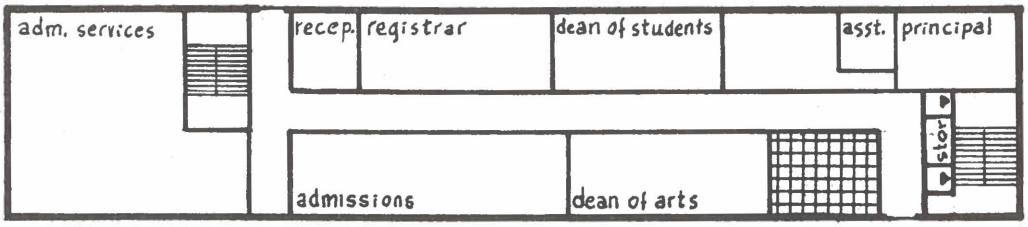
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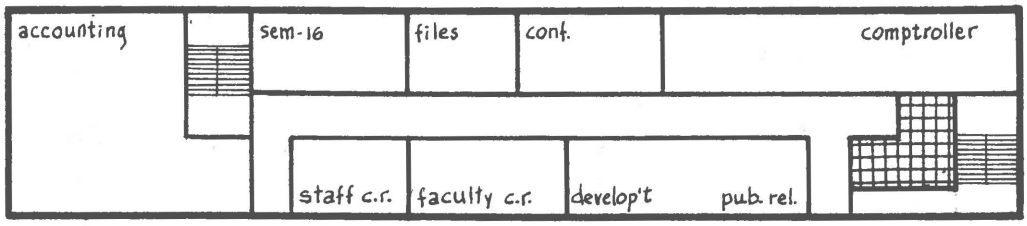
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ADMINISTRATION WING
ENROLLMENT LEVEL: 700

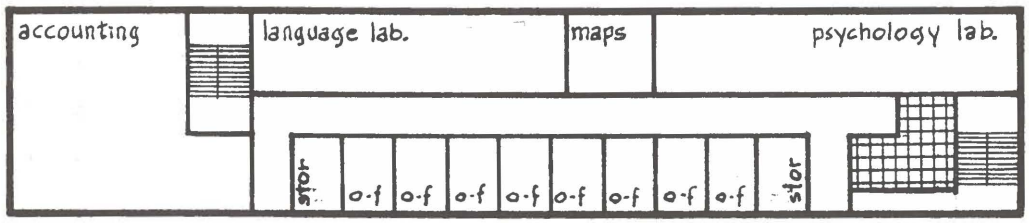
GROUND FLOOR



SECOND FLOOR



THIRD FLOOR



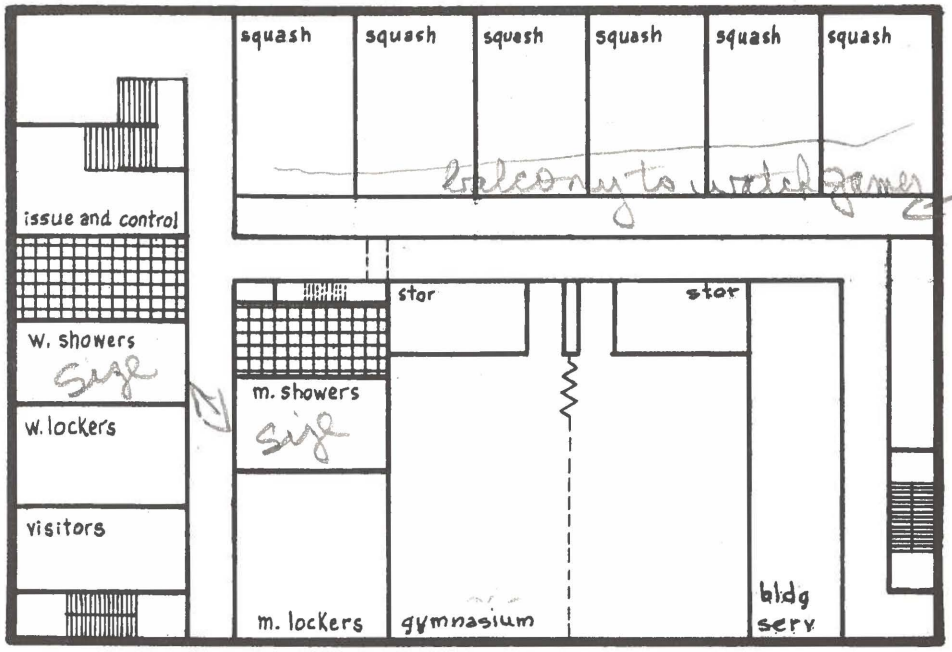




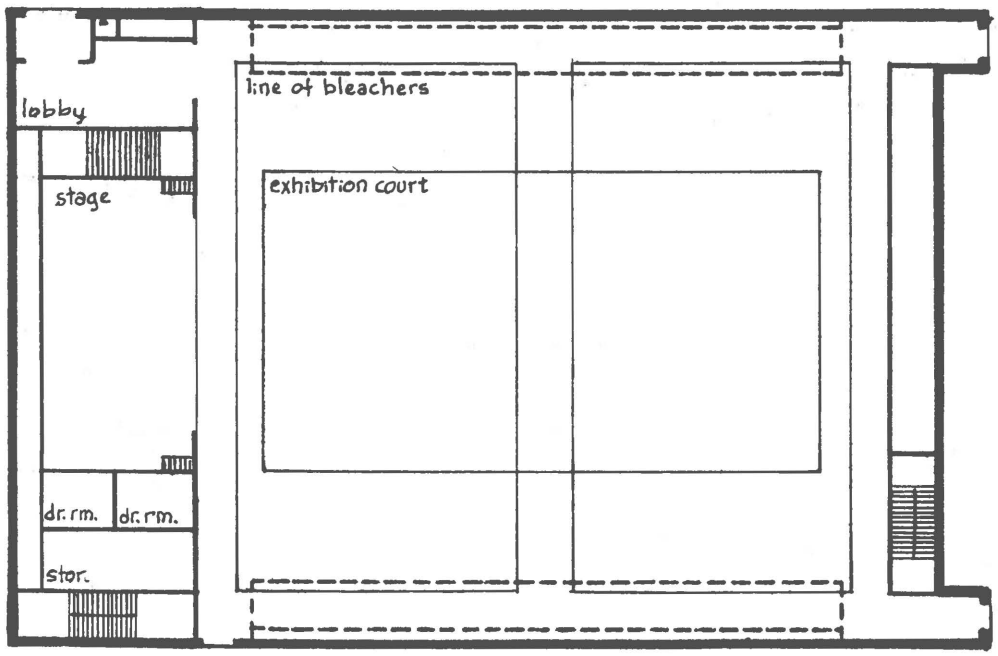
GYMNASIUM

ENROLLMENT LEVEL: 1200

BASEMENT



GROUND FLOOR

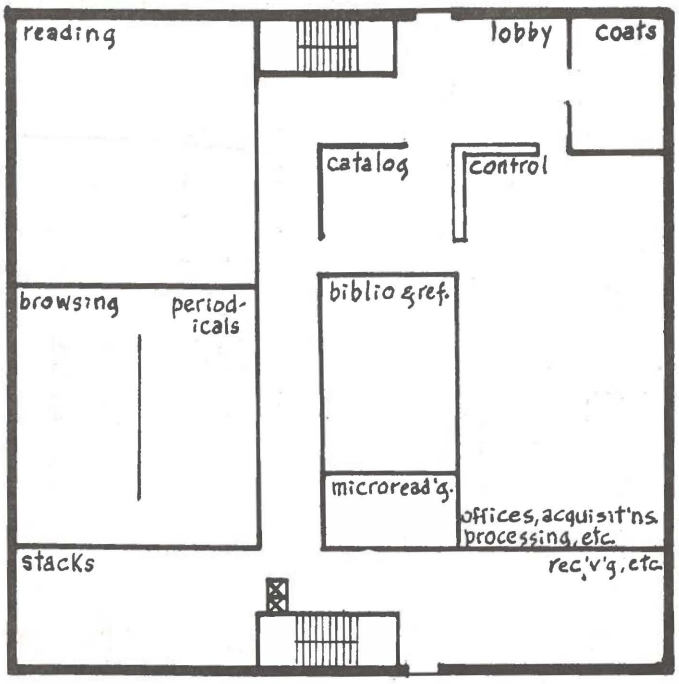


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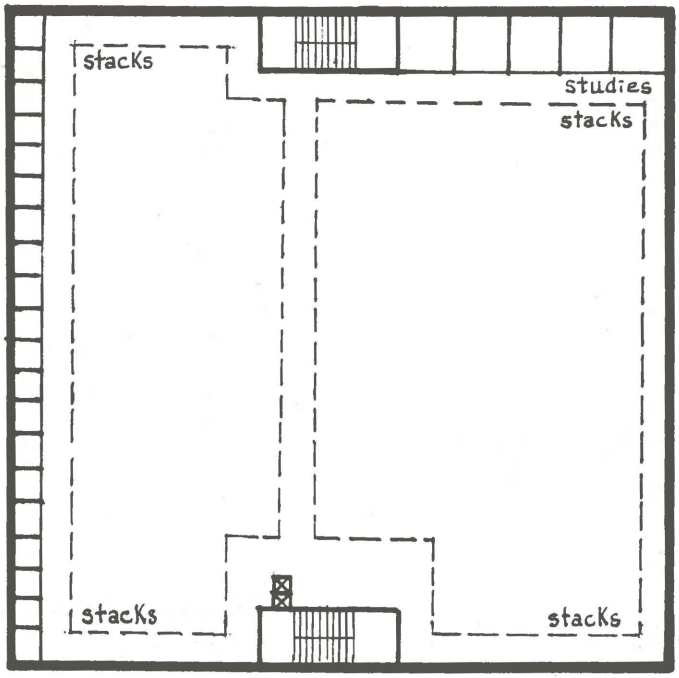
LIBRARY

ENROLLMENT LEVEL: 700 & 1200

GROUND FLOOR



SECOND FLOOR

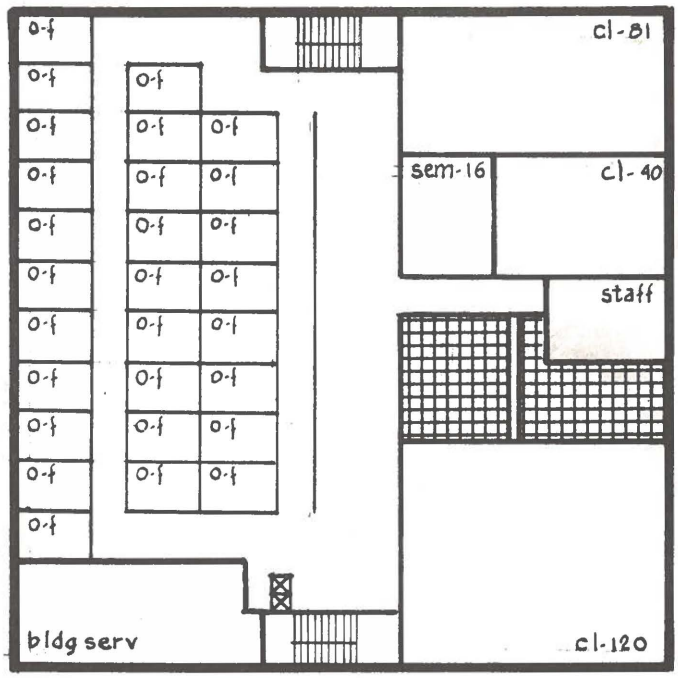


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LIBRARY

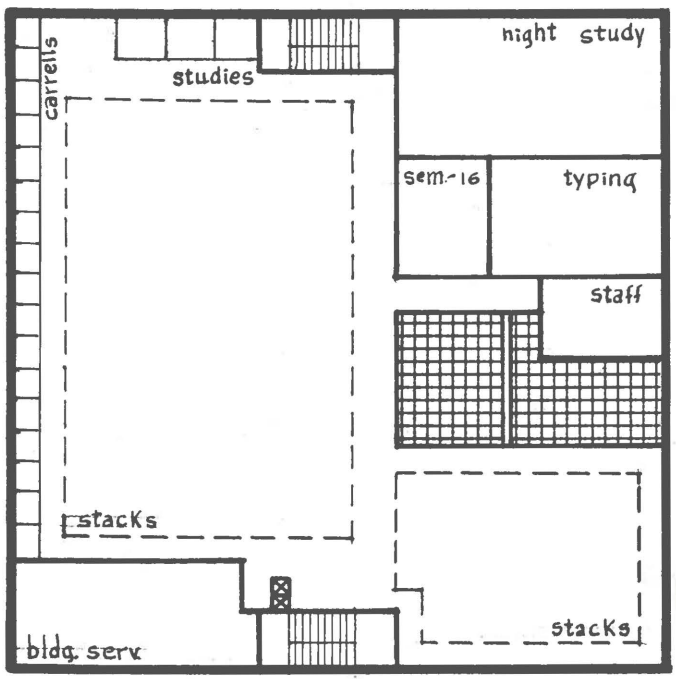
ENROLLMENT LEVEL: 700

LOWER LEVEL



ENROLLMENT LEVEL: 1200

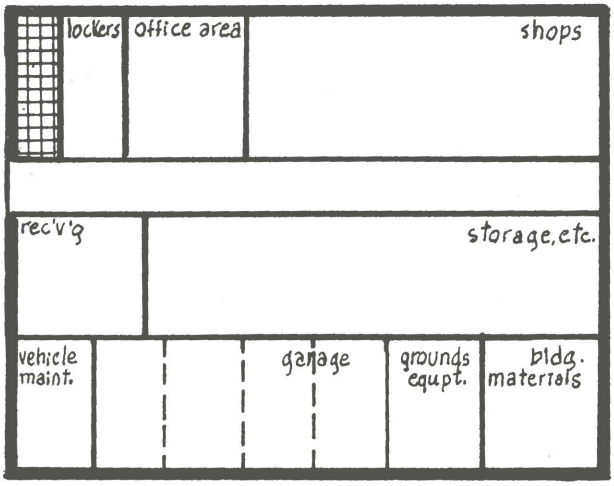
LOWER LEVEL



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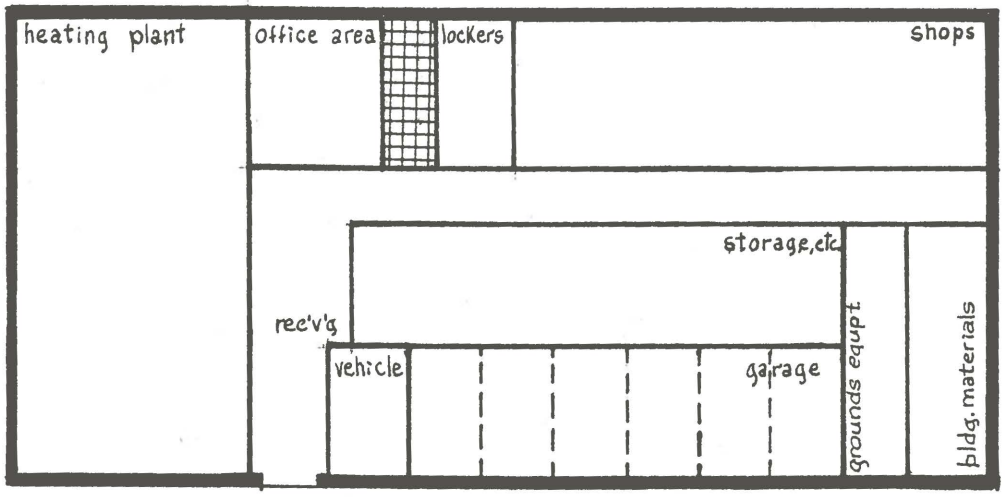
MAINTENANCE BUILDING
ENROLLMENT LEVEL: 700

GROUND FLOOR



ENROLLMENT LEVEL: 1200

GROUND FLOOR





CHAPTER 9

THE MASTER PLAN

A master plan for a campus may be described as the spatial organization of the physical environment, including buildings, roads, walks, parking areas, playing fields and landscape. The pattern of this organization is discussed in this chapter and is shown graphically in the drawing at the back of this volume. Both functional and aesthetic questions are necessarily considered. Although this report is not directly oriented towards matters of design, concepts such as harmony, balance and proportion become essential criteria when discussing the most suitable disposition of physical elements in space.

The development of the master plan emphasizes the target enrollment of 1200 students. Roads, buildings and other facilities designed to provide for the activities of interim enrollments should be so located as to fit into the pattern established for the College at the 1200 enrollment level. Reference to development after 1974 is also included in this chapter.

A. Existing Conditions

The site of Lakehead College comprises about 190 acres bounded on the north by Oliver Road, on the east by the Lakehead Teachers' College, on the west by the Port Arthur Golf and Country Club and on the south by property held by other institutions. The frontage on Oliver Road is interrupted by a trapezoid-shaped area of 14 acres, which is held privately. This property presently houses a gasoline service station.

The significant natural features of the campus are as follows:

1) The McIntyre River winds through the property from Oliver Road to the southern boundary, doubling back on itself over part of its route. It forms a natural asset of considerable potential beauty if integrated with landscaping and site development.

2) The property is largely flat. However, running in a generally northeast-southwest direction is a ridge, which drops sharply about 20 feet from a plateau with a prevailing elevation of about 675 square feet. South of the ridge in the eastern part of the property is a marshy area which is not suitable for development unless considerable money is expended in drainage and reclamation.

The river is also about 20 feet lower than the prevailing level, with embankments on both sides.

3) The views to the southeast, south and southwest are impressive in that they enable those at the College to see Mt. McKay, the Sleeping Giant, Lake Superior and other principal features of the area. Along the southern portion of the College property is a wooded area which provides an attractive landscape background. Access to the College is from Oliver Road, approached either from the northwest or the southeast. No entrance from any other point seems necessary. At some time in the future it is likely that an expressway will be built, extending north and south along the western boundary of the property. This will entail an effective loss to the College of 16 acres of property. Another 15 acres adjoining and east of the highway will be limited in its future usefulness because of

the noise and distraction associated with such a transportation artery. Nevertheless, it is quite possible for the College to construct on the present property sufficient buildings, playing fields, parking areas and other necessary facilities to accommodate an even larger institution than is the concern of this study.

At present there are three major structures on the campus, plus a temporary storage building and a gate house, which serves as a residence for a member of the maintenance staff. One of the three, the student residence, is located 300 feet from the University Centre and 500 feet from the science and technology building. It is well situated as a nucleus for a more extensive residential complex. However, it does not restrict or influence to any important degree the disposition of future non-residential buildings.

The existing academic(science and technology)building and University Centre will remain at the center of College activity throughout the course of development. It is worth nothing that,despite its size, covering a plot approximately 350 by 225 in extent, the academic building does not present a dominating or visually commanding appearance. This is due in part to its diffuseness of form, reflecting construction in four stages over seven years. The University Centre does suggest, because of its formal symmetry, a more monumental aspect. However, this building is at least partially obscured from view by the academic building over a considerable portion of the campus area.

The impression received by the Consultants, after careful examination

of the site and the existing buildings, is that the character of the man-made physical environment at Lakehead College has still to be established. It would seem likely that this character will derive more from buildings and site development anticipated over the next seven years than from those of the recent past.

B. Land Use Requirements

Before attempting to suggest specific locations for the proposed buildings, it is necessary to extend the programming of physical plant requirements to include elements other than structures. These elements are 1) parking areas, 2) playing fields, 3) other land use ancillary to building occupancy.

1. Parking Areas

Parking is required in some measure by all categories of personnel connected with Lakehead College activities. These categories may be considered as 1) students, 2) faculty, 3) staff and 4) visitors. Based on discussions with the Principal and others at the College, it was established that certain percentages of each of these categories of personnel would require parking stalls. These percentages include consideration of the fact that some members of each category may travel by bus, others may travel together in the same car and still others may be brought to the campus by friends or relatives who will require only unloading space. Table 9-1 indicates the number of personnel involved and also the total parking area required at each enrollment level.

9-1. Lakehead College of Arts, Science and Technology: Requirements for Parking Area

	Percent Requiring Accommodation	Total Number Enrollment			Number Requiring Accommodation Enrollment			Required Parking Area[d] Enrollment		
		400	700	1200	400	700	1200	400	700	1200
								(square feet)		
Students	20	400	700	1200	80	140	240	25600	44800	76800
Faculty	100[a]	35	64	105	35	64	105	11200	20480	33600
Staff[b]	80	40	55	75	32	44	60	10240	14080	19200
Visitors[c]	100	10	20	35	10	20	30	3200	6400	9600
Total	--	485	839	1413	157	268	433	50240	85760	139200

[a]Probably only 80-90 percent of faculty will require parking spaces. However, the higher percentage is used to compensate for the use of full-time equivalents in estimating the total number of faculty.

[b]Approximate only; includes staff associated with administration, library, maintenance and food service.

[c]Estimate of probable number of visitors' cars on campus at any one time.

[d]Based on average unit area of 320 square feet per parking stall.

2. Playing Fields

The College's requirements for outdoor athletic facilities are influenced by a number of factors, such as the long winter and severe cold; the lack, at present, of any indoor facilities, except for two squash courts; the isolation of the College, inhibiting intercollegiate activities; and the problem of organizing intramural activities in a small institution. Nevertheless, outdoor recreation is important to the students at the present time, limited though it be to games such as "broom ball", which require little except flat, open space.

Typical outdoor activities (football, soccer, etc.) require about one acre per field. At the 400-student enrollment level it is recommended that four such fields be available. At the 700-student enrollment level six fields will be desirable. At the 1200-student enrollment level, after the construction of the gymnasium, the relative intensity of use of the playing fields is likely to decline. Seven one-acre fields are programmed for this enrollment target.

3. Miscellaneous Land Use

In attempting to estimate land use requirements a fifth item must be added to the four elements -- buildings, parking areas, playing fields and roads. This last factor is the space between the buildings. It would be possible, but undesirable, to consider the buildings illustrated in the preceding chapter as a series of contiguous masses. A more likely assumption for preliminary planning is that the buildings will form a reasonably compact group with sufficient space between any two to provide light, air

and a sense of individuality to each. Thus the key concept here in estimating the land required for a group of buildings is density. A reasonable ratio to use in estimating is 30 percent. That is, 30,000 square feet of buildings at ground level will occupy 100,000 square feet of land. The areas of the building sites proposed for Lakehead, based on the schematic plans, are shown in table 9-2.

4. Summary

Land use requirements are summarized in table 9-2. In addition to the three categories described above, there is a listing for roads, estimated at 100,000 square feet (5,000 linear feet x 20 feet in width) for the 1200-student level.

These calculations are meant to provide only an approximation of the amount and distribution of acreage required for the development of a master plan. Additional space will of course be required for student and faculty residence, for expansion beyond 1200 students and for amenities such as informal recreation areas.

The pertinent figure is the approximately 26 acres required at the 1200-student enrollment level. This provides a program element important as a basis for the next stage of the planning process, the organization of the elements of the College as a master plan.

C. The Master Plan

A number of postulates are suggested by the Consultants relative to planning for growth at Lakehead. These are listed below.

9-2. Lakehead College of Arts, Science and Technology: Approximate Requirements for Land Use, 1200-Student Enrollment Level, Excluding Residences

Category	Ground Floor Area	Required Site
	(square feet)	
Existing buildings		
Academic building	79000[a]	
University Centre	25500	
Proposed buildings		
Library	12100	
Academic building	25000[a]	
Gymnasium	16950	
Maintenance building	12800	
Subtotal	171350	571165[a]
Parking fields	--	138560
Playing fields	--	304920
Roads	--	100000
Total		1114645[c]

[a]Includes courtyards entirely enclosed by building.

[b]Ground area is converted to required site by assuming a density factor of 30 percent in built-up area of campus. See text.

[c]This area is equivalent to approximately 26 acres.

1) The new buildings should be located south and east of the principal existing building, rather than between the existing building and Oliver Road. It is felt that, to take advantage of the potential of the site and the views to the south and east, the College should grow in the direction of the principal undeveloped area. This will permit the area between the road and the existing academic building to be used for playing fields and thus serve as a buffer zone between academic activities and the outside community.

2) The buildings should be clearly detached from one another, so that separate structures can express the complexity and variety of campus life. The quality of the experience of proceeding from building to building in a park-like setting is viewed as a desirable contrast to the character of urban street patterns.

3) Given the desirability of attaining the campus character described above, the climate limits the distances which may practically be interposed between buildings. Further, the cold and snow, extending through most of the academic year, become a time factor in that students and faculty must don boots, hats, and overcoats to proceed outdoors. Therefore, for those buildings which are to be part of the scheduled academic day, interior or weather-protected connections are desirable.

1. Circulation Patterns

In planning, the determination of circulation patterns precedes the specific determination of building locations. The classic device for organizing vehicular circulation is the perimeter road. Such a road would

enclose all the principal existing and proposed buildings, so that most of the pedestrian inter-building traffic will not intersect the road. Parking fields should adjoin the perimeter road and short service roads will be necessary for a few of the buildings. Otherwise, this one continuous loop can serve the entire area under discussion.

It is recommended that the road be 20 feet in width, adequate for two-way traffic, and that a parking lane be omitted. A parking lane would increase the cost of the road and, more important, would contribute to defeating one of the reasons for having such a road; namely, to permit the separation of inter-building traffic from parking and service traffic. For the developed areas of the campus to maintain the serenity and beauty of the surrounding area it will be necessary to enforce regulations permitting parking only in designated areas distinct from the roadway itself. An exception may have to be made for peak visiting days such as the opening of the College, commencement and the like, because no College can afford to design facilities for use on only a few occasions. However, this should occur only rarely and will not alter the basic recommendations.

The perimeter road should intersect the present road leading from Oliver Road.

For pedestrian traffic among the buildings used most continuously by the greatest number of students the Consultants recommend the construction of tunnels. The tunnels will connect the science and technology building with the proposed library and the proposed academic building. The two new buildings will be connected in the same manner. A tunnel may also be

constructed from the existing academic building to the University Centre. A tunnel connection to the proposed gymnasium is not considered essential. It is possible that, when a central heating system is installed for the College, these tunnels may also serve to contain the steam piping.

It is also proposed that, following the path of the tunnels, covered passages connect the buildings at grade. These covered walkways, which would not be otherwise enclosed are in part functional but in part designed as an adjunct to the appearance of the campus. They would form a court-yard enclosed by the science and technology building, the proposed academic building and the library.

2. The Master Plan

The required minimum of 26 acres can conveniently be found in the area east of the McIntyre River, south of Oliver Road, west of the present main entrance to the campus and north of the marsh-like terrain described earlier. This area is in fact about 40 acres, so that ample provision for expansion beyond 1974 exists. Included within these boundaries are the existing science and technology and University Centre buildings. The existing student residence is west of this area.

The specific recommendations for location of facilities are best understood by reference to the plan itself, but a few of the principal features will be described below.

It is proposed that immediately south of Oliver Road, between the present entrance road and the College property line, an area be reserved

for playing fields. This area (excluding the property immediately adjacent to the gate house) will measure about 350 feet by 1,000 feet. This space will provide the seven acres of playing field proposed for the 1200-student enrollment level. The perimeter road can be located between the playing fields and the area designated for all of the principal buildings except the gymnasium and the maintenance building. It is considered better practice to separate the gymnasium from the other buildings by the perimeter road than to divide the gymnasium from the playing fields.

The perimeter road describes an area about 900 x 900 feet. Within this area are all buildings except for the gymnasium, maintenance building and student residences. There is room for considerable expansion within the road's circumference, as indicated on the plan. The northeast strip of the road will border the existing parking field, so that the road may be constructed while this field remains operative. As soon as sufficient capacity is provided by the fields indicated on the plan, the existing field should be converted to turf in order to improve the appearance of the campus.

The library is located about 100 feet from the science and technology building, and the new academic building is indicated at a distance of 120 feet from the library and 130 feet from the existing structure. The three buildings, with the connecting passages, form a court about 200 x 140 feet in area. Despite the expense of the tunnels, it is felt that these distances between buildings should be maintained and not reduced. The intended effect of the scheme is to de-emphasize the science and technology building and shift the visual focus to the open quadrangle and to the two

new buildings at its southeast border.

Both these new buildings will be three stories in height, taller than science and technology and, it is anticipated, similar to each other in architectural design. These new buildings will dominate and give definition to the campus. It is felt that their impact should not be compromised by reducing the distances between them, or between them and the science and technology building.

The maintenance building is located outside the perimeter road area, on a spur road of its own. The building will not be dependent on pedestrian traffic, so that the distance from the other buildings on the campus does not pose any difficulties in communication. The site has two principal advantages: 1) Although the building need not be unattractive, its use as a center for various types of trucks, tractors and miscellaneous vehicular traffic generally results in a kind of aspect which goes counter to the serenity and order which one associates with a campus. Therefore, it is best isolated. 2) The location indicated is about ten feet lower in elevation than the prevailing level within the perimeter road. Should this maintenance building serve as the site of a central heating plant, which the Consultants consider a desirable eventuality, then the steam condensate can be returned by gravity. The location is also favorable in terms of prevailing winds and at least partial concealment of the smoke stack.

The building will have its own parking area, for employees and for visitors. Space is allowed for deliveries and truck maneuvering.

3. Future Expansion

The development of academic facilities beyond the 1200-student enrollment level has already been described in general terms. A few comments may be added on residential facilities, circulation and athletic facilities.

Student residence should develop in the immediate vicinity of the existing dormitory. Such a development is shown on the master plan. An addition to the existing building and a new, larger structure would provide for up to 300 students. Additional residences (not shown) could be added on the high ground south of those indicated on the plan.

At some time in the future a faculty residential community might be established on the campus. This could be located across the McIntyre River in the northwest sector of the campus.

The road which, on the master plan, is indicated as terminating near the student residence and maintenance building might then bridge the river, turn north and exit on Oliver Road between the proposed expressway and the existing service station.

Additional playing fields might be located immediately west of those shown on the plan, if the College acquires the property, and also between the entrance road and the Lakehead Teachers' College site. The latter might serve women students at such time as their numbers warranted separate facilities.

The development of the southwest sector of the property will probably not take place until the College has reached an enrollment of many times 1200 students and become a multi-faculty university.

4. Master Plan Delineation

The plan indicates roads, buildings, parking fields, playing field area and direction of future development. Contour and property lines are also indicated. Only a few footpaths are shown, as pedestrian traffic patterns are difficult to predict at this stage. Such paths can be set after student movement between buildings is defined.

CHAPTER 10

INSTITUTIONAL FINANCES

This chapter focuses upon the impact of the various aspects of campus development discussed earlier in the report upon the College's finances. It is divided into two broad sections. In the first, consideration is given to the operating statements of the College; that is, the non-capital expenditure and revenue elements of the College's financial life. The second half of the chapter then deals with the capital outlays implied by the campus development program and outlines a financial schedule consistent with the proposed expansion. Unless otherwise noted, all value data used in describing the College's financial life are expressed in 1962 dollar values.

A. Expenditures and Revenues

Tables 10-1 to 10-6 present the historical data concerning expenditures and revenues at the College since 1957-58. Total expenditures have increased from $98,000 in 1957-58 to an estimated $339,000 in 1962-63. Expressed in terms of expenditures per full-time student, there has been an increase from $793 per student to $1,515 per student during the specified time period. During the same interval, the proportion of total outlays devoted to instruction has increased from 54 percent of the total to 63 percent of the total. The proportion of outlays devoted to administration has also been increasing over the 1958-1963 fiscal span. On the other hand, the proportion of total expenditures devoted to plant operation and maintenance and other purposes has declined.

10-1. Lakehead College of Arts, Science and Technology: Summary of Expenditures, Fiscal Years 1958 to 1963

Budget Category	Fiscal Year Ending May 31					
	1958	1959	1960	1961	1962	1963[a]
	(1962 dollars)					
Expenditures: summary[b]	98393	120938	157675	208404	277501	339450
Instruction	53313	74656	96879	138737	182574	212000
Administration	6824	7533	8031	12856	17307	26550
Plant operation and maintenance	17943	18314	18511	24161	32421	27300
Other	20314	20434	34254	32651	45199	74600
Expenditure: detail						
Instruction	53313	74656	96879	138737	182574	212000
Salaries	47141	67505	78174	91074	121056	140000
Instructional supplies	2634	2389	1638	1879	2921	3000
Library	3308	4171	16388	45446	57105	67000
Travel	230	592	680	337	1492	2000
Administration	6824	7533	8031	12856	17307	26550
Office salaries and expense	4942	6350	6245	9654	14009	22800
Other	1881	1183	1786	3202	3297	3750
Plant operation and maintenance	17943	18314	18511	24161	32421	27300
Building	5333	8600	9088	12204	18035	10000
Grounds	5831	3980	3108	6361	7504	10000
Heat, light and water	5446	4896	5403	4640	5773	6100
Insurance	1332	837	911	956	1110	1200
Other	20314	20434	34254	32651	45199	74600
Extraneous	1490	2592	1198	1192	3767	19600
Capital expenditures charged to operations	3966	--	11945	7740	7918	15000
Depreciation	14858	17842	21112	23719	33515	40000

[a]Projected.

[b]Items may not add to totals due to rounding.

10-2. Lakehead College of Arts, Science and Technology: Summary of Revenues, Fiscal Years 1958 to 1963

Budget Category	Fiscal Year Ending May 31					
	1958	1959	1960	1961	1962	1963[a]
	(1962 dollars)					
Revenues: summary	114947	190390	186569	238262	287361	343150
Grants	89873	156663	152784	187483	202743	246000
Student fees	22600	31734	31216	48166	81864	94850
Other	2473	1994	2569	2613	2755	2300
Revenues: detail						
Grants	89873	156663	152784	187483	202743	246000
Municipal	16026	20921	20471	20243	20101	20000
Federal	20428	31140	24841	30600	31888	41000
Provincial	53419	104603	107472	136640	150754	185000
Student fees	22600	31734	31216	48166	81864	94850
Registration	1421	1579	1310	1832	2508	2500
Supplementary exams	310	476	379	304	337	350
Tuition	20870	29679	29527	46030	79020	92000
Other	2473	1994	2569	2613	2755	2300
Miscellaneous	869	726	869	812	902	500
Rentals: janitor's cottage; Rentals: rooms	1605	523	614	607	603	600
		745	1086	1194	1250	1200

[a]Projected.

[b]Items may not add to totals due to rounding.

10-3. Lakehead College of Arts, Science and Technology: Percentage Distribution of Expenditures, Fiscal Years 1958 to 1963

Budget Category	Fiscal Year Ending May 31					
	1958	1959	1960	1961	1962	1963[a]
Expenditures: summary[b]	100.0	100.0	100.0	100.0	100.0	100.0
Instruction	54.2	61.7	61.4	66.6	65.8	62.5
Administration	6.9	6.2	5.1	6.2	6.2	7.8
Plant operation and maintenance	18.2	15.1	11.7	11.6	11.7	8.0
Other	20.6	16.9	21.7	15.7	16.3	22.0
Expenditures: detail						
Instruction	54.2	61.7	61.4	66.6	65.8	62.5
Salaries	47.9	55.8	49.6	43.7	43.6	41.2
Instructional supplies	2.7	2.0	1.0	.9	1.1	.9
Library	3.4	3.4	10.4	21.8	20.6	19.7
Travel	.2	.5	.4	.2	.5	.6
Administration	6.9	6.2	5.1	6.2	6.2	7.8
Office salaries and expense	5.0	5.3	4.0	4.6	5.0	6.7
Other	1.9	1.0	1.1	1.5	1.2	1.1
Plant operation and maintenance	18.2	15.1	11.7	11.6	11.7	8.0
Building	5.4	7.1	5.8	5.9	6.5	2.9
Grounds	5.9	3.3	2.0	3.1	2.7	2.9
Heat, light and water	5.5	4.0	3.4	2.2	2.1	1.8
Insurance	1.4	.7	.6	.5	.4	.4
Other	20.6	16.9	21.7	15.7	16.3	22.0
Extraneous	1.5	2.1	.8	.6	1.4	5.8
Capital expenditures charged to operations	4.0	--	7.6	3.7	2.9	4.4
Depreciation	15.1	14.8	13.4	11.4	12.1	11.8

[a]Projected.

[b]Items may not add to totals due to rounding.

10-4. Lakehead College of Arts, Science and Technology: Percentage Distribution of Revenues, Fiscal Years 1958 to 1963

Budget Category	Fiscal Year Ending May 31					
	1958	1959	1960	1961	1962	1963[a]
Revenues: summary[b]	100.0	100.0	100.0	100.0	100.0	100.0
Grants	78.2	82.3	81.9	78.7	70.6	71.7
Student fees	19.7	16.7	16.7	20.2	28.5	27.6
Other	2.2	1.0	1.4	1.1	1.0	.7
Revenue: detail						
Grants	78.2	82.3	81.9	78.7	70.6	71.7
Municipal	13.9	11.0	11.0	8.5	7.0	5.8
Federal	17.8	16.4	13.3	12.8	11.1	11.9
Provincial	46.5	54.9	57.6	57.3	52.5	53.9
Student fees	19.7	16.7	16.7	20.2	28.5	27.6
Registration	1.2	.8	.7	.8	.9	.7
Supplementary exams	.3	.3	.2	.1	.1	.1
Tuition	18.2	15.6	15.8	19.3	27.5	26.8
Other	2.2	1.0	1.4	1.1	1.0	.7
Miscellaneous	.8	.4	.5	.3	.3	.1
Rentals: janitor's cottage	1.4	.3	.3	.3	.2	.2
Rentals: rooms		.4	.6	.5	.4	.3

[a]Projected.

[b]Items may not add to totals due to rounding.

10-5. Lakehead College of Arts, Science and Technology: Expenditures per Full-Time Day Student, Fiscal Years 1958 to 1963

Expenditure Category	Fiscal Year Ending May 31					
	1958	1959	1960	1961	1962	1963[a]
	(1962 dollars)					
Expenditures: summary[b]	793	812	1303	1198	1261	1515
Instruction	430	501	801	797	830	946
Administration	55	51	66	74	79	119
Plant operation and maintenance	145	123	153	139	147	122
Other	164	137	283	188	205	333
Expenditure: detail						
Instruction	430	501	801	797	830	946
Salaries	380	453	646	523	550	625
Instructional supplies	21	16	14	11	29	13
Library	27	28	135	261	260	299
Travel	2	4	6	2	7	9
Administration	55	51	66	74	79	119
Office salaries and expense	40	43	52	55	64	102
Other	15	8	15	18	15	17
Plant operation and maintenance	145	123	153	139	147	122
Building	43	58	75	70	82	45
Grounds	47	27	26	37	34	45
Heat, light and water	44	33	45	27	26	27
Insurance	11	6	8	5	5	5
Other	164	137	283	188	205	333
Extraneous	12	17	10	7	17	87
Capital expenditures charged to operations	32	--	99	44	36	67
Depreciation	120	120	174	136	152	179

[a]Projected.

[b]Items may not add to totals due to rounding.

10-6. Lakehead College of Arts, Science and Technology: Revenues per Full-Time Day Student, Fiscal Years 1958 to 1963

Revenue Category	Fiscal Year Ending May 31					
	1958	1959	1960	1961	1962	1963[a]
	(1962 dollars)					
Revenues: summary[b]	927	1278	1542	1369	1306	1532
Grants	725	1051	1263	1077	922	1098
Student fees	182	213	258	277	372	423
Other	20	13	21	15	13	10
Revenues: detail						
Grants	725	1051	1263	1077	922	1098
Municipal	129	140	169	116	91	89
Federal	165	209	205	176	145	183
Provincial	431	702	888	785	685	826
Student fees	182	213	258	277	372	423
Registration	11	11	11	11	11	11
Supplementary exams	2	3	3	2	2	2
Tuition	168	199	244	265	359	411
Other	20	13	21	15	13	10
Miscellaneous	7	5	7	5	4	2
Rentals: janitor's cottage	13	4	5	3	3	3
Rentals: rooms		5	9	7	6	5

[a]Projected.

[b]Items may not add to totals due to rounding.

10-7. Lakehead College of Arts, Science and Technology: Expenditures per Full-Time Student, By Major Expenditure, Category, Selected Years, 1957-58 to 1973-74

Year	Expenditures per Student				
	Total	Instruction	Administration	Plant Operation	Other
	(1962 dollars)				
1957-58	793	430	55	145	164
1958-59	812	501	51	123	137
1959-60	1303	801	66	153	283
1960-61	1198	797	74	139	188
1961-62	1261	830	79	147	205
1963-64[a]	1714	1188	100	159	266
1966-67[b]	1949	1403	112	151	282
1973-74[c]	2982	2250	167	172	390
Indexes of growth:					
1961-62[a]	1.000	1.000	1.000	1.000	1.000
1963-64[b]	1.359	1.431	1.266	1.082	1.298
1966-67[c]	1.546	1.690	1.418	1.027	1.376
1973-74	2.365	2.711	2.114	1.170	1.902

[a]Adjusted to 400-student enrollment.

[b]Adjusted to 700-student enrollment.

[c]Adjusted to 1200-student enrollment.

During the same interval, the College's revenues have risen from $115,000 to $343,000. Expressed on a per student basis, total revenues have increased from $927 per student in 1958 to $1,532 per student in 1963. By far the largest proportion of the College's revenues are accounted for by grants from various governmental bodies. In 1958, 78 percent of the revenues were derived from grants. After rising slightly in 1959, the proportion of total revenue derived from grants declined to approximately 72 percent in 1963. More than half of the College revenues are derived from Provincial grants. The proportion of total revenues accounted for by student fees has risen from 20 percent in 1958 to 28 percent in 1963. Revenues from other sources account for a negligible proportion of the total College income.

What developments can be expected during the course of the College's expansion to the 1200-student enrollment?

Considered on a per student basis, expenditures for instruction have increased from $430 per student in 1958 to $830 in 1962. During the same interval, expenditures per student for administration increased from $55 to $79, for plant operation and maintenance from $145 to $147, and for other purposes from $164 to $205. In short, the two most pronounced areas of increase in the expenditures of the College in servicing the expanding enrollment were in the areas of instruction and administration.

These trends, when projected, yield estimates of expenditures per student which show substantial increases over the current levels of outlay. Thus, total expenditures per student increase to $1,714 in 1963-64, $1,949 in 1966-67, and $2,982 in 1973-74. These represent increases of 36 percent,

55 percent and 137 percent above the 1961-62 level.

All of the components of outlay also reveal substantial increases. Thus, expenditures per student for instructional purposes rise from $830 per student in 1961-62 to $1,188 in 1963-64, $1,403 in 1966-67, and $2,250 in 1973-74 -- increases of 43 percent, 69 percent and 171 percent, respectively. The expenditures per student for administration, plant operation and maintenance, and other categories of expenditure also show marked increases over the 1961-62 levels, although the expansions are all of a lower order of magnitude than the increases in total expenditures per student or instructional expenditures per student.

The Consultants believe that these figures are reasonable. There is tremendous pressure in higher educational circles for substantial increases in faculty salaries. Apart from the problem of catching up with past shortcomings in the levels of faculty salaries vis-a-vis the earnings offered to persons of comparable competence in non-university activities, the general increases in productivity throughout the Canadian economy will force a sustained upward rise in the level of real faculty salaries over the course of the planning interval under consideration. Moreover, the College in 1961-62 was 26th among Canadian institutions in average faculty outlays The Consutlants believe that by the time the 400-student enrollment is reached, outlays for faculty salaries should reach $1,037 per student; and by the time the 1200-student enrollment is reached, outlays per student for faculty salaries should reach $1,341. In 1961-62, the comparable figure was approximately $550, reflecting the relatively low salary scale of the College and its relative isolation.

Nor are the other components of the increase in expenditures per student unusual. Increased enrollment and an increasingly varied program of curriculum offerings will require constant expansion in the scope of library acquisitions and in the amount of service offered by the library to the enlarged student body. The larger enrollment will necessitate a substantial increase in the size and scope of the administrative supporting units, both in central administration and, more importantly, in the supporting administrative units such as business services, record keeping services, typing services, student and staff service facilities and so on. Nor will plant operation and maintenance be left behind in the increased cost pattern. While there may be some economies in plant operation and maintenance costs per square foot of building space over the course of the College's expansion, there is such variety in the additional space and buildings that must be added to meet the College's expansion that the cost per student will rise even though the unit cost of maintenance per square foot of space may fall. By way of example, gymnasium facilities and student center facilities are not even included in the financial data for the 1958-63 fiscal period. In short, increased plant operation costs per student can be rationalized in terms of the increased scope and variety of services and activities being undertaken by the College as it expands from its present enrollment of 220 students to the 1200-student enrollment. While it may be possible for unit costs per student to decline for brief periods of time, it is characteristic of higher educational institutions that the long-term upward trend in costs per student is usually irreversible because of the constantly expanding horizons in the scope, character and quality of the services provided to the faculty and student body of the institution.

What revenues can the College expect to offset the expansion in total current operating outlays to approximately 3.6 million dollars that will accompany the expansion to the 1200-student enrollment?

It is clear from the financial data that the principal sources of revenue for the College have been grants from governmental bodies and student fees. Together, these have accounted for well over 95 percent of the College's current operating revenues. It seemed to the Consultants that an appropriate assessment of the future composition of the College's revenues should involve an evaluation of how high student fees are likely to go, a comparison of the estimated student fee level with projected total expenditures per student, and the treatment of grants from governmental bodies as a residual which reflects the amount of support needed from external sources to offset operating needs. The underlying data on revenues from student fees suggest that the $372 per student received in 1961-62 could rise to $469 in 1963-64, $557 in 1966-67, and $900 in 1973-74. As compared with the 1961-62 level, these represent increases of 26 percent by 1963-64, 50 percent by 1966-67, and 142 percent by 1973-74. In short, these are very rapid rises in the student fees charged at the College. In fact, they are more rapid than the increases in personal income projected for the country as a whole during the planning interval under consideration.

If other revenues per student are treated as a function of student fee revenues per student, a not unreasonable assumption since the components of this revenue category seem to be closely related to the level of enrollment and the over-all size of the category is relatively negligible, then the bulk of the College's revenues must still be derived from grants provided by governmental bodies. Taking revenues from student fees and other sources

10-8. Lakehead College of Arts, Science and Technology: Revenues per Full-Time Student, by Major Revenue Category, Selected Years, 1957-58 to 1973-74

Year	Revenues per Student				
	Total: Received or Required[a]	Student Fees	Other	Total: Non-Grants	Grants: Received or Required[a]
	(1962 dollars)				
1957-58	927	182	20	202	725
1958-59	1278	213	13	226	1051
1959-60	1542	258	21	279	1263
1960-61	1369	277	15	292	1077
1961-62	1306	372	13	385	922
1963-64[b]	1714	469	30	499	1215
1966-67[c]	1949	557	35	592	1357
1973-74[d]	2982	900	57	957	2025
Indexes of growth					
1961-62	1.000	1.000	1.000	1.000	1.000
1963-64[b]	1.312	1.261	2.308	1.296	1.318
1966-67[c]	1.492	1.497	2.692	1.538	1.472
1973-74[d]	2.283	2.419	4.385	2.486	2.196

[a]As indicated by projections of expenditures.

[b]Adjusted to 400-student enrollment.

[c]Adjusted to 700-student enrollment.

[d]Adjusted to 1200-student enrollment.

10-9. Lakehead College of Arts, Science and Technology: Estimated Faculty Salary Outlays at Alternate Target Enrollments, by Rank (in 1962 dollars)

Item	Rank				
	Professor	Associate Professor	Assistant Professor	Instructor and Lecturer	Total Faculty
			400 Students		
Average salary: 1963-64	14024	10600	8427	7202	--
Number of faculty	11	8	10	9	38
Faculty salary outlays					
Total (000)	154	85	84	65	388
Per student	386	212	211	162	970
			700 Students		
Average salary: 1966-67	15774	11923	9478	8100	--
Number of faculty	18	14	17	15	64
Faculty salary outlays					
Total (000)	284	167	161	122	734
Per student	406	238	230	174	1048
			1200 Students		
Average salary: 1973-74	20751	15685	12469	10656	--
Number of faculty	29	23	28	25	105
Faculty salary outlays					
Total (000)	602	361	349	266	1578
Per student	501	301	291	222	1315

N.B. Faculty salary estimates for Central Canada based upon growth of 4 percent per annum were used in projecting Lakehead College outlays.

and subtracting them from the total revenues required to offset the total expenditures per student already estimated, the College must increase its revenues from grants from $922 per student in 1961-62 to $1,215 in 1963-64, $1,357 per student in 1966-67, and $2,025 per student in 1973-74. Relative to the 1961-62 grants, these represent increases of 32 percent by 1963-64, 47 percent by 1966-67, and 120 percent by 1973-74.

How reasonable are these estimates? It would certainly seem from a review of past experience that the revenue side of college and university financial life tends to be passive; that is, revenues rise only because the colleges go out and seek the means to support and sustain the higher levels of expenditure that are associated with the increasingly costly commodity known as education. Thus, if there are any weaknesses in the analysis, they would seem to be on the cost side rather than on the revenue side. Moreover, distasteful though it may be to contemplate, student fees have been rising, and rising significantly, during the post-World War II period. The increases have been a response to the rapidly rising cost of providing a higher education in the context of an increasing departure from the relatively inexpensive classical education curriculum and the keen competition facing higher educational institutions from non-academic employment sources. Moreover, the increases have been much more rapid than the increases in the levels of total expenditures per student. Indeed, at the College, revenues from student fees have increased relatively more rapidly than revenues from grants; the latter have experienced much more modest increases during the historical interval under examination. Moreover, there appears to be no reason to assume that governmental bodies will absorb an increasing share of the educational burden, given the vigorous competition for the tax

dollar provided by a whole spectrum of governmental services outside the sphere of education.

However, there is the possibility that student fees may not be able to keep pace with the increased costs of education. If this were the case, and student fees could increase no more rapidly than the cost of providing educational services, then it seems likely that the most obvious source to be tapped for making up the difference between what is required and what is available from student fees and governmental grants will be private sources -- benefactions, grants and the income from endowments yet to be made to the College. If student fees cannot keep pace with the cost rise projected above and increased revenues from new sources such as private benefactions are not forthcoming, there is no alternative to increased revenues from government sources, unless a lower scale of services than has been anticipated in the analyses underlying this study is offered to the students at the College during the coming decade.

B. Capital Costs and Phasing of Construction

1. Procedure

This study includes estimates of the cost and phasing of the building program and master plan. The schedule of outlays and priorities associated with them is presented in table 10-12. These estimates do not include routine maintenance and minor repair projects, which are considered to be incorporated in the operating budget.

Sources for determining unit costs for construction work included commercial surveys and indexes and also representative Canadian architects.

10-10. Lakehead College of Arts, Science and Technology: Preliminary Budget Estimates for Site Development Work

Item	Quantity Enrollment 400	700	1200	Unit	Unit Price[a]	Amount Enrollment 400	700	1200
						(1962 dollars)		
Parking field (175)	57000	--	--	S.F.	.60	34200	--	--
Parking field (90)	--	25600	--	S.F.	.60	--	15360	--
Parking field (90)	--	--	25600	S.F.	.60	--	--	15360
Parking field (40)	--	15000	--	S.F.	.60	--	9000	--
Parking field (30)	--	--	16000	S.F.	.60	--	--	9600
Perimeter road	3850	300	--	L.F.	15	57750	4500	--
Other roads and service yards	4000	15000	7500	S.F.	.60	2400	9000	4500
Landscaped area[b]	3.5	8	4.5	Acre	7000	24500	56000	31500
Playing fields	4	2	1	Acre	3000	12000	6000	3000
Total						130850	99860	63960

[a]Abbreviations: L.F. = linear feet; S.F. = square feet.

[b]This item includes planting, footpaths, benches and miscellaneous decorative features.

10-11. Lakehead College of Arts, Science and Technology: Preliminary Budget Estimate for Utilities Systems

Item	Quantity, Enrollment 400	Quantity, Enrollment 700	Quantity, Enrollment 1200	Unit	Unit Price[a]	Amount, Enrollment 400	Amount, Enrollment 700	Amount, Enrollment 1200
						(1962 dollars)		
Electrical distribution system[b]								
Underground distribution	500	1750	1250	L.F.	10	5000	17500	12500
Outside lighting	20	10	10	Ea.	350	7000	3500	3500
Miscellaneous	--	--	--	L.S.	--	5000	10000	10000
Water supply system								
Underground water mains and fire hydrants	--	1500	1500	L.F.	9	--	13500	13500
Storm drainage system								
Storm sewers	--	2000	2000	L.F.	8	--	16000	16000
Miscellaneous	--	--	--	L.S.	--	5000	7500	5000
Sanitary system[c]	--	--	--	--	--	--	--	--
Total[d]						22000	68000	60500

[a]Abbreviations: L.F. = linear feet; Ea. = each; L.S. = lump sum.

[b]This table excludes the contract for a sub-station and distribution to existing buildings.

[c]It is assumed that a sewer line will be installed by the City; connections to this line are included under project cost in table 10-12.

[d]Utilities implied by additional student residence are not included.

10-12. Lakehead College of Arts, Science and Technology: Schedule of Capital Development, Priority Phasing and Budget Outlays

Target Year of Completion[a]	Item	Area (gross sq. ft.)	Unit Cost (1962 dollars/ sq. ft.)	Cost: Basic Project (thousands of 1962 dollars)	Additional Costs (percent of basic project)	Cost: Total Project (thousands of 1962 dollars)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1964	Alterations and additions to existing academic building -					
	alterations:	--	--	10.0	20	12.0
	additions:	7000	18	126.0	20	151.2
1964	Site development[b]	--	--	140.5	15	161.6
1964	Bus station	--	--	5.0	15	5.8
1965	Library	36300	23	834.9	25	1043.6
1965	Tunnels[c]	1980	11	21.8	15	25.1
1965	Utilities[d]	--	--	22.0	15	25.3
1965	Administration wing, new academic building	19075	21	400.6	20	480.7
1965	Tunnels[e]	3150	11	34.7	15	39.8
1966	Maintenance building	7800	14	109.2	15	125.6
1967	Site development[b]	--	--	99.9	15	114.9

(Continued)

10-12. (Continued)

Target Year of Completion[a]	Item	Area (gross sq. ft.)	Unit Cost (1962 dollars/ sq. ft.)	Cost: Basic Project (thousands of 1962 dollars)	Additional Costs (percent of basic project)	Cost: Total Project (thousands of 1962 dollars)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1967	Utilities[d]	--	--	68.0	15	78.2
1967	Alterations to existing academic building	--	--	95.0	35	128.3
1967	Alterations and additions to University Centre -					
	alterations:	--	--	15.0	20	18.0
	additions:	3175	25	79.4	40	111.2
1967	Gymnasium	33900	17	576.3	20	691.6
1967	Academic building	39955	20	799.1	20	958.9
1967	Site development[b]	--	--	64.0	15	73.6
1967	Utilities[d]	--	--	60.5	15	69.6
1968	Addition to maintenance building	5000	14	70.0	15	80.5
1968	Alterations to library	--	--	10.0	20	12.0
	Total[f]	--	--	--	--	4407.5

(Continued)

10-12. (Continued)

[a]It is assumed that each project is to be completed by September of the listed target year. Thus, 1964 refers to the beginning of the academic year 1964-65.

[b]See table 10-10.

[c]Includes tunnels from science and technology building to library and University Centre.

[d]See table 10-11.

[e]Includes tunnels from proposed academic building (administrative wing) to library and science and technology building.

[f]Total excludes student residences, as their construction will depend on College policy, as noted in Chapter 7. For 250 additional residents 58,500 gross square feet would be required over the years 1964-74. At nineteen dollars per square foot the basic cost would be $1,111,500 and the total project cost would be 20 percent higher or $1,334,250.

The Consultants are indebted to the firm of Mickelson, Fraser and Haywood for their assistance in this aspect of the study.

Commercial construction surveys proved to be of only limited usefulness, as their data on Canadian cities include Toronto but not the Lakehead area. Nor is their information organized in sufficient detail to permit the various types of projects represented at the College to be identified and differentiated. Therefore, greater emphasis was placed on local architects' and engineers' experience, including the work recently completed at the College.

Table 10-12 distinguishes between the cost of the basic project and the cost of the total project. The basic project cost can be equated with the amount of the general construction contract, which, it is assumed, includes built-in and fixed equipment. The cost of the total project includes the other sums which must be expended by the client before the building can be occupied. These sums include professional fees, movable furniture and certain minor outlays for site and utilities work not covered elsewhere as separate items. The difference between basic cost and total cost is expressed as a percentage of basic cost and varies with the nature of the project.

It is assumed that the new buildings will be simple in detail and finish but of materials that are non-combustible and easy to maintain. Equipment is assumed to be of first-class institutional quality.

2. Phasing and Priorities

The items in table 10-12 are arranged in chronological order as to

completion dates of construction. Some of the recommendations can be interpreted with flexibility, some are virtually mandatory. The construction of the perimeter road, the large parking field, the west wing of the science and technology building and the library should be undertaken immediately. The maintenance building could also well be built in the immediate future; the workload of the maintenance staff will increase greatly with the expansion of both developed campus area and gross building space. Nevertheless, some deferral of this building's priority would be possible, as indicated in the table.

The gymnasium would be an important adjunct to the College at any time. Its lower priority listing reflects the greater emphasis placed on academic facilities and also the long-range desirability of building a gymnasium adequate for over 1000 students in one stage. Advancing the construction date of the gymnasium would add greatly to the excess space on the campus at the time of its completion.

The area of greatest possible variation from the schedule in table 10-12 consists of the academic facilities to be built subsequent to the construction of the library. For an enrollment greater than about 700 students, a building of at least 11,000 net square feet will be required. Much of this is for administration and the resulting structure would be about the same size as, or slightly smaller than the administration wing shown in the schematic plans. However, if a larger building were to be built at this time, then the balance of the academic space, listed for completion by September, 1967 in the table, could be deferred. Or, alternately, the building could be built in three stages, rather than two. Instead of a wing of 19,075 gross square feet to be completed in 1965 and a

balance of 39,955 to be completed in 1967, the total of 59,030 gross square feet might be distributed equally among three target years, probably 1965, 1968 and 1971.

Student residences are not included in the table, although their potential cost in relation to an enrollment of 1200 students is listed in a footnote. This cost could be prorated over time to provide for housing a maximum of 300 students between 1964 and 1974.

3. Site Development

This heading refers to parking fields, roads, paths, landscaping and playing fields. A breakdown of costs by item and enrollment level is shown on table 10-10. These costs are then summarized on table 10-12, where the total cost for each target enrollment level is entered at the appropriate point in the priority listing.

4. Utilities

Cost estimates for utilities can only be presented in rough terms at this time; preliminary engineering design work would be required to produce more detailed studies of cost for these elements.

In general the College will proceed to develop utilities on an institutional, centralized basis over the next decade, rather than as a series of self-contained systems related to individual buildings. For example, instead of separate drainage fields to accommodate sewerage, it is expected that an extension of the city sewer system will reach the campus in the next few years as a continuation of the piping line from Katherine Street.

In electrical power supply, a central sub-station is under contract. In heating, each building to date has been equipped with a package boiler unit. The Consultants believe that in time a central heating plant and steam distribution system will be used; however, quantifying this viewpoint would imply engineering feasibility studies outside the scope of this report.[a] Therefore, no specific costs on either the central heating plant or the steam distribution system are listed. The unit costs of buildings listed in table 10-12 are considered adequate to include self-contained heating systems.

Table 10-11 lists utility system estimates, organized in a similar manner to site development costs. These figures are also incorporated in table 10-12.

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[a]The Consultants prepared questionnaires and received replies from five Ontario universities on the subject of central vis-a-vis individual package heating systems. These replies have been forwarded to Lakehead College separately from this report.

APPENDIXES

APPENDIX A

ENROLLMENT

A-1. Canada and Ontario: Population, Total and 18-21 Years Age Group, Selected Years, 1941 to 1971

Year	Total Population			18-21 Years Age Group		
	Canada[a]	Ontario[b]	Ratio: Ontario/ Canada	Canada[c]	Ontario[d]	Ratio: Ontario/ Canada
	(000)			(000)		
1941	11507	3788	.329	n/a	266.5	--
1946	12292	4093	.333	865.2	273.3	.316
1951	14009	4598	.328	851.8	264.3	.310
1956	16081	5405	.336	895.1	282.5	.316
1961	18238	6236	.342	1016.4	316.7	.312
1966	19518	6990	.358	1222.6	418.6	.342
1971	21643	7898	.365	1484.9	487.6	.328

N.B. Projections for 1966 and 1971 were taken or adapted from the following sources:

[a]W.C. Hood and Anthony Scott, Output Labor and Capital in the Canadian Economy.

[b]Ontario Department of Economics, Ontario, Economic and Social Aspects Survey, 1961.

[c]Dr. E.F. Sheffield, Enrollment in Canadian Universities and Colleges to 1970-71 (1961 Projection).

[d]Dr. R.W.B. Jackson, Secondary School and University Enrollment Study: Volume I: Basic Tables.

A-2. Canada and Ontario: Undergraduate University-Grade Enrollments, Fall Semester, Selected Years, 1944-45 to 1970-71

Year[a]	Undergraduate Enrollment			Non-Veteran Undergraduate Enrollment		
	Canada	Ontario	Ratio: Ontario/ Canada	Canada	Ontario	Ratio: Ontario/ Canada
1944-1945	38376	12297	.320	37859	11335	.299
1945-1946	61861	20278	.328	41861	12078	.289
1946-1947	76237	25848	.339	42237	11818	.280
1947-1948	79346	27648	.348	49746	10446	.210
1948-1949	75807	26303	.347	54007	15127	.280
1949-1950	69111	23679	.343	56062	17082	.305
1950-1951	64036	21268	.332	57910	18159	.314
1951-1952	59849	19495	.326	57385	18677	.325
1952-1953	60046	19333	.322	58921	18453	.313
1953-1954	61198	19037	.311	60665	18239	.301
1954-1955	62291	19137	.307	61886[b]	19137	.309
1955-1956	66277	20037	.302	66086	20037	.303
1956-1957	72629	21263	.293	72479	21263	.293
1957-1958	80443	23174	.288	80371	23174	.288
1958-1959	88010	24927	.283	87959	24927	.283
1959-1960	96766	27189	.281	96722[c]	27189	.281
1960-1961	107482	29501	.274	107450	29501	.275
1961-1962	121547	32968	.271	121524	32968	.271
1965-1966	169900	57900	.341	169900	57900	.341
1970-1971	286600	107100	.374	286600	107100	.374

N.B. Projections of enrollment are adapted from estimates prepared by Dr. E. F. Sheffield and Dr. R. W. B. Jackson.

[a]Fall semester.

[b]Estimate: 191 veterans.

[c]Estimate: 32 veterans.

Source data: DBS publications on Fall undergraduate enrollment. Projections from Sheffield publication, 1962 and Jackson estimate #6. See tables V-1 and V-3. N.B. Jackson estimate may be low.

A-3. Canada: Undergraduate Enrollment, Total and Enrollment in Arts and Pure Science Programs, Selected Years, 1931 to 1962

Academic Year Ending in	Under-graduate Enrollment				Arts and Pure Science as Percent of All Programs
	Arts	Pure Science	Arts and Pure Science	Total: All Programs	
			(number)		
1931	a	a	16828	31576	53.29
1936	a	a	17741	33522	52.92
1941	a	a	17634	34817	50.65
1946	a	a	31229	61861	50.48
1951	a	a	29771	64036	46.49
1953	a	a	27548	60046	45.88
1954	a	a	27499	61198	44.93
1955	23504	4214	27718	62291	44.50
1956	24246	4548	28794	66277	43.44
1957	26341	5151	31492	72629	43.36
1958	29845	6001	35846	80443	44.56
1959	33296	7521	40817	88010	46.38
1960	37179	8209	45388	96766	46.90
1961	42670	9237	51907	107482	48.29
1962	49332	12215	61547	121547	50.64
			(indexes: 1962 = 1.000)		
1931	a	a	.273	.260	1.052
1936	a	a	.288	.276	1.045
1941	a	a	.287	.286	1.000
1946	a	a	.507	.509	.997
1951	a	a	.484	.527	.918
1953	a	a	.448	.494	.906
1954	a	a	.447	.503	.887
1955	.476	.345	.450	.512	.879
1956	.491	.372	.468	.545	.858
1957	.534	.422	.512	.598	.856
1958	.605	.491	.582	.662	.880
1959	.675	.616	.663	.724	.916
1960	.754	.672	.737	.796	.926
1961	.865	.756	.843	.884	.954
1962	1.000	1.000	1.000	1.000	1.000

[a]Not available.

A-4. Ontario: Undergraduate Enrollment, Total and Enrollment in Arts and Pure Science Programs, Selected Years 1931 to 1962

Academic Year Ending in	Undergraduate Enrollment				Arts and Pure Science as Percent of All Programs
	Arts	Pure Science	Arts and Pure Science	Total: All Programs	
			(number)		
1931	a	a	5387	11414	47.20
1936	a	a	5801	12066	48.07
1941	a	a	5408	11693	46.25
1946	a	a	9320	20278	45.96
1951	a	a	9330	21268	43.87
1953	a	a	7990	19333	41.33
1954	a	a	7701	19037	40.45
1955	6512	968	7480	19137	39.09
1956	6758	1017	7775	20037	38.80
1957	7514	1126	8640	21263	40.63
1958	8567	1488	10055	23174	43.39
1959	9909	1564	11473	24927	46.03
1960	10970	1765	12735	27189	46.84
1961	12284	2239	14523	29501	49.23
1962	13780	3571	17351	32968	52.63
			(indexes: 1962 = 1.000)		
1931	a	a	.310	.346	.897
1936	a	a	.334	.366	.913
1941	a	a	.312	.355	.879
1946	a	a	.537	.615	.873
1951	a	a	.538	.645	.834
1953	a	a	.460	.586	.785
1954	a	a	.444	.577	.769
1955	.473	.271	.431	.580	.743
1956	.490	.285	.448	.608	.737
1957	.545	.315	.498	.645	.772
1958	.622	.417	.580	.703	.824
1959	.719	.438	.661	.756	.875
1960	.796	.494	.734	.825	.890
1961	.891	.627	.837	.895	.935
1962	1.000	1.000	1.000	1.000	1.000

[a]Not available.

A-5. Canada: Professional Workers, by Occupational Groups and Classes; Selected Years, 1931 to 1961

Group and Class	1931	1941	1951	1961
All professional groups[a]	200662	240402	302557	524000
Teachers, instructors	82983	88279	105118	178027
Professors, college principals	3200	4217	5422	11145
Social scientists	29120	39695	54092	60787
Accountants, auditors	17623	25887	34151	30670
Actuaries and statisticians[b]	217	491	1000	2901
Judges, magistrates	544	481	597	834
Lawyers, notaries	8058	8621	9038	12088
Librarians	1009	1578	2061	3439
Social workers	892	1460	3995	10855
Statisticians	(138)	(327)	(742)	(b)
Others	777	1177	3250	--
Artists, writers, clergymen	27426	31007	36243	50676
Artists, art teachers	2618	3492	4896	7451
Authors, editors, journalists	3344	4580	7217	13030
Clergymen, priests	12678	14474	16097	18924
Musicians, music teachers	8786	8461	8033	11271
Life scientists	37499	47187	59907	95756
Agricultural professionals	899	1375	2698	2746
Veterinarians	1046	1095	1205	1524
Dentists	4039	4210	4608	5469
Dieticians	491	935	1101	1915
Graduate nurses	20462	27114	35138	61699
Osteopaths, chiropractors	542	585	832	1113
Physicians, surgeons	10020	11873	14325	21290
Physical scientists	20434	30017	41775	43244
Architects	1298	1313	1740	2940
Chemists, metallurgists	3318	8203	8574	6142
Engineers				
Civil	7524	7470	12168	11917
Electrical	3937	5118	6349	8763
Mechanical	2859	4870	8328	8137
Mining, chemical	1498	3043	4616	5345

[a]Adjusted total. Items may not add to totals due to incomplete data.

[b]Actuaries and statisticians are combined because of the manner in which the data were reported for 1961.

A-6. Canada: Indexes of Growth for Professional Workers, by Occupational Groups and Classes; Selected Years, 1931 to 1961

Group and Class	1931	1941	1951	1961
All professional groups	.383	.459	.577	1.000
Teachers, instructors	.466	.496	.590	1.000
Professors, college principals	.287	.378	.486	1.000
Social scientists	.479	.653	.890	1.000
Accountants, auditors	.575	.844	1.113	1.000
Actuaries and statisticians	.075	.169	.345	1.000
Judges, magistrates	.652	.577	.716	1.000
Lawyers, notaries	.667	.713	.748	1.000
Librarians	.293	.459	.599	1.000
Social workers	.082	.135	.368	1.000
Others	a	a	a	a
Artists, writers, clergymen	.541	.592	.715	1.000
Artists, art teachers	.351	.469	.657	1.000
Authors, editors, journalists	.257	.351	.554	1.000
Clergymen, priests	.670	.765	.851	1.000
Musicians, music teachers	.780	.751	.713	1.000
Life scientists	.392	.493	.626	1.000
Agricultural professionals	.327	.501	.983	1.000
Veterinarians	.686	.719	.791	1.000
Dentists	.739	.770	.843	1.000
Dieticians	.256	.488	.575	1.000
Graduate nurses	.332	.439	.570	1.000
Osteopaths, chiropractors	.487	.526	.748	1.000
Physicians, surgeons	.471	.558	.673	1.000
Physical scientists	.473	.694	.966	1.000
Architects	.441	.447	.592	1.000
Chemists, metallurgists	.540	1.336	1.396	1.000
Engineers				
Civil	.631	.627	1.021	1.000
Electrical	.449	.584	.725	1.000
Mechanical	.351	.599	1.023	1.000
Mining, chemical	.280	.569	.864	1.000

[a]Data not available.

A-7. Ontario: Professional Workers, by Occupational Groups and Classes; Selected Years, 1931 to 1961

Group and Class	1931	1941	1951	1961
All professional groups[a]	74172	80120	116179	164630
Teachers, instructors	23659	25110	30022	56525
Professors, college principals	687	1089	1424	3052
Social scientists[b]	11598	17398	20774	25503
Accountants, auditors	7382	12409	13813	12885
Actuaries and statisticians[c]	--	--	542	1598
Judges, magistrates	176	165	196	282
Lawyers, notaries	2792	3103	3388	4902
Librarians	622	866	1037	1663
Social workers	626	855	1798	4173
Statisticians	--	--	(376)	--
Others	--	6130	7089	--
Artists, writers, clergymen	10758	11956	13928	20018
Artists, art teachers	1317	1710	2362	3603
Authors, editors, journalists	1465	1877	3189	5739
Clergymen, priests	4303	4827	5132	6195
Musicians, music teachers	3673	3542	3245	4481
Life scientists	15455	18567	23328	37579
Agricultural professionals	256	--	773	704
Veterinarians	467	501	591	633
Dentists	1852	1891	1966	2299
Dieticians	--	--	515	829
Graduate nurses	8689	11178	13693	24579
Osteopaths, chiropractors	257	299	427	495
Physicians, surgeons	3934	4698	5363	8040
Physical scientists	8331	15795	19614	21953
Architects	576	570	744	1138
Chemists, metallurgists	1572	3998	3982	2836
Engineers				
Civil (including surveyors)	2669	2759	4205	7392
Electrical	1718	2410	3551	4205
Mechanical	1063	2263	4929	4075
Mining, chemical	733	3795	2203	2307

[a] Adjusted total. Items may not add to totals due to incomplete data.

[b] Excludes actuaries, statisticians, others for purposes of analysis.

[c] Actuaries and statisticians are combined because of the manner in which the data were reported for 1961.

A-8. Ontario: Indexes of Growth for Professional Workers, by Occupational Groups and Classes; Selected Years, 1931 to 1961

Group and Class	1931	1941	1951	1961
All professional groups	.451	.487	.706	1.000
Teachers, instructors	.419	.444	.531	1.000
Professors, college principals	.225	.357	.467	1.000
Social scientists	.456	.682	.815	1.000
Accountants, auditors	.573	.963	1.072	1.000
Actuaries and statisticians	--	--	.339	1.000
Judges, magistrates	.624	.585	.695	1.000
Lawyers, notaries	.570	.633	.691	1.000
Librarians	.374	.521	.624	1.000
Social workers	.150	.205	.431	1.000
Others	a	a	a	a
Artists, writers, clergymen	.537	.597	.696	1.000
Artists, art teachers	.366	.475	.656	1.000
Authors, editors, journalists	.255	.327	.556	1.000
Clergymen, priests	.695	.779	.828	1.000
Musicians, music teachers	.820	.790	.724	1.000
Life scientists	.411	.494	.621	1.000
Agricultural professionals	.364	--	1.041	1.000
Veterinarians	.738	.791	.934	1.000
Dentists	.806	.823	.855	1.000
Dieticians	--	--	.621	1.000
Graduate nurses	.354	.455	.557	1.000
Osteopaths, chiropractors	.519	.604	.863	1.000
Physicians, surgeons	.489	.584	.667	1.000
Physical scientists	.379	.719	.893	1.000
Architects	.506	.501	.654	1.000
Chemists, metallurgists	.554	1.410	1.404	1.000
Engineers				
Civil (including surveyors)	.361	.373	.569	1.000
Electrical	.409	.573	.844	1.000
Mechanical	.261	.555	1.210	1.000
Mining, chemical	.318	1.645	.955	1.000

[a]Data not available.

A-9. Canada and Ontario: Labor Force Post-Secondary School Educational Attainment, Grade 13 and Beyond, by Occupational Category, 1941 and 1951[b]

Occupational Category	Persons Attaining Grade 13 and Beyond as Percent of Total Labor Force			
	Canada		Ontario	
	1941	1951	1941	1951
All occupations	6.76	10.26	9.07	13.39
Proprietary and managerial	a	18.76	a	23.66
Professional	48.61	59.72	56.14	68.17
Clerical	a	15.14	19.38	18.94
Agricultural	1.24	1.88	1.42	2.80
Fishing, hunting and trapping	.52	.64	7.99	1.83
Logging	.83	1.38	1.13	2.59
Mining and quarrying	2.85	3.12	3.98	4.18
Manufacturing and mechanical	a	3.64	a	4.75
Foremen	6.08	6.96	7.03	8.88
Food products	2.73	2.43	3.40	3.59
Liquor, beverages, tobacco	2.56	3.12	4.81	6.81
Rubber products	2.45	2.53	2.97	3.20
Fur and fur goods, furriers	2.77	3.33	4.29	4.31
Leather and leather products	1.45	1.48	2.04	2.12
Textiles	1.41	1.72	2.26	2.72
Textile goods and wearing apparel	1.82	2.39	2.65	3.70
Wood products	2.37	2.59	2.65	3.22
Pulp, paper and paper products	3.57	2.62	3.54	3.07
Printing, publishing, bookbinding	5.04	5.74	a	6.16
Metal products	3.58	4.13	4.26	4.94
Non-metallic mineral products	2.74	2.25	3.22	3.20
Chemicals	4.57	4.99	4.89	5.61
Miscellaneous	4.45	5.34	5.23	5.87
Electric light and power production	8.13	4.12	8.48	5.50
and stationary enginemen	3.80	a	4.18	a
Construction	2.91	3.26	3.53	4.32
Transportation	a	2.67	a	3.50
Communication	3.00	7.54	3.63	9.06
Commercial	8.54	10.11	10.54	13.53
Financial	19.32	27.40	21.80	32.38
Service	3.91	4.95	4.85	6.60
Personal	2.94	3.34	3.83	4.50
Protective	--	9.61	12.03	12.04
Other	11.13	7.64	--	9.72
Laborers	1.29	2.37	1.75	3.02
Not stated	1.27	7.46	1.79	8.78

[a]Data not available or incomplete.

[b]Data for 1961 not yet available at time of completion of study.

A-10. Lakehead College of Arts, Science and Technology: Analysis of Enrollment Progression Pattern in University Division, 1952-53 to 1962-63

Year	Enrollment			Conversion Coefficient: Years 1-21 Year 1[a]
	Year 1	Year 2	Total Years 1-2	
1952-53	47	--	47	--
1953-54	40	--	40	--
1954-55	35	--	35	--
1955-56	44	--	44	--
1956-57	47	--	47	--
1957-58	76	--	76	--
1958-59	84	--	84	--
1959-60	69	--	69	--
1960-61	81	18	99	--
1961-62	83	24	107	1.32
1962-63	72	28	100	1.20

[a]Total enrollment divided by freshmen enrollment in preceding period.

A-11. Canada: Total, Freshman and Non-Freshman Undergraduate Enrollment and Degrees Granted in Arts and Pure Science Programs, 1952-53 to 1961-62

Year	Total Full-Time Enrollment	Degrees Granted	Year	Non-Freshman Enrollment	Freshman Enrollment	Conversion Coefficient, Total/Freshman Enrollment
1952-1953	27548	6153	1953-1954	21395	6104	4.51
1953-1954	27499	5857	1954-1955	21642	6076	4.56
1954-1955	27718	5727	1955-1956	21991	6803	4.23
1955-1956	28794	6128	1956-1957	22666	8826	3.57
1956-1957	31492	6669	1957-1958	24823	11023	3.25
1957-1958	35846	7044	1958-1959	28802	12015	3.40
1958-1959	40817	7576	1959-1960	33241	12147	3.74
1959-1960	45388	8482	1960-1961	36906	15001	3.46
1960-1961	51907	9219	1961-1962	42688	18859	3.26
1961-1962	61547	11000	1962-1963	50547	a	--

[a]Not available.

A-12. Ontario: Analysis of Enrollment Distribution among First Three Year Levels in Faculties of Arts and Sciences at Selected Ontario Colleges and Universities, Selected Years

Institution and Year	Enrollment		Conversion Coefficient: Years 1-3/Year 1
	Year 1	Total, Years 1-3	
McMaster			
1957-58	405	920	2.27
1958-59	348	903	2.59
1959-60	381	972	2.55
1960-61	457	1079	2.36
1961-62	572	1318	2.30
Queens			
1957-58	347	a	a
1958-59	427	a	a
1961-62	473	a	a
1962-63	617	a	a
Toronto			
1956-57	1198	3292	2.75
1960-61	1433	3582	2.50
Median	--	--	2.50

[a]Not available.

A-13. Ontario: Analysis of Enrollment Distribution between First and Second Year Levels in Faculties of Applied Science and Engineering at Selected Ontario Colleges and Universities, Selected Years

Institution and Year	Enrollment			Conversion Coefficient: Years 1-2/Year 1
	Year 1	Year 2	Total, Years 1-2	
Assumption				
1960-61[a]	52	40	92	1.77
McMaster				
1958-59	50	42	92	1.84
1959-60	64	44	108	1.69
1960-61	78	52	130	1.67
1961-62	81	61	142	1.75
Queens				
1957-58	314	231	545	1.74
1958-59	309	254	563	1.82
1961-62	232	208	440	1.90
1962-63	236	192	428	1.81
Toronto				
1956-57	708	496	1204	1.70
1960-61	408	424	832	2.04
Western Ontario				
Actual				
1955-56	27	17	44	1.63
1956-57	53	17	70	1.32
1957-58	51	41	92	1.80
1958-59	79	44	123	1.56
1959-60	95	40	135	1.42
1960-61	93	45	138	1.48
Projected				
1961-62	100	63	163	1.63
1962-63	115	70	185	1.61
1963-64	130	80	210	1.62
1964-65	145	91	236	1.63
1965-66	160	102	262	1.64
1966-67	175	112	287	1.64
Median	--	--	--	1.67

[a]Majors only.

A-14. Lakehead College of Arts, Science and Technology: Analysis of Enrollment Progression Pattern in Technology Division, 1952-53 to 1962-63

Year	Enrollment			Conversion Coefficient: Years 1-2 / Years 1[a]
	Year 1	Year 2	Total, Years 1-2	
1952-53	16	5	21	--
1953-54	19	10	29	1.81
1954-55	18	10	28	1.47
1955-56	19	11	30	1.67
1956-57	26	5	31	1.63
1957-58	39	9	48	1.85
1958-59	46	19	65	1.67
1959-60	31	21	52	1.13
1960-61	63	12	75	2.42
1961-62	91	22	113	1.79
1962-63	97	27	124	1.36
Weighted average				1.68

[a]Total enrollment divided by freshman enrollment in preceding period.

A-15. Lakehead College of Arts, Science and Technology:

	1962	1963	1964
Secondary school retirements to further education			
Indexes of growth: 1961-62 = 1.000			
Universities	1.000	1.135	1.296
Provincial Technical Institutes	1.000	1.123	1.269
Schools of Nursing	1.000	1.097	1.213
Professional workers in labor force			
Index of growth: 1961-62 = 1.000	1.000	1.044	1.088
Index of trend variance[a]	1.000	1.012	1.024
First-year enrollment in post-secondary education			
Indexes of growth: 1961-62 = 1.000			
Universities	1.000	1.149	1.327
Provincial Technical Institutes	1.000	1.136	1.299
Schools of Nursing	1.000	1.110	1.242
Lakehead College University Division, part-time enrollment			
Index of growth: 1961-62 = 1.000	1.000	1.024	1.048
Lakehead College enrollment			
First-year, full-time			
University Division			
Arts program	62	71	82
Applied Science program	21	24	28
Technology Division	91	103	118
Conversion coefficients: total/first-year enrollment			
University Division			
Arts program	--	1.53	1.80
Applied Science program	--	1.00	1.00
Technology Division	--	1.68	1.68
Total, full-time			
University Division			
Arts program	86	109	148
Applied Science program	21	24	28
Technology Division	113	173	198
Other			
Nurses	85	94	106
University Division, part-time enrollment	140	143	147
Summary			
Total full-time enrollment	220	306	374
Total full-time enrollment plus nurses	305	400	480
Total full-time enrollment plus nurses and part-time enrollment	445	543	627

[a]Relative to index of growth in total civilian labor force.

N.B. 1. Assumes first degrees are conferred in 1965-66.

Projection of Enrollment, by Division and Program, 1961-62 to 1975-76

Academic Year Ending in											
1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
1.597	1.892	1.965	2.042	2.126	2.178	2.213	2.308	2.403	2.498	2.593	2.687
1.545	1.814	1.882	1.950	2.027	2.074	2.107	2.193	2.279	2.365	2.452	2.539
1.430	1.642	1.695	1.749	1.810	1.847	1.873	1.941	2.009	2.077	2.145	2.213
1.132	1.177	1.230	1.283	1.336	1.388	1.440	1.495	1.550	1.605	1.660	1.715
1.036	1.049	1.064	1.079	1.094	1.110	1.126	1.138	1.150	1.162	1.175	1.188
1.654	1.985	2.091	2.203	2.326	2.418	2.492	2.627	2.763	2.903	3.047	3.192
1.601	1.903	2.002	2.104	2.218	2.302	2.372	2.496	2.621	2.748	2.881	3.016
1.481	1.722	1.803	1.887	1.980	2.050	2.109	2.209	2.310	2.413	2.520	2.629
1.072	1.096	1.121	1.150	1.179	1.208	1.237	1.267	1.304	1.337	1.371	1.405
103	123	130	137	144	150	155	163	171	180	189	198
35	42	44	46	49	51	52	55	58	61	64	67
146	173	182	191	202	209	216	227	239	250	262	274
2.07	2.34	2.61	2.88	3.15	3.42	3.64	3.64	3.64	3.64	3.64	3.64
1.33	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68
213	288	339	395	454	513	564	593	622	655	688	721
47	70	73	77	82	85	87	92	97	102	107	112
245	291	306	321	339	351	363	381	402	420	440	460
126	146	153	160	168	174	179	188	196	205	214	223
150	153	157	161	165	169	173	177	183	187	192	197
505	649	718	793	875	949	1014	1066	1121	1177	1235	1293
631	795	871	953	1043	1123	1193	1254	1317	1382	1449	1516
781	948	1028	1114	1208	1292	1366	1431	1500	1569	1641	1713

N.B. 2. Assumes second year of Applied Science program is introduced in 1964-65 and is in full swing by 1965-66.

3. Assumes no change in length or depth of Technology Division programs throughout planning period.

APPENDIX B

INSTRUCTIONAL ACTIVITY STRUCTURE

B-1. Ontario and Lakehead Region: Attendance by Atkinson Students at First and Preliminary Years of Ontario Colleges and Universities in 1956-57

Institution and Institution Group	Province, Total	Lakehead			
		Total	Kenora	Rainy River	Thunder Bay
Colleges and universities in Ontario					
Assumption	(11) 70	1	--	--	1
Carleton	(8) 135	--	--	--	--
McMaster	(8) 246	--	--	--	--
Ottawa	(4) 29	--	--	--	--
Queens	456	13	1	3	9
Toronto	1345	21	2	4	15
Western	(9) 581	6	--	2	4
RMC	34	--	--	--	--
OAC, OVC, MacDonald Institute	116	1	--	--	1
Lakehead	27	24	--	2	22
Subtotal	3039	66	3	11	52
Colleges and universities outside Ontario	256	22	2	5	15
Schools of Nursing	555	8	--	--	8
Teachers' Colleges	(23)1258	19	2	1	16
Total	5108	115	7	17	91

B-2. Ontario and Lakehead Region: Attendance by Atkinson Students at Institutions of Further Education in 1956-57

	Province, Total	Lakehead			
		Total	Kenora	Rainy River	Thunder Bay
			(number)		
Total students	5108	115	7	17	91
In colleges and universities					
In Ontario					
First year	2999	66	3	11	52
Preliminary year	40	--	--	--	--
Outside Ontario	256	22	2	5	15
Schools of Nursing	555	8	--	--	8
Teachers' Colleges					
One-year course	1235	19	2	1	16
Two-year course	23	--	--	--	--
			(percent)		
Total students	100.0	100.0	100.0	100.0	100.0
In colleges and universities					
In Ontario					
First year	58.7	57.4	42.9	64.7	57.1
Preliminary year	.8	--	--	--	--
Outside Ontario	5.0	19.1	28.6	29.4	16.5
Schools of Nursing	10.9	7.0	--	--	8.8
Teachers' Colleges					
One-year course	24.2	16.5	28.6	5.9	17.6
Two-year course	.5	--	--	--	--

B-3. University of Toronto: Analysis of Relative Distribution of Course Registrations by Students Enrolled in Arts and Sciences Programs in 1956-57 and 1960-61, by Division, by Year Level and by Type of Program

Division	Year Level	1956-57 Pass and General	1956-57 Honors	1956-57 Total	1960-61 Pass and General	1960-61 Honors	1960-61 Total
Languages	1	.043	.030	.072	.042	.041	.083
	2	.026	.010	.037	.023	.016	.039
	3	.013	.006	.019	.014	.011	.024
	4	--	.005	.005	.001	.007	.008
Total		.082	.051	.133	.079	.076	.155
Science - lecture	1	.040	.031	.071	.062	.034	.096
	2	.023	.022	.046	.022	.022	.044
	3	.016	.012	.027	.016	.011	.027
	4	--	.006	.006	--	.007	.007
Total		.079	.070	.150	.101	.073	.174
Science - laboratory	1	.030	.020	.050	.045	.021	.066
	2	.009	.012	.022	.013	.013	.026
	3	.011	.007	.018	.013	.007	.020
	4	--	.004	.004	--	.004	.004
Total		.050	.043	.093	.072	.045	.116
Humanities	1	.085	.059	.144	.074	.072	.145
	2	.074	.034	.108	.065	.036	.100
	3	.067	.033	.102	.054	.029	.084
	4	.009	.018	.027	.006	.022	.029
Total		.237	.144	.381	.199	.159	.358
Humanities - studio	1	.002	.001	.002	.001	.001	.002
	2	--	.001	.001	--	.001	.002
	3	.001	--	.001	--	--	.001
	4	--	--	--	--	--	--
Total		.003	.002	.005	.001	.003	.004
Social sciences - lecture	1	.056	.024	.080	.048	.020	.068
	2	.054	.018	.072	.039	.016	.055
	3	.045	.012	.058	.036	.013	.049
	4	.005	.009	.014	.004	.010	.013
Total		.160	.064	.224	.127	.058	.185

(Continued)

B-3. (Continued)

Division	Year Level	1956-57 Pass and General	1956-57 Honors	1956-57 Total	1960-61 Pass and General	1960-61 Honors	1960-61 Total
Social sciences - laboratory	1	--	--	--	--	--	--
	2	.006	.002	.008	.003	.002	.005
	3	.004	.002	.006	--	.001	.001
	4	--	.001	.001	--	.001	.001
Total		.010	.005	.015	.003	.004	.007
All divisions	1	.255	.163	.418	.271	.189	.460
	2	.193	.100	.294	.165	.106	.271
	3	.160	.072	.232	.135	.072	.206
	4	.014	.042	.056	.011	.052	.063
Total		.622	.378	1.000	.582	.418	1.000

B-4. Ontario: Distribution of Enrollment by Year Level at Selected Ontario Colleges and Universities, Selected Years and Study Programs

Program, Institution and Academic Year	Total Enrollment (number of students)	Year Level 1st	2nd	3rd	4th	All
Arts and Sciences						
Carleton						
1961-62[a]	668	.528	.274	.177	.021	1.000
1961-62[b]	1113	.526	.264	.190	.020	1.000
McMaster						
1957-58[a]	560	.405	.304	.245	.046	1.000
1958-59[a]	579	.377	.294	.269	.060	1.000
1959-60[a]	668	.344	.289	.292	.075	1.000
1960-61[a]	727	.422	.289	.237	.052	1.000
1961-62[a]	902	.426	.292	.235	.048	1.000
1957-58[b]	953	.405	.291	.230	.075	1.000
1958-59[b]	957	.349	.307	.246	.098	1.000
1959-60[b]	1028	.362	.270	.275	.092	1.000
1960-61[b]	1154	.388	.300	.222	.090	1.000
1961-62[b]	1369	.403	.292	.238	.066	1.000
Queens						
1957-58	902	.385	c	c	c	1.000
1958-59	1078	.396	c	c	c	1.000
Toronto						
1956-57[a]	3578	.335	.320	.265	.080	1.000
1960-61[a]	3879	.369	.308	.246	.077	1.000
1960-61[b]	5098	.372	.301	.238	.089	1.000
Median (adjusted)	--	.390	.295	.239	.075	1.000
Applied Science						
Carleton						
1961-62	311	.527	.225	.222	.026	1.000
McMaster						
1957-58	47	1.000	--	--	--	1.000
1958-59	92	.543	.457	--	--	1.000
1959-60	139	.460	.317	.223	--	1.000
1960-61	190	.411	.274	.184	.132	1.000
1961-62	208	.389	.293	.178	.139	1.000
Queens						
1957-58	998	.315	.231	.222	.231	1.000
1958-59	994	.311	.256	.213	.220	1.000
Toronto						
1956-57	2078	.341	.239	.221	.200	1.000
1960-61	1692	.241	.251	.241	.267	1.000
Median (adjusted)	--	.371	.237	.206	.186	1.000

[a]B.Arts only. [b]B.Arts, B.Com., B.Sc. [c]Not available.

B-5. Ontario: Weekly Clock Hours of Meeting Required in University Baccalaureate Degree Programs in Arts and Sciences, by Program and Year Level

Program	Year Level 1st A/B	2nd A/B	3rd A/B	4th A/B
General	16/4	13/4	13/4	--/--
Science	15/8	13/9	13/9	--/--
Honors				
Humanities and Languages				
Classics	16/--	18/--	14/--	16/--
East Asiatic Studies	19/--	18/--	22/--	18/--
English Languages and Literature	19/--	15½/--	15½/--	14/--
Latin	19/--	15/--	16½/--	15/--
Modern History	18½/--	15½/--	16½/--	13/--
Modern History and Languages	17/--	17/--	15/--	15/--
Modern Languages and Literatures	18/--	16/--	15½/--	14/--
Ancient Near Eastern Studies	17/--	15/--	15/--	13/--
Slavic Studies	18/--	20/--	21/--	20/--
Art and Archaeology	21/--	18/--	19/--	17/--
Music	19/--	19/--	19½/--	19/--
Philosophy	18/--	18/--	15/--	17/--
Social and Philosophical Studies				
Anthropology	15/2	18/--	20/--	24/2
History	15/2	14/2	18/--	16/--
Philosophy	15/2	18/--	15/--	16/--
Political Science and Economics	15/2	18/--	18/--	17/--
Psychology	15/2	16/3	20/--	20/--
Sociology	15/2	19/--	18/--	15/--
Natural Sciences				
Mathematics, Physics, Chemistry				
Mathematics	17/6	15/3	19½/3	18/--
Applied Mathematics	17/6	15/3	19½/3	15/--
Physics	17/6	13/6	15½/8	12/9
Astronomy	17/6	13/6	15/8	13/8
Statistics and Actuarial Science	17/6	15/3	14/3	14/3
Physics and Chemistry	17/6	12/12	12½/15	12/10
Physics and Geology	17/6	14/12	12½/12	11½/14
Biological and Earth Sciences				
Biology	14/15	18/12½	15/12	11/12
Geography	14/15	24/4	16/5	12/8
Geological Sciences	14/15	13/14	11/11	7½/20
Commerce and Finance	17/--	16/--	17/--	16/--

N.B. "A" indicates lecture-classroom-type meetings; "B" indicates laboratory-type meetings.

B-6. Ontario: Weekly Clock Hours of Meeting Required under Various Technology Programs at Selected Technological Institutes, by Year Level and Type of Meeting

Institution	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab
	Aeronautical Technology			Architectural Technology		
1. Ryerson	23/7	19/11	17/13	30/--	30/--	30/--
2. Eastern Ontario	a	a	--/--	--/--	--/--	--/--
3. Northern Ontario	16/14	20/10	--/--	--/--	--/--	--/--
4. Western Ontario	a	--/--	--/--	--/--	--/--	--/--
5. Hamilton	a	a	--/--	--/--	--/--	--/--
6. Lakehead	--/--	--/--	--/--	20/5	--/--	--/--
	Chemical Technology			Civil Technology		
1. Ryerson	23/7	20/10	18/12	23/7	18/12	19/11
2. Eastern Ontario	18/12	20/10	19/11	a	--/--	--/--
3. Northern Ontario	16/14	20/10	19/11	16/14	18/12	19/11
4. Western Ontario	18/12	20/10	19/11	a	--/--	--/--
5. Hamilton	18/12	--/--	--/--	a	--/--	--/--
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--
	Electrical Technology			Electronic Technology		
1. Ryerson	23/7	20/10	18/12	23/7	20/10	18/14
2. Eastern Ontario	18/12	20/10	--/--	18/12	20/10	19/11
3. Northern Ontario	16/14	22/8	18/12	16/14	22/8	18/12
4. Western Ontario	a	a	--/--	18/12	20/10	19/11
5. Hamilton	18/12	20/10	20/10	18/12	20/10	19/11
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--

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B-6. (Continued)

Institution	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab
	Gas Technology			Instrument Technology		
1. Ryerson	23/7	19/10	16/11	23/7	20/10	20/10
2. Eastern Ontario	a	--/--	--/--	a	a	--/--
3. Northern Ontario	16/14	20/10	--/--	16/14	20/10	--/--
4. Western Ontario	a	--/--	--/--	a	--/--	--/--
5. Hamilton	a	--/--	--/--	a	--/--	--/--
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--
	Mechanical Technology			Medical Laboratory Technology		
1. Ryerson	23/7	19/11	15/17	22/8	--/--	--/--
2. Eastern Ontario	18/12	19/11	16/14	--/--	--/--	--/--
3. Northern Ontario	16/14	20/10	16/14	--/--	--/--	--/--
4. Western Ontario	18/12	19/11	16/14	--/--	--/--	--/--
5. Hamilton	18/12	19/11	16/14	--/--	--/--	--/--
6. Lakehead	--/--	--/--	--/--	20/14	--/--	--/--
	Metallurgical Technology			Sanitary Inspectors Course		
1. Ryerson	23/7	22/11	14/16	25/--	--/--	--/--
2. Eastern Ontario	a	a	--/--	--/--	--/--	--/--
3. Northern Ontario	16/14	20/10	--/--	--/--	--/--	--/--
4. Western Ontario	a	--/--	--/--	--/--	--/--	--/--
5. Hamilton	a	a	--/--	--/--	--/--	--/--
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--

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B-6. (Continued)

Institution	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab
	Business Administration			Hotel, Resort and Restaurant Administration		
1. Ryerson	28/--	28/--	29/--	28/--	29/--	29/--
2. Eastern Ontario	29/--	29/--	27/--	--/--	--/--	--/--
3. Northern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
4. Western Ontario	29/--	29/--	27/--	--/--	--/--	--/--
5. Hamilton	29/--	29/--	27/--	--/--	--/--	--/--
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--
	Merchandising Administration			Printing Management		
1. Ryerson	28/--	28/--	27/--	30/--	29/--	30/--
2. Eastern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
3. Northern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
4. Western Ontario	--/--	--/--	--/--	--/--	--/--	--/--
5. Hamilton	--/--	--/--	--/--	--/--	--/--	--/--
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--
	Secretarial Science			Furniture and Interior Design		
1. Ryerson	28/--	28/--	27/--	30/--	30/--	30/--
2. Eastern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
3. Northern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
4. Western Ontario	--/--	--/--	--/--	--/--	--/--	--/--
5. Hamilton	--/--	--/--	--/--	--/--	--/--	--/--
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--

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B-6. (Continued)

Institution	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab
	Home Economics - Fashion			Home Economics - Food Administration		
1. Ryerson	28/--	29/--	28/--	28/--	28/--	27/--
2. Eastern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
3. Northern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
4. Western Ontario	--/--	--/--	--/--	--/--	--/--	--/--
5. Hamilton	--/--	--/--	--/--	--/--	--/--	--/--
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--
	Journalism			Photographic Arts		
1. Ryerson	27/--	29/--	29/--	27/--	30/--	27/--
2. Eastern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
3. Northern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
4. Western Ontario	--/--	--/--	--/--	--/--	--/--	--/--
5. Hamilton	--/--	--/--	--/--	--/--	--/--	--/--
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--
	Industrial and Business Management Technology			Textile Technology		
1. Ryerson	--/--	--/--	--/--	--/--	--/--	--/--
2. Eastern Ontario	30/--	--/--	--/--	--/--	--/--	--/--
3. Northern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
4. Western Ontario	a	--/--	--/--	--/--	--/--	--/--
5. Hamilton	30/--	30/--	30/--	18/12	18/12	20/10 or 17/13
6. Lakehead	--/--	--/--	--/--	--/--	--/--	--/--

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B-6. (Continued)

Institution	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab	Year 1st Lecture/Lab	Year 2nd Lecture/Lab	Year 3rd Lecture/Lab
	Forest Technology			Mining Technology		
1. Ryerson	--/--	--/--	--/--	--/--	--/--	--/--
2. Eastern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
3. Northern Ontario	--/--	--/--	--/--	--/--	--/--	--/--
4. Western Ontario	--/--	--/--	--/--	--/--	--/--	--/--
5. Hamilton	--/--	--/--	--/--	--/--	--/--	--/--
6. Lakehead	15/17	18/11	--/--	20/12	17/14	--/--
	Engineering Technology					
1. Ryerson[b]	21/6	--/--	--/--			
2. Eastern Ontario	--/--	--/--	--/--			
3. Northern Ontario	--/--	--/--	--/--			
4. Western Ontario	--/--	--/--	--/--			
5. Hamilton	--/--	--/--	--/--			
6. Lakehead	18/9	19/10	--/--			

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[a]Offered; detail not specified.

[b]See Lakehead catalogue.

APPENDIX C

STAFF REQUIREMENTS

C-1. Canada and Central Canada: Full-Time Students, Teaching Staff and Student/Staff Ratios, Based upon 17 Universities, Selected Years, 1951-52 to 1961-62

Academic Year	Central Canada			Canada		
	Students	Staff	Students Per Staff Member	Students	Staff	Students Per Staff Member
1951-52	20109	1258	16.0	36882	2447	15.1
1956-57	21955	1502	14.6	44505	2941	15.1
1957-58	22904	1548	14.8	48142	3137	15.3
1958-59	23886	1663	14.4	51889	3421	15.2
1959-60	24748	1862	13.3	55253	3870	14.3
1960-61	27063	1961	13.8	61195	4138	14.8
1961-62	29499	2186	13.5	67863	4557	14.9

C-2. Canada: Enrollment, Staff and Students per Staff Member in Technical Institutes, by Province, 1960-1962

	1960	1961	1962
Nova Scotia			
Enrollment	30	32	294
Staff[a]	2	3	24
Students per staff member	15.0	10.7	12.3
New Brunswick			
Enrollment	61	78	149
Staff[a]	8	8	16
Students per staff member	7.6	9.8	9.3
Quebec			
Enrollment	5063	5712	5976
Staff[a]	1490	1553	1654
Students per staff member	3.4	3.7	3.6
Ontario			
Enrollment	3086	3959	3990
Staff[a]	198	228	237
Students per staff member	15.6	17.4	16.8
Saskatchewan			
Enrollment	105	168	218
Staff[a]	8	17	21
Students per staff member	13.1	9.9	10.4
Alberts			
Enrollment	911	952	1154
Staff[a]	137	149	166
Students per staff member	6.7	6.4	7.0
British Columbis			
Enrollment	146	197	202
Staff[a]	28	33	27
Students per staff member	5.2	6.0	7.5
All Provinces			
Enrollment	9402	11098	11983
Staff[a]	1872	1988	2147
Students per staff member	5.0	5.6	5.6

[a]Full-time plus one-half of part-time staff.

C-3. Canada: Distribution of Full-Time Teaching Staff at Selected Institutions, by Rank, Selected Years, 1937-38 to 1961-62

Academic Year	Rank					
	Dean	Professor	Associate Professor	Assistant Professor	Instructor and Lecturer	All Ranks except Dean
1937-38	72	503	199	267	335	1304
1938-39	85	505	198	283	342	1328
1939-40	73	493	208	264	354	1319
1940-41	77	507	202	266	341	1316
1941-42	74	488	203	279	373	1343
1942-43	69	482	201	278	396	1357
1943-44	75	494	227	264	387	1372
1944-45	73	490	271	291	421	1473
1945-46	76	564	352	382	464	1762
1946-47	84	600	396	514	787	2297
1947-48	84	595	420	490	701	2206
1948-49	85	649	461	575	591	2276
1949-50	81	676	477	577	669	2399
1950-51	91	672	488	565	618	2343
1951-52	90	689	509	590	569	2357
1952-53	94	690	520	633	548	2391
1953-54	92	695	566	660	576	2497
1954-55	87	736	584	706	578	2604
1955-56	--	--	--	--	--	--
1956-57	89	796	714	786	556	2852
1957-58	93	831	759	866	588	3044
1958-59	97	868	824	984	646	3324
1959-60	97	920	930	1166	735	3773
1960-61	98	940	994	1298	785	4040
1961-62	102	987	1138	1449	870	4455
Percentage distribution: weighted average	a	28.3	21.7	26.3	23.6	100.0

[a]Not included in calculations of weighted average distribution.

APPENDIX D

EXISTING SPACE AND

ROOM UTILIZATION

D-1. Lakehead College of Arts, Science and Technology: Summary of Net Space in Existing Buildings[a]

Building and Floor level	Net Area (square feet)
Science and Technology	
Basement	4750
Ground	21675[b]
Second	6505
Subtotal	32930
University Centre	
Basement	5325
Ground	12525
Second	6990
Subtotal	24840

[a]The existing student residence consists of 17,645 gross square feet, or 339 square feet per bed for 52 students.

[b]Excludes wing under construction in the summer of 1963.

D-2. Lakehead College of Arts, Science and Technology: Scheduled Utilization of Classrooms and Laboratories, 9 A.M. to 4:30 P.M., Excluding Saturday, Fall, 1963

Room Number	Scheduled Hours per Week	
	Lecture	Laboratory
1	--	24
3	--	9
4	23	--
5	11	--
6	15	--
7	18	--
12	12	--
14	15	--
16	24	--
20	--	26
21-22	--	9
23	--	9
24	--	7
25	--	17
Total	118[a]	101[b]

Source: Data supplied by Lakehead College administration

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[a]Average utilization of seven lecture rooms is 16.9 hours per week.

[b]Average utilization of seven laboratories is 14.6 hours per week.

APPENDIX E

INSTITUTIONAL FINANCE

E-1. Lakehead College of Arts, Science and Technology: Summary of Expenditures, Fiscal Years 1958 to 1963

Budget Category	Fiscal Years Ending May 31					
	1958	1959	1960	1961	1962	1963[a]
	(current dollars)					
Expenditures: summary[b]	92096	115617	154048	205903	276113	339450
Instruction	49901	71371	94651	137072	181661	212000
Administration	6387	7202	7846	12702	17220	26550
Plant operation and maintenance	16795	17508	18085	23871	32259	27300
Other	19014	19535	33466	32259	44973	74600
Expenditures: detail						
Instruction	49901	71371	94651	137072	181661	212000
Salaries	44124	64535	76376	89981	120451	140000
Instructional supplies	2465	2284	1600	1856	2906	3000
Library	3096	3987	16011	44901	56819	67000
Travel	215	566	664	333	1485	2000
Administration	6387	7202	7846	12702	17220	26550
Office salaries and expense	4626	6071	6101	9538	13939	22800
Other	1761	1131	1745	3164	3281	3750
Plant operation and maintenance	16795	17508	18085	23871	32259	27300
Building	4992	8222	8879	12058	17945	10000
Grounds	5458	3805	3037	6285	7466	10000
Heat, light and water	5097	4681	5279	4584	5744	6100
Insurance	1247	800	890	945	1104	1200
Other	19014	19535	33466	32259	44973	74600
Extraneous	1395	2478	1170	1178	3748	19600
Capital expenditures charged to operations	3712	--	11670	7647	7878	15000
Depreciation	13907	17057	20626	23434	33347	40000

[a]Projected.

[b]Items may not add to totals due to rounding.

E-2. Lakehead College of Arts, Science and Technology: Summary of Revenues, Fiscal Years 1958 to 1963

Budget Category	Fiscal Year Ending May 31					
	1958	1959	1960	1961	1962	1963[a]
	(current dollars)					
Revenues: summary[b]	107590	182013	182278	235403	285924	343150
Grants	84121	149770	149270	185233	201729	246000
Student fees	21154	30338	30498	47588	81455	94850
Other	2315	1906	2510	2582	2741	2300
Revenues: detail						
Grants	84121	149770	149270	185233	201729	246000
Municipal	15000	20000	20000	20000	20000	20000
Federal	19121	29770	24270	30233	31729	41000
Provincial	50000	100000	105000	135000	150000	185000
Student fees	21154	30338	30498	47588	81455	94850
Registration	1330	1510	1280	1810	2495	2500
Supplementary exams	290	455	370	300	335	350
Tuition	19534	28373	28848	45478	78625	92000
Other	2315	1906	2510	2582	2741	2300
Miscellaneous	813	694	849	802	897	500
Rentals: janitor's cottage	1502	500	600	600	600	600
Rentals: rooms		712	1061	1180	1244	1200

[a]Projected.

[b]Items may not add to totals due to rounding.

E-3. Canada: Gross National Product, Current and Constant Dollar Series; 1951 to 1962

Year	Gross National Product		Implicit Price Index		
	Current Dollars	1949 Dollars	1949 = 1.000	1962 = 1.000 Calendar Year	1962 = 1.000 Academic Year[c]
1951	21170	18547	1.141	.801	
1952	23995	20027	1.198	.841	.818
1953	25020	20794	1.203	.844	.842
1954	24871	20186	1.232	.865	.853
1955	27132	21920	1.238	.869	.867
1956	30585	23811	1.284	.901	.882
1957	31909	24117	1.323	.928	.912
1958	32894	24397	1.348	.946	.936
1959	34784	25157	1.383	.971	.956
1960	35928	25617	1.403	.985	.977
1961	36844[a]	26097[b]	1.412	.991	.988
1962	39424[a]	27664[b]	1.425	1.000	.995

[a] Annual rate, 2nd quarter.

[b] Equivalent in 1957 dollars is 36,000. Equivalent in 1949 dollars is derived by multiplying 36,600 by ratio of 1949 index to 1957 index; or (36,600)(1.000/1.323).

[c] Weighted 7 months for earlier year, 5 months for later year; to take account of May 31 fiscal year end at Lakehead College.

E-4. Canada: Growth Rates in Median Salaries of Full-Time Teaching Staffs, Based upon 12 Universities, All Ranks, 1951-52 to 1961-62

Academic Year	Median Salary, All Ranks		Percentage Increment over Preceding Year
	Current Dollars	1962 Dollars	
1951-52	4797	5864	
1952-53	4860	5772	- 1.6
1953-54	5249	6154	+ 6.6
1954-55	5423	6255	+ 1.6
1955-56	--	--	--
1956-57	5892	6461	+ 1.6[a]
1957-58	6713	7172	+ 11.0
1958-59	7445	7788	+ 8.6
1959-60	7979	8167	+ 4.9
1960-61	8404	8506	+ 4.2
1961-62	8646	8689	+ 2.2
Average per annum	--	--	+ 4.3

[a]Average per year, 1954-55 to 1956-67.

E-5. Canada and Central Canada: Median Salaries of Full-Time Teaching Staffs Based upon 17 Universities, Selected Years, 1961-62 to 1973-74

Year	Index of Growth (1961-62 = 1.000)	Rank					
		Dean	Professor	Associate Professor	Assistant Professor	Instructor and Lecturer	All Ranks
				Canada			
1961-62							
Current dollars	--	15577	12619	9703	7687	6570	8646
Constant 1962 dollars	1.000	15655	12682	9752	7726	6603	8689
Estimate A: growth at 3 percent per annum							
1963-64	1.061	16610	13456	10347	8197	7006	9219
1966-67	1.159	18144	14698	11303	8954	7653	10071
1973-74	1.426	22324	18085	13906	11017	9416	12391
Estimate B: growth at 4 percent per annum							
1963-64	1.082	16939	13722	10552	8360	7144	9401
1966-67	1.217	19052	15434	11868	9403	8036	10575
1973-74	1.601	25064	20304	15613	12369	10571	13911
				Central Canada			
1961-62							
Current dollars	--	17063	12896	9748	7749	6623	8887
Constant 1962 dollars	1.000	17149	12961	9797	7788	6656	8932
Estimate A: growth at 3 percent per annum							
1963-64	1.061	18195	13752	10395	8263	7062	9477
1966-67	1.159	19876	15022	11355	9026	7714	10352
1973-74	1.426	24454	18482	13971	11106	9491	12737
Estimate B: growth at 4 percent per annum							
1963-64	1.082	18555	14024	10600	8427	7202	9664
1966-67	1.217	20870	15774	11923	9478	8100	10870
1973-74	1.601	27456	20751	15685	12469	10656	14300

N.B. Unless specified otherwise, figures are expressed in 1962 dollar values.

BIBLIOGRAPHY

BIBLIOGRAPHY

Assumption University of Windsor. General Announcement 1962-63. Windsor, Ontario.

Assumption University of Windsor. Report of the President, Academic Year of 1960-61. Windsor, Ontario.

Carleton University. 1962-63 Calendar. Ottawa, Ontario.

Carleton University. The President's Report 1961-62. Ottawa, Ontario.

Carleton University. The President's Report 1960-61. Ottawa, Ontario.

Committee of Presidents of Provincially Assisted Universities. Post-Secondary Education in Ontario 1962-70. Report of the Presidents of the Universities of Ontario to the Advisory Committee on University Affairs: May, 1962 (Revised January, 1963).

Dominion Bureau of Statistics. Fall Enrolment in Universities and Colleges 1961. Ottawa: Roger Duhamel, 1962.

Dominion Bureau of Statistics. Fall Enrolment in Universities and Colleges 1959. Ottawa: The Queen's Printer and Controller of Stationery, 1960.

Dominion Bureau of Statistics. Fall Enrolment in Universities and Colleges 1958. Ottawa: The Queen's Printer and Controller of Stationery, 1959.

Dominion Bureau of Statistics. Fall Enrolment in Universities and Colleges 1957. Ottawa: Edmond Cloutier, 1958.

Dominion Bureau of Statistics. Fall Enrolment in Universities and Colleges 1956. Ottawa: Edmond Cloutier, 1957.

Dominion Bureau of Statistics. 1961 Census of Canada. "Series 1.2, Population". Ottawa, Canada.

Dominion Bureau of Statistics. Salaries and Qualifications of Teachers in Universities and Colleges. Ottawa: Roger Duhamel, 1962.

Dominion Bureau of Statistics. Salaries and Qualifications of Teachers in Universities and Colleges 1960-61. Ottawa: Roger Duhamel, 1961.

Dominion Bureau of Statistics. Survey of Elementary and Secondary Education 1959-60. Ottawa: Roger Duhamel, 1962.

Dominion Bureau of Statistics. Survey of Higher Education 1952-54. Ottawa: Edmond Cloutier, 1957.

Dominion Bureau of Statistics. Survey of Vocational Education and Training 1959-60. Ottawa: Roger Duhamel, 1961.

Dominion Bureau of Statistics. University Student Expenditure and Income in Canada 1956-57. Ottawa: The Queen's Printer and Controller of Stationery, 1959.

Dominion Bureau of Statistics. University Teachers' Salaries 1937-60. Ottawa: Roger Duhamel, 1960.

Engineering News Record. New York: McGraw Hill Publishing Company. Selected Issues.

Jackson, R. W. B. Secondary-School and University Enrolment Study. "Volume I: Basic Tables".

Laurentian University of Sudbury. President's Report for the year ending June 30th, 1962. Sudbury, Ontario.

McMaster University. The President's Report 1961-1962. Hamilton, Ontario.

McMaster University. McMaster University Calendar 1963-64. Hamilton, Ontario.

Ontario Department of Economics. Ontario Economic and Social Aspects Survey 1961. Ontario, Canada.

Ontario Department of Education. Report of the Minister 1961. Printed by Order of the Legislative Assembly of Ontario Sessional Paper No. 7.

Queen's University. Report of the Principal of Queen's University to the Board of Trustees 1958-59. Kingston, Ontario.

Royal Commission on Canada's Economic Prospects. The Canadian Construction Industry October, 1956. Prepared by the Royal Bank of Canada. Montreal, Quebec.

Royal Commission on Canada's Economic Prospects. Output, Labour and Capital in the Canadian Economy. Prepared by Wm. C. Hood and Anthony Scott.

Royal Commission on Canada's Economic Prospects. Skilled and Professional Manpower in Canada, 1945-1965. Prepared by The Economics and Research Branch, Department of Labour of Canada. Ottawa, Ontario.

Royal Commission on Canada's Economic Prospects. Some Regional Aspects of Canada's Economic Development. Prepared by R. D. Howland.

Sheffield, Edward F. Enrolment in Canadian Universities and Colleges to 1970-71 (1961 Projection). Ottawa: Canadian Universities Foundation, 1962.

Sheffield, Edward F. Financing Higher Education in Canada No. 1. -"Financial Needs of Canadian Universities and Colleges, 1960." Ottawa: Canadian Universities Foundation, 1960.

Sheffield, Edward F. Financing Higher Education in Canada No. 2. "Sources of University Support". Ottawa: Canadian Universities Foundation, 1961.

Sheffield, Edward F. and ApSimon, Claire M. Financing Higher Education in Canada No. 4. "University Costs and Sources of Support". Ottawa: Canadian Universities Foundation, 1962.

University of Toronto. University of Toronto Calendar Faculty of Arts 1958-1959. Toronto: University of Toronto Press, 1958.

University of Toronto. University of Toronto Faculty of Applied Science and Engineering Calendar 1957-58. Toronto: University of Toronto Press, 1957.

University of Toronto. President's Report for the Year Ended June 1961. Toronto: University of Toronto Press, 1961.

University of Toronto. President's Report for the Year Ended June 1957. Toronto: University of Toronto Press, 1958.

University of Western Ontario. Report of the President Academic Year 1960-1961. London, Ontario.

Vanderkamp, J. Rosemary. Financing Higher Education in Canada No. 3. "Provincial Programmes of Aid to University Students, 1957-58 to 1960-61".

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