REPORT
OF THE
Johns Hopkins University
ON THE
Technical School
(See section of Trustees, May 9, 1913)
(Its Organization and the Award of State Scholarships)
TO THE
General Assembly of Maryland

JANUARY 1914
REPORT

TO

THE GENERAL ASSEMBLY

OF THE

STATE OF MARYLAND

BY THE TRUSTEES OF

THE JOHNS HOPKINS UNIVERSITY

ON

The organization of a Department of Engineering under the terms of the Act of the Assembly of 1912, Chapter 90, "providing for the establishment of Scholarships in Applied Science or Advanced Technology," in the Johns Hopkins University.

JANUARY, 1914
To the General Assembly of
the State of Maryland:

The passage by the Maryland Legislature of a bill "providing for the establishment of scholarships in applied science or advanced technology" in the Johns Hopkins University not only met with the prompt approval of leading men of the State, but was heartily commended by prominent men throughout the country.

President Wilson, then Governor of New Jersey (himself a graduate of the Johns Hopkins University), said:

"The University, the State and the whole country are to be most heartily congratulated on the action of the Legislature. Maryland will thus quicken and advance the industrial development of the Nation."

Speaker Clark said:

"Maryland will long be proud of the work of its Legislature in establishing the school."

Majority Leader Oscar Underwood of the House of Representatives, said:

"No educational achievement of recent years means as much for the South as the action of the Maryland Legislature in providing for a great school of technology at the Johns Hopkins University."

Representative Lever of South Carolina, Chairman of the Committee on Education, said:

"No section of the country is growing as is the South. Its great resources are being developed and its young men must be equipped with the best technical education to meet the responsibilities of this development. We need young men skilled in mining engineering, in civil engineering, in electrical engi-
neering and in architecture. The progressive step towards giving us those things by the Maryland Legislature cannot be too highly praised.”

Representative Slmp of Virginia, said:

“The Johns Hopkins University is not surpassed by any other institution in the country. I am glad to hear that the Maryland Legislature has taken such an advanced stand in establishing a school of technology in connection with that great university.”

Professor Pupin of Columbia, whose inventions made the long distance telephone possible, said:

“I realize what a tremendous aid to the development of this country such a school would be. Germany is striving her utmost to establish such institutions and is doing so rapidly. That is one reason for German progress and success in the commercial and business world. This country needs all such institutions that it can obtain, and Johns Hopkins should make an ideal place for such a school.”

Among other non-residents of the State who commended the plan, were Mayor Newton D. Baker, Cleveland, Ohio; Francis E. McGovern, Governor of Wisconsin; Charles F. Brush, Scientist and founder of the Brush Electric Company; Edward P. Hyde, former President of the Illuminating Engineering Society; Congressmen James Hay of Virginia, Gordon Lee of Georgia, Thomas U. Sisson of Mississippi, William A. Jones and Robert Turnbull of Virginia, former Senator Nathan B. Scott and Congressman Hughes of West Virginia. The opinions of men from out of the State are given in this report, not because they carry greater weight than the opinions of leading men within the State, but because the Legislature of 1912 was thoroughly familiar with the attitude of the latter, while the expressions of approval from without the State came for the most part after the adjournment of the Legislature. It is worthy of permanent record that the bill passed the Senate by a vote of 16 to 9 and on the final reading it passed the House by a vote of 68 to 23.
ORGANIZATION OF THE DEPARTMENT OF ENGINEERING.

Shortly after the passage of the bill, the Trustees of the Johns Hopkins University met and by unanimous vote accepted the conditions of the Act of 1912 by the passage of the following resolutions:

Resolved, That the Johns Hopkins University hereby accepts the offer of the State of Maryland to the Johns Hopkins University of six hundred thousand dollars and an annual sum of fifty thousand dollars, in consideration of the establishment of the scholarships provided in said Act and agrees on its part to carry out the terms of said Act. And, be it further

Resolved, That the Board of Trustees of the University record its appreciation of the action of the State of Maryland in the passage of the legislation referred to, and the earnest desire and intent of the Board to co-operate with the State to secure the best results for the young men of the State whose educational welfare will be committed to the University under the terms of the Act.

Resolved, That a copy of these Resolutions be forwarded to the Governor, the President of the Senate and the Speaker of the House of Delegates.

Committees composed of trustees and professors of the University were at once appointed, with instructions to prepare plans for the new Department of Engineering.

CO-ORDINATION WITH STATE HIGH SCHOOLS.

Professor Edward F. Buchner was requested to proceed at once to visit the high schools of the State in order to explain the terms of the Bill to the instructors and scholars of the schools and to encourage co-operation of the schools with the University.

The Bill passed by the Legislature had stated clearly and concisely that nothing in the bill should be interpreted as lowering in
any way the standards of education at the Johns Hopkins University, which had been responsible for its success. On the other hand, it was felt by all those interested that the free scholarships provided by the State in the Bill would serve as an excellent lever to raise the standards of education and improve the teaching efficiency throughout the State. When boys coming from all over the State enter into a competitive examination and are graded by results, it will not belong before the county and city schools which give the best elementary education will stand clearly forth, while those which are deficient for one reason or another will be shown to be such by the failure of the boys to pass the necessary examinations. Where a deficiency of this sort is evident, correction becomes comparatively easy.

REPORT OF PROFESSOR BUCHNER ON STATE HIGH SCHOOLS.

Professor Buchner visited as many of the county high schools of the State as possible, between April 29, 1912, and the end of the school year in June. He was able to reach Allegany, Anne Arundel, Baltimore, Caroline, Carroll, Cecil, Dorchester, Frederick, Garrett, Harford, Kent, Montgomery, Prince George's, Queen Anne's, Somerset, Talbot, Washington, Wicomico and Worcester counties. He visited the high schools, or conferred with the school officers, in Cumberland, Lonaconing, Annapolis, Reisterstown, Towson, Sparrows Point, Denton, Westminster, Elkton, Cambridge, Frederick (Boys'), Oakland, Havre de Grace, Chestertown, Rockville, Centreville, Easton, Hagerstown (Male), Salisbury, Pocomoke City, and Snow Hill, of the first group high schools, and Hurlock, Laurel, Crisfield, and Princess Anne, of the second group high schools. In eighteen of these schools he gave addresses to the faculty and students on the law establishing the Engineering Courses, making specific mention of the scholarship provisions and the articulation indicated in the law between the high schools of the State and this new department of the University. Special observation was made of the equipment for high school instruction. In some of the schools visited he was able to observe at some length the instruction that was being given. In other schools he was unable to make a full inspection, owing to the early closing of the school year. In all instances he secured official data concerning the details of the courses of study and
the interest in Engineering exhibited by the young men who were completing the courses.

In addition to the visits to the high schools, he interviewed nearly one hundred and fifty leading and representative citizens in the cities and counties visited, ascertained their interest in the action of the Legislature and obtained their suggestions as to the solution of the problem of the adjustment of the instruction to be given in the Engineering Courses to the development of the natural resources in the different parts of the State.

He found in all parts of the State a lively and appreciative interest in the new school which the Legislature had established. He was greeted most cordially by school officers, high school principals, teachers and students. They seemed greatly pleased with the promise of technical education in terms of high standards which had come to the young men of the State. For the most part, public opinion outside the schools seemed also in happy accord with this appreciation of the legislative action and its guarantee of the promotion of technical education in Maryland. Professor Buchner reported that in only four places had he found any serious doubt expressed as to the wisdom of the law, and in three of these this attitude was confined, so far as his observation went, to single individuals.

He found all the county high schools endeavoring to follow the courses of study as authorized by the State Board of Education. Not more than seven high schools, however, were doing their work so extensively and thoroughly as to equip their graduates in the regular or academic course to meet the existing entrance requirements of the University. He found, however, that neither the State Board of Education nor the principals of the schools were responsible for this. Many of the schools in all parts of the State find great difficulty in meeting the minimum requirements of the State courses, owing to the lack of proper equipment, or to a shortage in the number of teachers, or to the difficulty in securing teachers with adequate preparation.

The high school work throughout the State he found to be of various degrees of thoroughness. Not a little of this inequality was due to the state of local opinion as to the place and advantages of thorough high school training. The most marked deficiencies in high school courses found were in the subjects of Physics, Chemistry, French, German and Latin. In some cases one or more of these
subjects was omitted, and in other cases the amount of work accomplished was too meagre to be of satisfactory value. A defect noted in a number of places was in the quality of teaching, owing to the heavy daily schedules demanded of the teachers.

The secondary school situation in the State was found, on the whole, to be favorable for carrying out the intent of the law. With a required course of study standardized, at least in outline, for the State, Maryland and the University are favored with a good basis for the development of secondary training which, in a few years, will adequately meet the standards to be maintained in the Engineering Courses.

In the spring of 1913, Professor Buchner continued his visitation of high schools. In addition to re-visits to several schools mentioned above, he reached Sparks, Catonsville, Mount Airy, Middletown, Bel Air, Rockville, Sandy Springs, Brookville, and Gaithersburg. His study of the State high schools included a special survey of their records in the office of Dr. M. Bates Stephens, State Superintendent of Public Education, and a conference with Acting-President Spence and Professor Richardson of the Maryland Agricultural College. In response to a request, he visited Charles County, and conferred with several leading citizens on the possibility of the establishment of a free county high school where boys might receive near home the necessary secondary preparation required of applicants for the engineering scholarships.

Graduating Requirements of the Approved High Schools of the State and Entrance Requirements to the Engineering Courses.

The graduating requirements of the qualified high schools are greater in scope and amount than the entrance requirements to the Engineering Courses. The report of Professor Buchner, however, covered actual conditions in the High Schools as distinguished from mere requirements. Certain minor re-adjustments in the courses of study of the high schools are still necessary, in order to give students the most effective preparation with the least waste of time and effort. For example, many of the high schools give their students both plane and solid geometry without trigonometry. The latter is essential for preliminary technical courses, while solid geometry can be postponed
until a later stage in the education of an engineer. It is believed also that trigonometry will in later years prove of more practical use than solid geometry to young men who do not intend to pursue their education beyond the opportunities offered by the high school.

The State Board of Education, through the Superintendent, Dr. M. Bates Stephens, has been most cordial in its co-operation, and has aided materially in the adjustment of the entrance examinations to the graduating requirements of the high schools.

**Opening of the Department of Engineering.**

The Department of Engineering opened in the fall of 1913. The first year’s work in the new Department is now well under way. There are already enrolled in Engineering courses 92 students of whom 78 are undergraduate students and the remaining 14 are graduates of colleges.

Before determining upon plans for the new department, consultations were held with the presidents and deans of the leading technical schools, with the foremost consulting engineers of the country, and with practical engineers and large manufacturers who come in contact with the product of our engineering schools.

The investigation developed a surprising unanimity of opinion among teachers and engineers that the Johns Hopkins University has a unique opportunity to make a decided improvement in the methods of engineering instruction. While duplicating in a general way the courses given at the Massachusetts Institute of Technology and Cornell University, much greater attention will be paid to training students in the sciences underlying engineering and in other fundamental studies.

The work of organization has proceeded along three lines:

1. **First**—Determination of the courses to be followed by the students.

2. **Second**—Award of the scholarships provided by the Act for residents of Maryland; and

3. **Third**—Construction of the new buildings at Homewood.
HEADS OF MECHANICAL, ELECTRICAL AND CIVIL ENGINEERING DEPARTMENTS.

At the start three branches of Engineering are to be taught—Mechanical, Electrical and Civil.

The following heads of engineering departments were appointed:
Charles J. Tilden, Professor of Civil Engineering; John B. Whitehead, Professor of Electrical Engineering, and Carl O. Thomas, Professor of Mechanical Engineering.

Professor Tilden comes to Johns Hopkins University from the University of Michigan, where he held the professorship of Engineering Mechanics. Professor Tilden was born in Brookline, Massachusetts, October 3, 1873. He graduated from Harvard University as Bachelor of Science in Civil Engineering in 1896. He spent the next seven years in active engineering practice and was assistant engineer of the New York Rapid Transit Commission from 1901 to 1903. He was instructor in Civil Engineering in Cornell University in 1903-1905, and from that time until he came to Baltimore he was at the University of Michigan. Professor Tilden is a member of the American Society of Civil Engineers and of several other scientific organizations. He has contributed to the knowledge of the profession of Civil Engineering through numerous articles and publications. Among the subjects he has treated may be mentioned tests of re-inforced concrete, structural steel work, concrete highway bridges, stress distribution in girders, and kinetic effects of crowds. He has also engaged widely in the practice of his profession.

Professor Whitehead has been professor of Applied Electricity at Johns Hopkins University for several years. He was born in Norfolk, Virginia, August 18, 1872. He graduated from the Johns Hopkins University as Proficient in Applied Electricity in 1893, as Bachelor of Arts in 1898, and as Doctor of Philosophy in 1902. He was connected with the Westinghouse Electric and Manufacturing Company as designing engineer in 1893-1896; with the Niagara Falls Power Company, Niagara Falls, New York, 1896-1897. He then returned to the Johns Hopkins University as instructor, later advancing to the chair of Applied Electricity. He was laboratory assistant for the United States Bureau of Standards in 1902; research assistant in the Carnegie Institution, Washington, 1903-1906. He is a Fellow of the American Institute of Electrical Engineers.

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Professor Whitehead has engaged widely in practise as a consulting engineer, and he has also written numerous papers, among others, on the following subjects: Inductive E. M. F. in Transformers; Magnetic Effect of Electric Displacement; Single Phase Railway System; Transformation from Alternating to Direct Current; Electrical Constants of Armored Cables; and a series of papers on the Electric Strength of Air.

Professor Thomas was formerly head of the Department of Mechanical Engineering at the University of Wisconsin. He was born in Detroit, Michigan, July 14, 1872. He was educated at Stanford and Cornell Universities, graduating as Mechanical Engineer from the latter in 1895. He was assistant engineer of Globe Iron Works Company, shipbuilders, in Cleveland, Ohio, and chief engineer, 1895-1899; chief draughtsman marine department, Maryland Steel Company, 1899-1901; professor of Marine Engineering at New York University and Cornell University, 1901-1908 and since 1908 professor of Steam and Gas Engineering at the University of Wisconsin, Madison, Wisconsin. At intermediate periods he has been associated with the Westinghouse Machine Company and with the General Electric Company, and other companies as consulting engineer. He is a member of the American Society of Mechanical Engineers, American Society of Naval Architects and Marine Engineers, The Inventors' Guild, American Gas Institute, etc. He has published numerous papers on the subjects of steam and gas engineering, steam turbines, the specific heat of superheated steam, and the measurement of steam and gas by weight instead of by volume. A type of central station gas meter invented by Professor Thomas is in extensive use in this country and abroad. He has also written a textbook on Steam Turbines.

The selections for these responsible positions were made after an exhaustive study of the qualifications of men, all over the country, distinguished in the respective branches of engineering.

In making their selections the Trustees required not only adequate teaching qualities but extensive experience in the actual practice of their professions by the men under consideration.

It is believed that the results will justify the wisdom of these requirements. The men selected were all young men, occupying high positions, of extensive practical experience and contributors of advanced studies in their respective branches. The University counts itself particularly fortunate in having secured their services.
They are now engaged in the organization of undergraduate courses in Engineering, in the instruction of the graduate students, and in negotiations for the equipment of the new laboratories. It is probable that associate professors will be appointed during the present year in the three subjects, in order to aid in the work. Further additions to the teaching staff will be made as necessity demands.

The undergraduate students are now following courses in Mathematics and Physics, in Mechanical Drawing and other subjects preparatory to the work in Engineering which is to follow. Instruction is being given in the present University buildings. The new laboratories at Homewood should be ready in time for these students.

**Courses of Study.**

The undergraduate courses will aim to give the students a broader and more liberal training than is now afforded by engineering schools. Following the advice received from practical engineers and manufacturers as well as from the technical schools, the University has adopted a plan of instruction whereby all undergraduates whether specializing in Civil, Electrical or Mechanical Engineering, will pursue the same course for the first two years, branching into the strictly engineering studies in the last two years of the four-year course. All undergraduates will be required to follow courses in all three branches of Engineering in their third year so that a mechanical engineer will not only become proficient in his own line but will have some knowledge of electrical and civil engineering as well. Specialization in the respective branches will be given in the fourth year, and in the graduate courses.

One of the requirements for graduation will be that the student must have spent during the summers of his course at least four months in the shops of some manufacturing company, public service corporation or other organization employing engineers. The Engineering Faculty has already opened a series of inquiries looking to the proper location of students in such positions.

It is not contemplated that a course such as that outlined will cover the entire field of any branch of Engineering. It is believed, however, that it will equip a student better than any other four-year course for taking up the practice of the profession of Engineering.
At the end of the four-year course an appropriate degree will be given. If a student desires to carry his studies and training further, graduate courses will be available in the three branches of Engineering above mentioned. The graduate students will, in addition, be expected to do original work, often of the character of research, and will be expected to make some distinct contribution to the knowledge of their respective branches of Engineering. It is this system applied to other fields of science which has given the Johns Hopkins its standing as a University.

It is expected that one of the chief activities in connection with the graduate work will be the development of relations with State and municipal construction work, with railroads, with public utilities and manufacturing corporations, for the purpose of ascertaining and solving questions of commercial and public importance.

STATE SCHOLARSHIPS UPON OPENING OF THE DEPARTMENT IN 1913.

The Bill creating the Department of Engineering provided as follows:

"The original and subsequent awards of scholarships shall be so arranged, so far as their number and the duration of the courses of the study permit, that substantially the same number of original awards, as distinguished from renewals or re-appointments, shall be made each year, and so that such residents of said counties or legislative districts and graduates of said colleges may at all times hold the number of such scholarships to which they are entitled, and so that the number of said scholarships so held at one time may as nearly as possible be equal to but shall not exceed one hundred and twenty-nine scholarships."

The purpose of the provision is evident. If all of the scholarships had been awarded to young men graduating from the high schools of the State last fall, and it took four years to educate these young men, there would be a period of four years before any other young men graduating from the high schools would have an oppor-
tunity for free education. At the end of this period another one hundred and twenty-nine scholarships would have been awarded and another injustice perpetrated. The bill contemplated, therefore, that so far as mathematically possible, the same number of awards should be made each year.

In accordance with the terms of the bill announcement was made in the spring of 1913 as follows:

"The first award of scholarships will be made in October, 1913. At that time Allegany, Baltimore, Frederick, and Washington Counties, and the four Legislative Districts of Baltimore City will each be entitled to two scholarships and each of the other counties will be entitled to one. The six "scholarships at large" may also be awarded at that time. Of the scholarships awarded to graduates of the seven colleges of Maryland enumerated above one may be awarded in each college in October, 1913."

Advertisements embodying these announcements appeared in practically all of the newspapers in the State in the spring and fall of 1913. As a result, there were received up to October 1st, a total of 92 applications for scholarships. As these applications were received, they were classified as to residence of the applicants, and in the latter part of the summer each Senator was notified of the names of the applicants from his county. In many cases this resulted in a correspondence aiding materially in the proper carrying out of the conditions under which the scholarships are awarded.

Representatives of the University also conferred with a number of Senators, with the result that by the aid of the information and advice so secured the awards of scholarships have been carried through practically without difficulty.

Of the 92 applicants, 47 were at once admitted to the University on college diplomas and high school certificates. In addition thereto 29 who did not have the necessary diplomas or certificates took the entrance examinations. Of those who did not hold diplomas or certificates 16 were able to pass the entrance examinations. There were in all 63 applicants for scholarships who were admitted to the University.
would have been done to students entering in the next three years had all the "Senatorial" scholarships been awarded in one year.

BUILDINGS.

There will be two main buildings, (a) the Laboratory of Mechanical and Electrical Engineering, and (b) the Laboratory of Civil Engineering.

(a) LABORATORY OF MECHANICAL AND ELECTRICAL ENGINEERING.

This building is now well advanced in process of construction. The front view of the building is shown in the frontispiece of this Report. The floor plans, sections and other elevations, with their titles, are distributed through the body of the Report. The contracts call for completion in full time for the work of the students who entered the school last fall.

In recognition of the action of the State, which made the Department of Engineering possible, the centre of the façade will be embellished by a large coat-of-arms of the State of Maryland carved from white marble.

The main part of this building comprises two full stories, basement and attic. The Machinery Hall, adjoining the two end wings and forming the rear of the building, is of a single story, and is a large laboratory room approximately 200 feet long by 50 feet wide, and 24 feet high under the roof trusses. A basement is provided under a portion of this hall.

The façade of the building has a length of 204 feet and the end elevation, including Machinery Hall, is approximately 160 feet in length. The ground plan, including area-ways and steps, covers an area approximately 226 feet by 173 feet.

In the basement will be located the mechanics shop and store room, storage battery room, space for ventilating fans, locker and toilet rooms, as well as several rooms for special experimental work. The basement proper connects with the main floor of Machinery Hall by means of the two end wings, and the space thus provided will be used for experimental work on electrical and mechanical apparatus.

On the first floor will be the auditorium or main lecture room,
the room for engineering societies, and various smaller class and instrument rooms.

The second floor will include the drafting rooms, the library and reading room, professors’ offices and several rooms for special research.

Machinery Hall will be the principal laboratory for experiments with heavy machinery. This large space will be well lighted and ventilated by means of monitor skylights and large windows of factory type on all sides. It will contain a traveling crane for the handling of machinery and the necessary electrical switchboard, for the control of all the lighting, power and experimental electric circuits in the building. The concrete floor of this space will be fitted with bed plates for attaching machinery of various types, and suitable for permitting alteration of the arrangement of machines as may be desired. The laboratory is especially designed with a view to temporarily installing and testing machines owned by manufacturing firms, and removing these upon completion of the tests.

Liberal provision has been made for the distribution of electric power to various points in Machinery Hall, and similar arrangements prevail with respect to steam, water, gas and compressed air supply. The building contains a gallery which will be used for certain classes of experimental work, and there are various rooms for special experiments in photometry, high voltage, electrolysis, wireless telegraphy, fuel testing, dynamometers, oil testing, refrigeration, testing of materials, measurement of air, etc.

The building faces the West, on the south quadrangle of the Homewood development, and is conveniently situated with respect to the power plant for heating and lighting the University buildings.

Cost of Building.

The estimated cost of the building for Mechanical and Electrical Engineering, including architect’s commission ........................................... $241,000

Heating, ventilating, electrical wiring, elevators, traveling crane, etc ...................................................... 44,500

Total, not including equipment required for purposes of instruction, approximately ........................................... $285,500

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Total cubic feet in building .................. 1,175,173
Cost per cubic foot of building .............. 20.5 cents
Cost per cubic foot, including heating, electric
light, wiring, elevators, traveling crane, wind
stops and screens, lockers and seats in lecture
room ........................................... 24.2 cents

The University will render to the Board of Public Works a
detailed statement of the cost of each building and its equipment
upon completion.

(b) LABORATORY OF CIVIL ENGINEERING.

The building for the use of the Department of Civil Engineer-
ing will be situated about 100 feet due west from the one now under
construction for Mechanical and Electrical Engineering. The tenta-
tive plans that have been prepared call for a structure covering about
12,000 square feet, the dimensions being roughly a little over 200
feet long by 53 feet deep, with a central projection at the back. If
the need arises, either from the establishment of courses of instruc-
tion in a fourth branch of Engineering or from the natural growth of
the work in Civil Engineering, this building may be increased by
building wings to the west.

In the basement three large laboratories are provided, each with
an area of nearly 25,000 square feet. The laboratory at the south end
of the building is planned particularly for the work of testing the
materials used in engineering construction, giving instruction in the
use of testing machines for steel, iron, timber, stone and concrete, and
for conducting research work along structural lines. Space will also
be provided here for instructing students in making routine tests of
cement. At the north end, the corresponding room is devoted to a
laboratory of hydraulics and sanitary engineering, the object
being, as in the previous case, to provide not only for regular under-
graduate instruction, but for advanced investigation and research.
The large room in the center of the building directly under the lecture
room on the first floor will be devoted to such laboratory work as is
needed in the field of transportation and concerned principally with
highway and canal construction, steam and electric railway lines, etc.
Smaller rooms are provided for special research, repair shop, instruments. Access to the building at the level of the laboratory floor is provided at the north and south ends and also from the front or east side.

On the first floor is the main entrance, which will be from the middle of the east side with subordinate entrances at the north and south ends. In the center of the building on this floor there is a reception room, also administrative offices and a large lecture room with seating capacity for about 200. At the ends over the laboratories are four large class rooms, two at the north end and two at the south. The smaller rooms on this floor are given up to the departmental library, seminary and research, offices, museum, toilet rooms, etc.

On the second floor there are three large drafting rooms, corresponding in size approximately to the three main laboratories in the basement. It is hoped by providing rooms of this kind, where a large part of the professional work of the students will be carried on, that each student will have his individual drawing table and locker, which he will make his headquarters while on the campus. By keeping the students in the different classes together, the sophomores in one drafting room, the juniors in another and the seniors in a third, there will be developed an interest in the work of the profession which could not be gained in any other way. There are also on the second floor two or three offices and four or five good-sized class rooms and seminary rooms.

The third floor will have a single large room, with lighting specially designed for instruction in free-hand drawing. This room will be devoted particularly to the needs of the first-year men. There will be on this floor a large blueprinting room, fitted with frames and machines for printing both by sunshine and electric light.

The cost of the building for Civil Engineering is estimated at $150,000.

The cost of the equipment of the two laboratories, including certain modifications of the machinery in the Power House to make it suitable for the purposes of instruction, is estimated at $165,000.
CONCLUSION.

When it is considered that higher technical training on the basis established by such schools as the Massachusetts Institute of Technology is a new opportunity offered for the first time in the year 1913 to the young men of the State, it is believed that the University has just grounds to congratulate the State and itself that the new school should have opened its doors with 92 students, all but 4 of whom are residents of the State of Maryland.

The training of the young men of this State by The Johns Hopkins University is no new departure. In spite of a deficit of $40,000 per annum which the creation of the Department of Engineering cannot be expected to reduce (the estimated cost of maintaining this Department equaling or exceeding the funds provided) and which would be $65,000 per annum were it not for the State's generous help in appropriating $25,000 annually, the University prior to this Act was educating a great number of Maryland's young men.

Of the entire undergraduate body of the University, including the Department of Engineering, 94 per cent. are residents of the State of Maryland and 61 per cent. of these are from the high schools of the State.

In a recent interview the President of the Board of Trustees of the University said:

"The University had a deficit last year of $40,000. If the State of Maryland had not given it $25,000 for current expenses, the deficit would have been $65,000. This is due in large part to the fact that the University is educating without charge many of its students. In the undergraduate department of the University last year 94 per cent. of the students were from the State of Maryland and 40 per cent. of these Maryland boys were receiving free tuition or some remission of dues. This percentage has been increased by the creation of the Technical School.

"It is doubtful whether any University in the country under private management is doing as much as this for the State in which it is located. The work
has been done quietly and without advertisement, so that it is not generally known. The figures, however, show that the sons of rich men do not go to Johns Hopkins. Over one-half of our undergraduate body receives its preliminary education in the public schools of the State. Even where a charge is made for undergraduate students, it is only $150 per year, which is as cheap as the education in the ordinary private school of lower grade."

The University Trustees and Faculty are deeply interested in the new Department of Engineering. They are thoroughly cognizant of the responsibility placed upon them by the State and will endeavor to carry out the trust to the best interest of the State and the young men under their care.