

MCGILL UNIVERSITY
MONTREAL

FACULTY OF APPLIED SCIENCE
OFFICE OF THE DEAN

November 1st, 1929.

Sir Arthur Currie, G.C.M.G., K.C.B.,
Principal.

Dear Sir Arthur:-

A day or two ago Dr. Adams asked me to give my opinion regarding desirable future developments in the Faculty of Applied Science, and I think I should tell you that I discussed the matter along the lines of the memorandum submitted to you a few weeks ago. He also asked me to give him a comparative statement of the engineering staffs in McGill and the Massachusetts Institute of Technology. I am enclosing a copy of the statement which I sent to him, as well as a copy of the letter of transmission.

Yours faithfully,

H. M. MacKay

Dean.

November 1st, 1929.

Dr. F. D. Adams, F.R.S.,
Chemistry Building.

Dear Dr. Adams:-

I have pleasure in sending you herewith a comparative statement of the staffs in the Engineering Departments as well as in Architecture of the Massachusetts Institute of Technology and McGill.

In making this comparative statement, I have assumed that the terms "lecturer" and "instructor" were interchangeable, and that "assistants" of graduate rank were more or less equivalent to our "demonstrators." I have omitted "technicians" in all cases.

The comparison by departments is a little misleading in two cases: At McGill Civil Engineering also includes Applied Mechanics, and, as a matter of fact, the Civil Engineering Department gives about half of the mathematical instruction in the Faculty of Applied Science. In the M.I.T. Applied Mechanics is given by the Department of Mechanical Engineering.

I am sorry that I have not at hand the enrollment at the M.I.T. for the last two years. In 1920, it was 3075; in 1926, 2260. It has probably come up again in the

Dr. F. D. Adams, F.R.S.

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meantime. All of these students, however, would not be included in the Engineering Departments which are compared; since the M.I.T. offers four-year undergraduate courses in Biology and Public Health, Chemistry, General Science, Geology, Physics, Mathematics, and Engineering Administration. A considerable number of students, moreover, take special courses; army officers, for instance, being detailed to the Institute for certain military courses.

Referring to our conversation the other day, there is an additional point which I stressed in a recent memorandum to the Principal, namely, the importance of providing graduate scholarships as a means of promoting the Graduate School. As compared with many other universities, we have very few of these. A few additional scholarships of an annual value of about \$500.⁰⁰/₁₀₀, available to graduate students in engineering, would, in my opinion, do much to develop graduate work.

Yours very truly,

COMPARISON OF ENGINEERING STAFFS IN THE
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY AND MCGILL
 UNIVERSITY.

Aeronautical Engineering.

	<u>M.I.T.</u>	<u>McGill</u>
Professors	1	0
Assoc. Professors	3	0
Asst. Professors	<u>2</u> 6	<u>0</u> Professorial
Special Lecturers	1	0
Instructors	4	0
Assistants	<u>2</u> 7	<u>0</u> Junior
Research Associates	2	0
" Assistants	<u>2</u> <u>4</u>	<u>0</u> Research
TOTAL	<u>17</u> <u>17</u>	<u>0</u>

Chemical Engineering (as distinct from Chemistry).

Professors	3	0
Assoc. Professors	4	0
Assist. Professors	<u>3</u> 10	<u>0</u> Professorial
Instructors	4	0
Assistants	<u>7</u> 11	<u>0</u> Junior
Research Associates	7	0
" Assistants	<u>26</u> <u>33</u>	<u>0</u> Research
	<u>54</u> <u>54</u>	<u>0</u>

Civil and Sanitary Engineering & Surveying.

(In McGill Applied Mechanics is included.)

	<u>M.I.T.</u>		<u>McGill</u>	
Professors	9		3	
Assoc. Professors	3		0	
Assist. Professors	<u>3</u>	15	<u>5</u>	8 Professorial
Instructors	2		0	
Assistants	<u>2</u>	4	<u>0</u>	0 Junior
Research Associates	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u> Research
	<u>20</u>	<u>20</u>	<u>9</u>	<u>9</u>

Electrical Engineering.

Professors	7		1	
Assoc. Professors	5		1	
Assist. Professors	<u>8</u>	20	<u>1</u>	3 Professorial
Instructors	22		1	
Assistants	<u>3</u>	25	<u>2</u>	3 Junior
Research Associates	1		0	
Research Assistants	<u>9</u>	<u>10</u>	<u>0</u>	<u>0</u> Research
	<u>55</u>	<u>55</u>	<u>6</u>	<u>6</u>

Fuel and Gas Engineering.

Professors	1		1	
Assist. Professors	<u>1</u>	2	<u>0</u>	1 Professorial
Instructors	<u>2</u>	2	<u>0</u>	0 Junior
Research Associate	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u> Research
	<u>5</u>	<u>5</u>	<u>1</u>	<u>1</u>

Mechanical Engineering. (In M.I.T.

Applied Mechanics is included.)

	<u>M.I.T.</u>		<u>McGill</u>	
Professors	9		2	
Assoc. Professors	12		0	
Assist. Professors	<u>4</u>	25	<u>1</u>	3 Professorial
Special Lecturers	7		0	
Instructors	21		2	
Assistants	<u>7</u>	35	<u>0</u>	2 Junior
Research Assistants	<u>2</u>	<u>2</u>	<u>0</u>	<u>0</u> Research
	<u>62</u>	<u>62</u>	<u>5</u>	<u>5</u>

Mining and Metallurgy.

Professors	3		3	
Assoc. Professors	4		0	
Assist. Professors	<u>1</u>	8	<u>2</u>	5 Professorial
Instructors	3		2	
Assistants	<u>2</u>	5	<u>0</u>	2 Junior
Research Assistants	<u>0</u>	<u>0</u>	<u>4*</u>	<u>4*</u> Research
	<u>13</u>	<u>13</u>	<u>11</u>	<u>11</u>

*Funds provided for four. Only one effective at present.

Naval Architecture and Marine Engineering.

	<u>M.I.T.</u>	<u>McGill.</u>	
Professors	4	0	
Assoc. Professors	1	0	
Assist. Professors	<u>1</u> 6	0	Professorial
Instructors	<u>1</u> <u>1</u>	<u>0</u>	Junior
	<u>7</u> <u>7</u>	<u>0</u>	

Total Engineering.

	<u>M.I.T.</u>	<u>McGill</u>
Professorial	93	20
Junior	90	7
Research	<u>51</u>	<u>5*</u>
	<u>234</u>	<u>32</u>

* Two only at present.

Architecture, Drawing and Building Construction.

	<u>M.I.T.</u>	<u>McGill</u>
Professors	8	3
Assoc. Professors	5	0
Assist. Professors	<u>4</u> 17	<u>1</u> 4
Special Lecturers	10	1
Instructors	12	1
Assistants	<u>2</u> <u>24</u>	<u>2</u> <u>4</u>
	<u>41</u> <u>41</u>	<u>8</u> <u>8</u>

Total Engineering & Architecture.

	<u>M.I.T.</u>	<u>McGill.</u>
Professorial	110	24
Junior	114	11
Research	51	5*

*Two effective at present. One Honorary.

October 31st, 1929.

MCGILL UNIVERSITY
MONTREAL

FACULTY OF APPLIED SCIENCE
OFFICE OF THE DEAN

September 28th, 1929.

Sir Arthur Currie, G.C.M.G., K.C.B., LL.D.,
Principal.

Dear Sir Arthur:-

I am enclosing herewith a
draft of the report which you requested me to prepare
some time ago.

I am calling it a draft because
I am not quite sure that it is along the lines which
you will find useful. I have tried to give as clear and
concise a picture of our present condition as I see it,
and also what I believe to be our most pressing requirements.
It may be, however, that I have omitted some considerations
and that I have introduced some things that are superfluous.
I shall be very grateful, therefore, if you will look it
over and let me know whether you would like to have it
developed or curtailed in any way.

Yours faithfully,

J. H. Marshall

Dean.

SURVEY OF THE PROGRESS OF THE FACULTY OF APPLIED SCIENCE
SINCE 1921 AND OF THE PRESENT REQUIREMENTS.

This survey deals chiefly with matters pertaining to the Engineering Departments of the Faculty, since the Departments of Chemistry, Geology, Mathematics and Physics although of vital importance to this faculty, are also associated with other faculties in the University.

Advances made may perhaps be taken up under the following heads:

1. Laboratories and equipment.
2. Curriculum, and
Teaching Efficiency.

Laboratories and Equipment.

(a) Highways Laboratory. This laboratory, which is devoted to the examination and testing of materials used in highway construction, is located in a basement formerly used as a coal cellar, but which is quite well adapted to its present use. The equipment, several important features of which were designed by the staff, has proved very satisfactory and compares favourably with that of

the leading engineering schools on the continent. It has made it possible to give a sound course in highway engineering. The appropriation asked and granted was \$6000., and the laboratory was satisfactorily completed within this appropriation.

(b) Hydraulics Laboratory. When the old Engineering Building was burnt in 1907, the hydraulics laboratory, an excellent one in its day, was destroyed. In the new building no adequate provision was made, so that a temporary laboratory was fitted up in a corner of the testing laboratory. This served to illustrate fairly well some of the principles taught, but it was quite inadequate. Although the department made many representations urging better facilities, there was no space available and so the laboratory fitted up as a makeshift was used for 16 or 17 years until the erection of the new electrical wing made it possible to find suitable space. The equipment, together with structural changes necessary, cost approximately \$40,000. Most of the new equipment was designed by members of the staff, and this laboratory too was completed within their estimates. Dependent as we are on the city water supply, it is impossible to install a hydraulic laboratory of the first class at the University site, as all the equipment must be on a relatively small scale. Visiting hydraulic engineers, however,

consider it one of the most efficient of its class on the continent. It serves purposes of instruction admirably, and although comparatively small has been found adequate to solve several important problems for local engineers and power companies. In the meantime, on the suggestion of the department, features have been incorporated in the permanent works of the Montreal Island Power Co. at the Back River, which will make it possible to construct a large-scale testing plant there, if this proves practicable in the future, at a minimum cost.

(c) Electrical Laboratories. At the beginning of the period under review, the electrical engineering laboratories had become so inadequate that laboratory instruction had to be curtailed, or omitted altogether in the case of certain groups of students. The erection of the new wing, housing four large laboratories with library, offices, etc., afforded ample space for the requirements of the department, and also relieved the Physics Building by the transfer of the Electrical Measurements Laboratory. The High Tension Laboratory was also enlarged. The equipment compares favourably with that of the best engineering schools except as regards the capacity of the transformer, which will be alluded to later. The cost of electrical laboratories

with new equipment purchased, was approximately \$85,000. A considerable amount of equipment was presented or loaned indefinitely.

(d) Mechanical Engineering Laboratories.

During the war and the subsequent lean years, the equipment of these laboratories became seriously run down. The thirty-year old boilers, for instance, were only capable of working at a pressure so low as to be practically useless, and the internal combustion equipment was hopelessly out of date. The removal of the foundry and smithy gave room for a new Internal Combustion Laboratory. The units installed are on a somewhat small scale, but they are efficient for their purpose. A new boiler has been installed with a working pressure of 385 lbs. These improvements have added greatly to the teaching efficiency. The cost was approximately \$20,000.

(e) Mining Laboratories.

These laboratories have been re-arranged and many minor additions have been made to the equipment. The cost of this work has been met for the most part by the regular annual appropriations.

The improvements in equipment mentioned above, costing from \$150,000 to \$160,000, have been supplemented by minor additions made from time to time out of regular annual appropriations. Although the expenditure was not large comparatively, it has resulted in a marked strengthening of the undergraduate work and constitutes by far the most important advance in the material resources of the Faculty in thirty years.

CURRICULUM AND TEACHING EFFICIENCY.

Up to some ten or fifteen years ago there was a trend in the curricula of engineering schools generally towards greater specialization. McGill did not follow this trend very far. Experience soon showed that while some parts of an engineer's training could be given in the class room and laboratory far better than elsewhere, other parts could be best obtained in the field, shop or office under actual commercial conditions and with the stimulus of responsibility. In the meantime the rapid developments in engineering science demanded a more thorough training in the fundamental sciences, mathematics, chemistry, physics, mechanics and the like. This demand made it difficult to maintain even the moderate degree of technological specialization which we had and which for several reasons it seemed desirable to maintain, without a better entrance standard. It was therefore decided to adopt full senior matriculation as an entrance requirement. Since, with perhaps one exception, none of the schools in Quebec, public or private, prepared students for senior matriculation the only alternative was to prescribe one year in the Faculty of Arts. This, although not an ideal arrangement, had the advantage of making the student somewhat accustomed to university life and methods before entering upon the rigorous course in Applied Science. This change, which became effective in 1927, had the inevitable effect of reducing the number of students entering the first year to a serious extent. This will

make the attendance abnormally small for some years after the entry has increased to its former size, that is to say, until the small entering classes have been worked through to graduation. Fortunately, while the standards of scholarship have been more than maintained, the percentage of eliminations which had become alarming five or six years ago has been much reduced, as indicated in the following table.

	Percentage of Eliminations or Demotions.				
	1924-5	1925-6	1926-7	1927-8	1928-9.
First Year:	37	32	33	33	23
Second "	57	24	23	17	17

The students represented by the above figures must repeat an entire year in order to proceed, and the great majority do so, many completing their courses with a very satisfactory standing.

It is gratifying to note that all the universities in Western Canada now require a year preparatory to the four years engineering course, except in the case of students entering with senior matriculation. Our affiliated colleges in the Maritime Provinces also readily adopted the same standard simultaneously with McGill.

Outwardly the changes in the curriculum have not been great. Junior shopwork has been abandoned, the space vacated being utilized for some of the laboratory extensions previously mentioned. To replace shopwork in a broad sense all students are now required to have at least six months

experience in engineering or industrial work before receiving a degree. In this step, which is working out well, McGill was a pioneer. Several other Canadian universities are now following the lead. Some new undergraduate courses have been added, notably one in Electrical Communications. The most vital changes, however, have been in the strengthening of existing courses. The process of keeping courses abreast of professional and scientific developments is always going on. But during the last few years there has been, on the part of the staff, a close scrutiny of objectives and, it is thought, notable improvement in teaching methods. Such a claim is hard to substantiate. Students, however, have their own ways of expressing dissatisfaction, either openly or indirectly. There has been no time in my experience when such expressions have been so rare as in the last few years. In 1921-22 out of a staff of 43 in the engineering departments 42 per cent. were of professorial rank; the remainder lecturers or demonstrators. At present in a staff of 37, 65 per cent. are of professorial rank. The added maturity and experience indicated by these figures cannot fail to increase teaching efficiency. In the departments of Chemistry, Geology, Mathematics and Physics, taken together, 45 per cent. were of professorial rank in 1922 as compared with 52.5 per cent. at present.

The engineering curriculum at McGill differs considerably from that of the two other leading schools of central Canada. It is therefore satisfactory to note that

all the new western universities have followed ours very closely so that interchange of students, practically all in one direction, takes place with little or no difficulty.

Although antedating slightly the period under review the advance in the salaries of the teaching staff in 1920 was doubtless a result in anticipation of the campaign of 1921. The average increase was perhaps about 50 per cent. It is probable that, taking the year 1913 as a basis, the advance in salaries to the present time has been about the same as that in the cost of commodities. On the other hand the standards of living have advanced materially in the last nine or ten years so that it can hardly be doubted that teachers who are entirely dependent on their university salaries are, as compared with their neighbours in professional and business life, not so well off as they were in 1913. Fortunately nearly all the members of this Faculty either have some private means or are able to supplement their salaries by professional work. Otherwise it would be quite impossible to retain the class of men we have. The private work undertaken consists of highly specialized consulting work, engineering investigations, service on engineering boards, or in the case of the younger men contacts with engineering firms, particularly during vacations. Such work is desirable in that it adds to the teacher's knowledge and experience, keeps him in contact with actualities, adds to his teaching authority and efficiency, and supplies a useful service to the engineering and industrial community. There is of course

a risk that it may be overdone to the detriment of university work. It happens however that with us the men most in demand for private work are in general those to whom one turns with most confidence when any extra university or faculty work is to be done. It may be said frankly, however, that this state of affairs is not favourable to fundamental research in engineering. It is however favourable to industrial research which constitutes a considerable part of the work undertaken. The average corporation engineer or executive is far more keenly interested in and more readily provides materials and facilities for the solution of some immediate problem with which he is face to face, than for a more remote one which may be of more importance, but not leading obviously to immediate results. Facilities, and cooperation in securing them are of vital importance, since but a fraction of the research problems suggesting themselves can be attacked, or at least pushed to a conclusion, on a laboratory scale. The engineering professor who wishes to engage in fundamental research in these conditions finds himself more or less restricted to laboratory problems for which inexpensive materials will suffice, foregoes profit and immediate credit and runs the risk, indeed, of being considered visionary and unpractical by his professional brethren generally.

FUTURE DEVELOPMENT.

Consideration of the special circumstances in which McGill is placed is necessary in order to form a reasonable

judgment as to the most desirable lines of development of the work of this Faculty. The natural local constituency is small, being confined to the English speaking population of Quebec and a section of Eastern Ontario. Tuition fees are higher in McGill than in any other engineering school in Canada. The following is the schedule of fees at Canadian engineering schools according to the latest information at hand.

Saskatchewan	\$ 60
N. S. Technical College	75
Alberta	75-85
Manitoba	100
New Brunswick	120
Queen's	130
British Columbia	150
Toronto	150
McGill	205

Students' experience too is that living expenses are decidedly higher in Montreal than in Toronto and most if not all of the smaller centres. In addition many parents prefer to send their sons direct from school to smaller centres, particularly those where college dormitories are available. The fact that in these circumstances McGill draws a much larger proportion of its students from other provinces, other parts of the empire and foreign countries than any other Canadian engineering schools, speaks for itself. The newer engineering schools have however been making rapid progress in the last

ten years. Most of them have fairly good equipment for undergraduate work, excellent staffs including many of our best graduates and on a salary basis comparable with our own. They have followed our curriculum quite closely and are often quick to adopt changes and improvements which we initiate. Undoubtedly much of the best material in the country which fifteen or twenty years ago would have come to McGill if anywhere, is now being drawn to the new institutions by reason of the smaller cost. Every year a considerable number of students who have taken a part of their course at one of the small universities come to McGill to complete it, generally entering the third year. These students are usually above the average in ability or industry and do well here. It seems doubtful however whether it is possible, with the student material available, to maintain a sufficient margin between the quality of our undergraduate courses and that of other schools to modify greatly the natural flow.

In graduate work on the other hand there is a comparatively clear field so far as Canada is concerned. The smaller universities are, I think, looking to McGill to take the lead in this and to undertake what they cannot hope to accomplish for many years. Restricting these remarks to the engineering departments one may say that a fair beginning has been made which has at least involved a vast amount of hard work. The following suggestions seem to me those which would lead to the most promising immediate results while providing for future

development in ways which cannot now be entirely foreseen.

done

Chemical Engineering. The undergraduate course should be strengthened by the appointment of an Assistant or Associate Professor of chemical engineering. Such a man should be capable of designing plant and equipment for carrying out the major unit processes involved in the chemical or near chemical industries. Graduate work in this important branch would then follow naturally.

Civil Engineering. Graduate courses are already offered in structures, hydraulics and highway engineering. That in structures is probably the best developed and has attracted more students from other Canadian Universities than any other graduate course in engineering. In order to carry students to the Doctor's degree it would be necessary to add to the staff a young man highly trained in mathematics and the theory of elasticity. We had such a man ten years ago, but he was selected for the principal chair of engineering in the University of Birmingham. To develop the course in hydraulic engineering to a point where it would attract students from other universities would require either some relief from other duties for the professor in charge, or a new appointment. Few of our graduates go into highway engineering, owing possibly to local conditions. Under present conditions I am not sure but that experience is the best graduate school ^{in this branch}, and it does not seem to me a promising field for immediate development. In order to bring the equipment of the testing laboratory up to date an expenditure of about \$15,000 would be required.

As in all our departments more elasticity in the annual appropriation for materials and minor pieces of special equipment would greatly facilitate research work in the graduate school. We often secure the co-operation of engineering corporations to help us out. But we have had perhaps too great a regard for economy in asking for University appropriations.

Electrical Engineering. Sound graduate work is being done, but not on a sufficient scale to attract students from other universities. The field is excellent, but an additional man with high mathematical qualifications would be necessary in order to advance.

Mechanical Engineering. Aeronautical engineering would probably be the best branch to develop. In this the undergraduate course needs strengthening too, although the work is so specialized that it must be relegated largely to the graduate field. A good man in aeronautical engineering would have to be added to the staff.

Metallurgy and Mining. Graduate work has been fairly active in these departments. Probably pending the provision of additional facilities the best that can be done is to carry on along the present lines.

Certain expensive pieces of equipment would be required either to remove serious handicaps or to make possible the developments I have suggested in structures, electrical and mechanical engineering. The most important of these are:-

- (1) A large testing machine with a capacity of perhaps 1000 tons.
- (2) A high tension transformer.
- (3) A tank for carrying out work on the landing floats of sea planes.
- (4) A wind tunnel for models of aircraft.

These are not only costly in themselves, but would require space and housing which make them wellnigh impracticable so far as the University is concerned. All of these, however, are being provided or will soon be provided in the laboratories of the National Research Council of Ottawa, and we are assured that they will be available for use by the universities. McGill would be in a more favourable position than any other university to take advantage of these facilities, and it seems to me that it opens the way for developments which but a short time ago seemed hopelessly blocked on the score of cost.

An obstacle in the way of graduate work in engineering is the lack of scholarships. The Research Council's scholarships are generally awarded in pure science. Three or four fellowships are available in Mining and Metallurgy which has kept a regular flow of graduate students in those departments. One graduate scholarship in Civil Engineering was founded last winter. Otherwise none are available. Many American engineering schools have a liberal number to offer and Canadian

students are received with open arms. All efforts to develop graduate courses will be handicapped until a more liberal supply of scholarships is available.

Some such programme as that suggested would, if carried out, make McGill supreme among the engineering schools of Canada. It is of course futile to challenge comparison with such an institution as the Massachusetts Institute of Technology which is unique in America, if not in the world. I believe that our undergraduate work is in some respects better, in others not so good, but that on the whole ^{it} compares favourably with theirs. As regards graduate work the resources of the Institute are too great to warrant comparison. In Mechanical Engineering alone the Institute has 27 teachers of professional ^{orioral} rank and 28 juniors, besides 7 special lecturers, or far more than our entire engineering staff. Investments in buildings, equipment and endowments devoted to engineering and allied branches are about equal to the entire investment of McGill University.

Wm. Mackay

October 26th, 1929.

The report which has been made by the Special Committee presents some useful matter for discussion and offers some suggestions of undoubted value.

Its contents appear to require supplementing in one important aspect - it deals primarily with the value of the University as an institution where research is to be carried on for the general benefit of the country. It does not, in my opinion, lay nearly sufficient stress on the object which was in the mind of the University's Founder and of most of its benefactors, namely the training and equipment for life of a large number of young Canadians. Valuable as research is we must never lose sight of this primary function.

I have one very general comment to make. The report does not offer any internal evidence that the Committee has been apprised of a great many changes which have been made in the University in the last five years. I refer particularly to the entire re-habilitation of the laboratories and the re-organization of the courses in the Faculty of Applied Science, but other examples will appear as we proceed to consider the report in detail. It is possible that the Committee were aware of some of these changes but if so it would, I think, have been proper for them to mention improvements of such importance.

I come now to the report itself. The report begins,-

I.

" It is assumed in this preliminary report that:-

- (1) The Board of Governors are resolved to build up a really great University in keeping with its national character."

In connection with this assumption it seems desirable to enquire whether it is really the intention of the Board of Governors to stress a national character in McGill. In considering the function of Provincial Universities, many are

disposed to hold that they should aim primarily at the advantage of the Provinces in which they are situated. Are we to consider that McGill is ~~to~~ aim primarily at the advantage of the Dominion of Canada - if so, certain questions must be answered.

1st. What is the difference between a University of national character and any other University?

2nd. What is the purpose of a University? Is it to train research workers, investigators and teachers for a particular community, or is it to advance the cause of learning generally?

I hesitate to think that either Oxford or Cambridge would permit themselves to be described as National Universities.

"(2) Such a development should be carefully and deliberately planned with respect to the greatest national needs, both in the immediate and more remote future."

With reference to this paragraph two questions arise. Is it possible to plan definitely a University's future, or is not this duty best left to future authorities. Could anyone, for example, have made even an approximate estimate of the development of our greatest commercial industries ten years ago, or could they make such an estimate for the next ten years? If not, we cannot foresee the needs of the country and of the youth requiring education and if we cannot foresee these needs then we cannot make definite and unchangeable plans.

"(3) The upbuilding of a great university cannot be achieved forthwith, and that advances and developments can only be made through a series of stages, depending upon the resources available from time to time."

The implication of this paragraph is that McGill is not at present to be considered a great University. With such a suggestion I do not agree, nor I think will

anyone connected with the progress of University education in the world. If McGill is one of the World's great Universities, a considerable amount of building has already been achieved.

"(4) The University will inevitably increase in size with the growth of the country, and that Montreal will more and more become the great centre of population in the Dominion. Therefore, it is unwise to suggest limitations of numbers in any dogmatic way. Nevertheless, we do believe that the creation of standards of a high order is a more important consideration than numerical limitations and that the latter will automatically result from a well-devised policy with respect to higher standards of excellence."

This paragraph is based on the assumption that McGill's student population is too grow in proportion to the population of Canada. I do not think that the Governors or the Corporation have ever considered this question much less given their approval expressed or implied to such a policy. It is very much open to doubt whether even if the population of the country has a very large increase that we should look forward to adding materially to the numbers of students at McGill.

"(5) In order to meet the competition of other universities with regard to equipment, facilities and men, we must so utilize our resources as to build up progressively the Institution in the direction of its most salient needs, and where development will give most immediate and satisfactory results. "

This is obvious and hardly required stating.

"(6) In this connection, we would call attention to the need in Canada for scientific men - for the development of our natural resources.

" Most of our graduates are compelled to go abroad for advanced work, having inadequate facilities and stimulus here for higher training, and a large proportion of these graduates never return. The exodus of such men, often the best graduates from our University and the best types of citizen, is a very real menace to the prosperity of the Institution, as well as of the country at large, and every possible effort should be made by the University to counteract such an inevitable threat to our prestige.

This statement not only applies to the outstanding branches of Science, e.g., Mining, Geology, Engineering, Physics, Biological Sciences, but to the more important departments in the Faculty of Arts, e.g., English, French and Economics.

A comparison over twenty years of the relative positions of the two competing schools of the Massachusetts Institute of Technology and the McGill Science Faculty (at one time on an equal footing) will serve as evidence - in the one case a steady growth and educational leadership on the Continent; in the other, a lagging far behind to, a distinctly inferior position."

The first paragraph of this section might very well be taken to imply that a large number of University graduates go abroad and do not return to Canada. This, of course, is not so. The proportion of McGill Graduates who were living in Canada last year, in the principal faculties, was as follows,-

Arts	85%
Medicine	75.9%
Science	83.1%

It may be that the Committee refers only to the graduates of very high standing whom wish to attend other universities. I am inclined to believe that the seriousness of graduates attending foreign universities for advanced work

is very much overstated. Many would go elsewhere in any case. I assume, of course, that the Committee had at its hand the available information concerning the Graduate School. I quote the following paragraph from Dr. Tory's Report at the 12th National Conference of Canadian Universities in 1928 and referring to the University of Alberta,-

"Only one out of 164

Further, I have inquired especially regarding our more recent graduates and find that of the one hundred and sixty-four who received degrees and diplomas a year ago there are at present only six in the United States, four of whom are studying for higher degrees and intend returning to Canada, when they have completed their courses, while one was a native of the United States, leaving only a possible loss of one Canadian out of one hundred and sixty-four."

I am not in any way contesting the statement that thorough developing of our Graduate School is most essential and that this is one of the most important fields of activities.

With reference to the third paragraph of Section 6, I do not know whether the Committee is acquainted with the physical and curricular changes that have taken place in the Faculty of Applied Science. If not, I should like to know who is responsible for the statement that the School "is lagging behind to a distinctly inferior position" and with what knowledge the statement is made. Has any such comparison over a period of twenty years been prepared, when and by whom?

It is quite true that there are two very important departments in the Massachusetts Institute of Technology which have no parallel at McGill. First, there is the Institute of Chemical Industry in which research workers apply themselves to practical and pressing problems of industry. It should be

pointed out that the Pulp and Paper Institute, which is of at least equal importance, has no parallel at the Institute of Technology and that a Committee of the Faculty of Applied Science two years ago recommended very strongly the formation of a similar institute to deal not only with chemistry but with all branches of industrial research. Attention must also be given to the fact that most advances in Canada have always been made by individual corporations with the object of commercial profit. The result is that such large corporations establish their own research laboratories in order to maintain secrecy which is an absolute essential.

The Massachusetts Institute of Technology also possesses a large building devoted to aeronautical research presented by an enthusiastic supporter. This development has also been considered by the Faculty of Applied Science, but it is very doubtful whether any such tremendous expenditure can be justified.

A third branch which exists at the Massachusetts Institute of Technology and not at McGill is Naval Engineering. It is doubtful whether for now or for many years to come such a branch will be necessary here.

If, physically the School at McGill is inferior, how are we to explain the fact that statistics show that McGill Engineers are receiving as good or better salaries as the average American Engineers of the same year of graduation.

"(7) It follows that a systematic effort should be made to inspire the interest of English Montreal in McGill, as the University can only be made and kept great through the support of many citizens over a considerable period. This can best be secured by creating the belief that the work of the Institution is being carried on by men who are able, active, learned and sincere. On a per capita basis, a majority of the teaching body must always be mediocre, but it

" should be a capital aim of policy that the staff should include, as a minimum, from ten to fifteen Professors of outstanding capacity and energy. The presence of radioactive teachers and investigators to this number cannot fail to make itself felt throughout the University, Montreal and the Dominion.

Such men at McGill have been largely imported from elsewhere, but it is of the utmost consequence that we should build up our own body of teachers, This can only be done if Canadian scholarship offers its prizes, as in business and the professions.

Relatively high salaries - \$2,000. to \$3,000. higher than the highest now received in Arts and Applied Science - for a limited number of key men (say eight) will go far to attaining such a purpose, and in the total disbursement, is a relatively insignificant expenditure amounting to, approximately, 2 per cent of the present disbursement on salaries. In addition to this, the importation of learned men for short periods, as well as the foundation of further scholarships, are subjects for consideration that stand in the first line."

The first implication in this section is that English Montreal is not interested in McGill. I do not know that I am as well qualified to speak of this as the other members of the Committee ^{who} with one exception ^{are} ~~and~~ not actively connected with the University, but I have certainly never observed any such lack of interest. I assume that where the next sentence speaks of "creating the belief" it does not mean that we are to make people believe something which is not so. I would have preferred to use the words "making it clear".

The next implication is that the University's staff does not include "from 10 to 15 professors of outstanding capacity and energy". I have been informed by the authorities of the Rockefeller Foundation that the Faculty of Medicine

alone contains at the present moment, at least, half this number, and to use the words of Simon Flexner " a team which cannot be equalled anywhere".

In the Faculty of Applied Science the staff are perhaps less appreciated in Montreal than they are throughout the rest of the Continent of North America. Many of them are universally regarded as authorities in their particular branches. I quote below the last paragraph of Dean H.M. Mackay's latest report,-

"The members of the teaching staff in practically all engineering departments continue to take an active part in national and international engineering and technical societies and organizations, Many important chairmanships and other official positions are held in such organizations. Few realize the importance of such activities or the vast amount of gratuitous work which they involve. As such work receives no publicity, and indeed no compensation except a sense of duty performed,

it seems only fair to call attention to it here."

It is not difficult to name other outstanding men in the other Faculties of the University.

"The importation of learned men for short periods" is, of course, the system already carried out by L'Institut Scientifique Franco Canadien, and the system is a very useful one if its object is to supplement an inadequate staff as is the case with the University of Montreal - in any case, if the money is available such visits are always worth while.

The next sections of the report deal with Land and Buildings and the ~~deeper mental~~ ^{departmental} needs of Faculties.

With the general statement of policy on page 5 I agree.

We next come to Section III. "LANDS".

The Committee deals first with the future of Sherbrooke Street development, a matter on which there is not much question, and secondly with the McGill Union.

The official report of the Students' Council concerning the use of the Union is attached. In this connection it is pointed out that residential facilities will decrease the attendance at the Union. At Cambridge, for example, the Union, which is a much older institution, is only patronized by a very small number of students.

There is nothing new about the question of the Union's disposal. The matter is now before the Governors and has been for some time.

With paragraphs on page 8, there is very little comment to be made. The report states that the importance of acquiring all the property within our boundary seems worthy of serious consideration. This is now the University's policy and has long been so.

"We do not believe that McGill can afford to give up any more of its existing land". What land has so been given up, except for the exchange of the second house above the Wesleyan College for Divinity Hall?

It is suggested that when the Westmount Mountain property is sold the receipts should be devoted to the expenses now incurred in purchasing properties here. This would be so, if it were going to be sold. I question the ultimate value of the suggestion. In the first place, I do not believe that Sir William Macdonald intended his purchase to be a speculation; in the second place, it might very well be desirable to utilize Westmount Mountain for the purposes of residences where our professors could be provided with dwelling houses at a very low cost, owing to the fact that we would have (on our books at all events) no important expenditure on land. This would be a much easier method of increasing ~~salaries~~ remuneration than ~~of~~ increasing salaries and I believe is more in line with what the benefactor intended.

As regards the last paragraph of page 9, it would be interesting to know what property is to be deeded to the University, further, what reason is there to

think that land on McTavish Street will increase in value. It is by no means certain that it will do so, and it is quite possible that it will decrease as has been in the case of all land in the neighborhood of Harvard.

" IV. - NEW BUILDINGS AND EXTENSIONS"

This section contains practically nothing which has not been deal with for years in the report of the Principal and Deans of the various Faculties. Its wording might have been "we agree with the University authorities who have for years constantly advocated,etcetera".

"GYMNASIUM"

The Principal's Report 1922-1923 states " The erection of a Gymnasium has in any event become a definite part of the University's policy and programme".

"DORMITORIES"

Dormitorieshave been advocated for about 50 years by those immediately responsible for the welfare of the students. This was also stressed in the Principal's Report of 1922-1923.

A building for Mining, Metallurgy and Geology - the same report of 1922-1923 states - "the inadequacy of the laboratory and lecture room accommodation for the requifements of the Department directly affects a very large number of students at these courses, and even this inadequate accommodation seriously cramps the Department of Chemistry".

"ADDITION TO THE LIBRARY"

The Librarian's Report for 1925-1926 states - "the outstanding needs of the Library are at the present threefold - more space for books, students and staff".

With reference to the other suggestions, Nos. 1 to 13, it is not stated by the Committee whether these are in order of importance. I doubt whether they are intended to be so, but deal with them in this order.

" EXTENSION TO THE PHYSICS BUILDING"

Suggestions as to this have been made verbally by the staff at different times.

"EXTENSION TO THE ROYAL VICTORIA COLLEGE"

Recommended in the Principal's Report of 1922-1923, referred to in the reports of the Warden in 1924-1925 and 1926-1927. This matter is already before the Governors and has been decided on.

"ACCOMMODATION FOR THE DEPARTMENT OF PHYSICAL EDUCATION"

This has long been under consideration and goes with the Gymnasium. The Director refers to the need of it in his report of 1924-1925, where he points out that the activities were being carried on in 13 different buildings.

"ACCOMMODATION FOR THE SCHOOL FOR GRADUATE NURSES, FACULTY OF DENTISTRY AND FACULTY OF LAW"

These are without doubt very urgent.

"MUSEUMS COLLECTIONS, DEPARTMENT OF ARCHITECTURE, STADIUM, PLAYING FIELDS AND LABORATORIES"

The report fails entirely to refer to the necessity for a rebuilt administration building, the desirability of a Convocation Hall and the need for proper accommodation for the Faculty of Music.

SPECIFIC NOTES REGARDING THE DIFFERENT BUILDINGS

1. GYMNASIUM - It has already been noted that the building of a Gymnasium is part of the University's policy and that the other Departments mentioned are to be houses is understood.

The report further contains the suggestion of a "palestra" . I am somewhat surprised that this should be suggested seriously. I doubt, however, whether the Committee in suggesting it has taken full account of the development of Winter Sports and other competitions which occupy one season very fully,. The report leads one to think that the Autumn is the only time any sport is carried on.

As regards the site for the Gymnasium that suggested is in accordance with my own views.

At the end of this section reference is made to the proposal of the Athletic Board for two extra playing fields and it is stated that this proposal "would apparently involve considerable expense". The proposal put forward was ^{the} integral part of a larger scheme and it is open to question whether the Authorities in charge of the physical activities of the University are not ^{the} best qualified people to judge of its necessity. There does not appear to be any separate estimate of the expense, although one may have been prepared.

2. MINING AND GEOLOGY BUILDING: The first portion of this section is by no means new and reference has already been made to this. It is hardly correct to say that two proposals are under consideration. The proposals mentioned ~~and given~~ by the Committee are as follows,-

"(1) The S.W. corner of Milton Street, where it intersects University Street and behind the present Engineering Building.

(2) An extension northward of the present Administrative Offices of the Principal and his staff, which form the eastern wing of the old McGill College and former residences of Sir William Dawson, and to establish there this new group of Departments."

As regards the first it is noted that the plans already prepared would be adequate but, of course, as plans included electrical engineering it would be desirable for them to be carefully re-considered. See report from Science

Faculty below -

Faculty of Applied Science

The Faculty of Applied Science is offering courses in Communication Engineering in the preparation of which they have for some time been engaged. In this connection a contribution of the highest value has been made by the Department of National Defence. The graduates of the course in Wireless Engineering will not only form a very useful reserve, but may be counted upon to provide a considerable number of active officers for the Signal Service. With this in mind the Department is lending one of its most highly qualified officers to supervise the course in wireless telegraphy for the next two years, and is moreover giving us the greatest assistance in the acquisition of equipment. In the course in telephony a promise of further and most valuable aid in obtaining equipment has been given by the Bell Telephone Company of Canada. It is to be hoped that commencing under such auspices the new course will before long prove a success.

Mention has already been made of the fact that the construction of the Electrical Wing has permitted the complete remodelling of the Engineering Laboratories, it is not yet generally realized that no such improvement has been made in the equipment of and the facilities offered by the Engineering Building since the erection of the original structure in 1893.

The new floor space which was available for the Electrical Department was 11,000 sq. ft. and by the removal from the former Smithy and Foundry of the shop equipment the use of which for instructional purposes had been discontinued this total was increased to 20,000 sq. ft.

The Electrical Laboratories have now been reinstalled in the main and first floors of the new

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wing in accordance with the most modern methods and up to the highest standards, while on the second floor is being placed the Communications Laboratory, as well as a new Electrical Measurement room. This frees much needed space in the Physics Building. The High Tension Room has been enlarged and re-conditioned, although some further apparatus is still required. The Department of Mechanical Engineering has installed a new gas engine laboratory, now almost complete, in the basement of the new wing. This Department, with its three excellent laboratories, besides the one remaining shop, is now as completely equipped as could be desired.

In the space cleared by the removal of the Alternating Current Laboratory the Department of Civil Engineering has installed a most excellent Hydraulic Laboratory. We shall thus, we hope, be able to carry on in a satisfactory way instruction and research in a subject of the greatest national importance and one in which the staff and graduates of McGill have an honored record.

In the space which has for many years been occupied by the very much cramped Hydraulic Laboratory has been placed a Cement Laboratory and in a further space now cleaned and remodelled in the basement is a new Highway Laboratory.

The whole work has been carried out at a minimum of expense through the utilization of all local facilities and the energetic and willing aid given by the Laboratory Superintendents of the building to whom as well as to the members of the staff the University owes its sincerest thanks.

We can indeed foresee a new problem, one which is in a way a direct result of all the efforts being made to improve engineering education. The question of the remuneration of the engineer when his University course is over and he has entered upon his professional career is one which, while it does not directly concern us, certainly affects us. The industries which have felt it possible to recognize the value of thorough Univers-

The other proposal has never been officially made at all. A very general suggestion was offered by the Dean of the Faculty of Arts in his report of 1926-1927.

LIBRARY - Reference has already been made to this.

DORMITORIES - Reference has already been made to this. As regards the last paragraph dealing with expense, it is difficult to see how the Committee arrive at their conclusions that buildings could be erected for \$600,000. Professor Nobbs recently made a report, copy of which is attached, based on plans which have already had a good deal of consideration. His estimate for a building for 400 students is \$1,060,000. This is on a basis of 40¢ per ft, and any increase in construction, labour or material would materially add to it. If the size of the Dormitories was increased for about 500 students, as the report recommends it would, on the basis recommended by Prof. Nobbs, involve an outlay of \$1,350,000. Our experience does not lead us to think that construction is often less than estimates.

The last paragraph suggests that with proper administration (sic!) the building would be self supporting. It is not clear what the Committee means by "self supporting". If they mean that in addition to paying current expenses it would show interest on the investment, the suggestion is impossible.

Calculations have been made for students' residences to operate on a commercial basis and pay a small profit. It was found that it would be necessary to charge such high prices for rooms that the project was abandoned. If it is only meant that the undertaking would pay its operating charges, the statement cannot be contradicted although this expense will likely be found higher than at first expected. This estimate of cost is borne out by general experience with apartment houses.

The only things reported upon
which is approved are

- 1) Graduate School of Nurses
- 2) Change in course last
year at Macdonald College
but which of course I had
nothing to do

What did James McNeil say in his will?
" " Macdonald - when re-founded
Macdonald College

The first need of university

1) To understand its mission and its
purpose

2) Then this is professors

Choice, Faculty organization, Salaries,