

THE UNIVERSITY OF MICHIGAN  
COLLEGE OF ENGINEERING

UTILIZATION OF SPACE

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Ann Arbor

## COLLEGE OF ENGINEERING

### Report of Study

### Utilization of Space

Concurrent with the work required to answer Dean Robert L. Williams' inquiry in May 1960 on "Space Utilization," the College of Engineering completed a comprehensive study of space assignments under the supervision of the administration of the College. Although this report provides additional information, the results indicate the same deficiency of faculty offices, and need for laboratory space as previously set forth in the "Space Study and Recommendations," dated January 23, 1959. Information in this report and the above-mentioned report do not contain duplicate information. They should be studied together.

This report is separated into the following headings: Part I - Analysis of Study; Part II - North Campus Building Program; and Part III - Conclusion.

It is the purpose of this report to provide the administrative officers of the University with information concerning the current problems of the College of Engineering in its attempt to provide facilities for educational programs that must be responsive to a rapidly growing technology.

## PART I - ANALYSIS OF STUDY

Table I has been prepared from the recent study to bring up to date and to amplify information presented in the January 1959 report.

In passing, it should be understood that there are likely to be minor discrepancies between this information and that which Dean Williams sought. His inquiry, for instance, did not recognize this College's need for design room space. This space is scheduled on a three- or four-hour continuous use basis. Some of this space, although not satisfactory for one-hour recitation classes, is scheduled for such use. In recording the use of space, a degree of judgment had to be exercised in allocating it to laboratory or classroom usage, both categories being recognized in Dean Williams' need for information.

### TABLE I

(See Page 3)



A. Table I. Table I provides two important pieces of information. It shows the distribution of office space, and the amount of office space available to each faculty man. It also shows the distribution of laboratory space. This space determination has been made by actual physical measurements and layouts in order that we could get an accurate idea of the per cent of the total space that was occupied by furnishings and equipment.

Column 8 of Table I is an evaluation of funds available to the College of Engineering from all sources other than State appropriations. This, likewise, is distributed in accordance with the participation by the several departments.

B. Offices. Our survey again shows that there is no academic rank of faculty of the College who as a group have individual offices. The limitation of space is such that certain items of furniture that most engineers would like to have in their offices cannot be accommodated. This refers to drawing boards, drawing tables, and reference files. (Most of the College faculty have an office in their home.) Where space is available, graduate students and student assistants are accommodated within the faculty man's office. The figures in Column 2 are based on the occupancy of 696 people occupying 335 offices.

Our recommendations, included in Table IV of the January 1959 report, show a requirement of 16.9 per cent of our total space devoted to offices. This report showed approximately 43,000 square feet of space now needed to house our faculty in a minimum amount of office space in single occupancy. This figure includes space to provide desks for the present number of graduate students.

The North Campus building program presented in Table VI shows a requirement of 79,700 square feet of space to move that portion of our total faculty to the North Campus who are primarily concerned with the junior, senior, and graduate level programs. This space is badly needed.

C. Laboratories. The present survey shows that 62.5 per cent of the total space now available to the College of Engineering is devoted to laboratories. Of this total, 73.5 per cent is devoted to student research programs, and 26.5 per cent is devoted to group laboratory instruction. A portion of the laboratory space is jointly used by both groups. In those cases where joint occupancy is required, the space has been listed as research space.

Table IV in our January 1959 report showed that the faculty needs for laboratory space requires that 67.2 per cent of our total space be devoted to laboratories. Table VI of this report showed a net deficiency as of this date of 147,000 square feet of space based upon the minimum needs as determined by a faculty committee. Tables IV and VI from the January 1959 report are being included in this document for your convenience--refer to Appendix. What the January 1959 report does not reflect, nor does this report, is anything concerning the problems of conducting research programs in totally obsolete facilities. In many cases, this obsolescence is such as to make it impractical to proceed in any area of interest to the faculty.

D. Funds for Educational Programs. The high percentage of space devoted to laboratory activity in the College of Engineering raises the important question of financial support for research and for the large amount of equipment that is actually in location. Column 8 of Table I in this report is the result of a study of the rate of expenditure of funds from all sources (fellowships, grants, contracts, etc.). This total fund represents the sum of money that is spent in support of our research programs. Sustenance, equipment, current expenses, and salary money make up this total. This presentation, in no way, indicates the lack of need for State appropriation support. It does, however, indicate a correlation between the growth in our technology in the College,

the need for space to support these programs, and the requirements of an expanding graduate program in engineering.

E. Classrooms. Roughly 13 per cent of the total space now available to the College of Engineering is devoted to classrooms. The North Campus Planning Committee's recommendation states that only 9.5 per cent of total new space on the North Campus should be devoted to classrooms.

The utilization of space for classrooms in the College is lower than other space requirements for the College. There are several reasons for this. First, it was found in our space survey that classrooms as used by teachers of mechanics, engineering english, and the engineering sciences are used a much higher portion of the day than the average for the College. This coming semester the 10 classrooms used by those in the Department of Engineering English will be used a maximum of 64 class-hours per day. Space used by the classes in the engineering sciences and mathematics last semester was approximately 600-700 class-hours per week. This was divided into approximately 20 classrooms. Those classrooms showing a relatively low occupancy are those specifically devoted to special purpose classes where demonstration equipment, projection equipment, chemistry benches, or equipment benches are a necessary part of the recitation class.



The 9.5 per cent of space requirement for North Campus classrooms shown in Table IV, and the gross space requirement as shown in Table VI in the January 1959 report considers only the requirements for classroom space for the junior, senior, and graduate level programs. Space requirements for classrooms would be higher on North Campus if the freshmen and sophomore programs were to be accommodated.

F. Seminar Rooms. The space survey which we have recently conducted has uncovered the fact that we only have two rooms in the entire College that are devoted to seminar activity. Space that had previously been available for this important portion of graduate work has gradually been taken over by laboratories and offices.

G. Design Rooms. Because of the special equipment involved for design activity, the utilization from the standpoint of hours per day per student will always be low. It should be pointed out, however, that this activity requires only approximately 6.5 per cent of our total space needs. Although our present design rooms are not at all satisfactory for one-hour recitation sessions, they are being scheduled for such purposes.

H. East Hall Demolition. The College of Engineering has not opposed the demolition of this building. We do not, as yet, however,

have a satisfactory answer for replacement space of offices and classrooms which is represented by this building. The faculty of the Department of Engineering English are very much aware that their teaching efforts will be handicapped by the lack of contiguity between their offices and classrooms. The published plans of the College of Engineering faculty in the "Faculty Requirement for Office and Laboratory Building - North Campus" specifically indicates that their needs are, likewise, best served by an intimate relationship of offices, classrooms, and small laboratories. At the present time, the teaching faculties and their office allocation for six departments of the College are partially distributed on the North Campus. A seventh group, the Department of Nuclear Engineering, is occupying offices in any space available in each of the three separate laboratories on the North Campus. These separations create many difficult problems.

The faculty of the Department of Physics in seeking to locate the new Physics and Astronomy Building close to the present Randall Laboratory undoubtedly anticipate the plan will provide a degree of communication between the people located in the two buildings that could not be accomplished from a more remote location. We think their planning is correct.

## PART II - NORTH CAMPUS BUILDING PROGRAM

A portion of the building program planned by the College of Engineering for North Campus has been completed. Full occupancy of this space

has also been completed, including the finding of space for a large nuclear engineering program that had not been planned for the present space.

The College needs badly the planned program as shown in Table VI of the January 1959 report. This program would provide the needed large laboratory space represented by the Fluids Engineering Building, office and laboratory space that is badly needed, and space for nuclear engineering to carry on their work with radiation materials. This program would provide again a degree of communication between our laboratories and our teaching activity that is not now possible because of the remote location of a partial engineering facility on North Campus. The faculty and departments of the College affected by this separation are quite disturbed by the resulting problem.

### PART III - CONCLUSION

Construction drawings and specifications for Fluids II have been completed. The North Campus Planning Committee of the College of Engineering has studied and completed the "Faculty Requirement for an Office and Laboratory Building" for North Campus. This publication was completed in August 1959. The nuclear engineering facility has, likewise, been planned. The publication of their requirements has not been completed.

The planning for North Campus space by the College has been completed and submitted to the administration and the University architect for their consideration. Detailed plans and specifications for the needed facilities could proceed immediately.

The administration of the College of Engineering is very much concerned over the present inability to provide office space for new people whom we would like to have on our faculty. We are concerned with the present difficulties with communication between the classrooms on Main Campus and the laboratories on North Campus. Further, we are seriously concerned over our present lack of facilities as compared with other institutions of comparable national rating. It cannot be denied that we are in competition with both industry and these institutions for the better faculty, the better students, and support funds.

## APPENDIX

TABLE IV  
 THE UNIVERSITY OF MICHIGAN  
 COLLEGE OF ENGINEERING  
 RECOMMENDATION FOR MINIMUM NET SPACE OCCUPANCY  
 NORTH CAMPUS PLANNING COMMITTEE

SPACE OCCUPANCY	RECOMMENDATION NET SQ. FT.	<u>% Area</u> Cl. Rm. Office & Laboratory
Class Rooms sq. ft. per student	13.6	9.5
Design Rooms sq. ft. per student	9.5	6.4
Laboratories sq. ft. per student (a) large labs (b) small labs	26.7 <u>70.0</u> Total Labs 96.7	67.2
Offices sq. ft. per faculty (a) faculty (b) secretary and support- ing files (c) Administrative and student activities	130.0  104.0  <u>53.0</u> Total Off. 287.0	16.9

TABLE VI. NORTH CAMPUS BUILDING PROGRAM  
(NET SQ. FT.)

YEAR	SCHEDULE FOR OCCUPYING BUILDING.	SPACE OCCUPANCY CUMULATIVE TOTAL			NET ADDITION OF SPACE	TOTAL NO. OF JUNIOR, SENIOR & GRAD. STD.	STUDENT OCCUPANCY												TOTAL NUMBER OF FACULTY ON INC.	FACULTY OCCUPANCY OFFICE SECTY FILES & ADMIN.				TOTAL SPACE DEFICIENCY ON NORTH C.
		O.	CR.	DR.			CR.				DR.				LABS					1	2	3	4	
							1	2	3	4	1	2	3	4	1	2	3	4						
1960	Fluids II	8,167	2,630	0	124,007	2800	4.95	13.6	12.65	35,300	44.3	9.50	26,600	147,000	26.7	287	260.3	79,700	288,600					
1961	Office, Lab I	48,687	25,270	15,350	240,000	3030	8.35	13.6	5.25	16,000	94.2	9.5	4.48	8,170	142.0	287	145.0	49,700	77,470					
1962	Nuclear Energy	50,657	25,270	15,350	303,527	3250	7.80	13.6	5.80	18,800	93.2	9.5	4.78	11,920	132.5	287	131.5	59,800	106,420					
1963	Office Lab II	91,177	47,910	30,700	465,017	3480	13.70	13.6	0.00	0	133.4	9.5	4.68	0	218.0	287	69.0	28,800	31,175					
1964	Structures	93,147	47,910	30,700	483,047	3700	12.90	13.6	.70	2,580	130.0	9.5	1.20	0	209.5	287	87.5	39,800	44,430					
1965		93,147	47,910	30,700	483,047	3930	12.20	13.6	1.40	5,350	122.0	9.5	1.70	0	191.0	287	96.0	46,800	51,320					
1968	Office, Lab III	133,667	70,550	46,050	644,537	5020	14.1	13.6	0.00	0	128.0	9.5	2.35	0	238.0	287	49.0	27,500	29,255					
1970		133,667	70,550	46,050	644,537																			
1971	Materials & Metallurgical Laboratory	4,670	0	0	165,330																			

COLUMN NOTATIONS:

- O Offices
- CR Class Rooms
- DR Design Rooms
- LAB Laboratory
- (1) Available Space - sq. ft./occupant (net)
- (2) Recommended Minimum New Space - sq. ft./occupant (net)
- (3) Deficiency - sq. ft./occupant
- (4) Total Deficiency - sq. ft. (net)

\* Basis: - 85% of College Faculty on North Campus

