CIVIL ENGINEERING

(Continued from page 1.)

To enable him to properly fulfill these responsibilities, his education should be thorough and broad. To that end he is first taught the fundamental sciences of mathematics, physics, chemistry, and mechanics, in order that his professional subjects may have a secure foundation. The professional courses described in this publication follow. The aim in these is to thoroughly drill the student in the underlying principles of the profession, which if he does not learn in college he can acquire only by arduous and time-consuming labor in later life. Enough attention is given to the details of practice to show him their importance and to give him some idea of the point of view of the practicing engineer; but it is realized that if he possesses a well-trained mind and is thoroughly familiar with the principles upon which good practice is based, he can acquire the necessary knowledge of the continually changing details of practice far better after leaving college.

In addition to scientific and professional courses he is also required to give considerable time during the first three years of his course to general subjects such as language, history, and economics. These subjects are considered to be of no less importance than the other courses in fitting the young man to become a leader in his profession, and no student should enter upon the study of civil engineering without a thorough realization of the necessity of adding to his scientific and professional training that ability in the use of the English language and that knowledge of human life and thought without which he will be unable to assume the highest responsibilities and duties.

STRUCTURES AND BRIDGE DESIGN

BY PROF. C. M. SPOFFORD.

The subject of Structures deals with the application of the principals of mechanics to the design of engineering structures such as bridges, roofs, dams, and retaining walls. It is the longest professional course given to civil engineering students and extends from the beginning of the second term of the junior year to the end of the senior year, with three hours per week of exercises for the first year, and five hours per week for the last half-year. To its allied subject, Bridge Design, there is also allotted six hours per week for the entire senior year. In addition to being the longest course, it is also one of the most fundamental subjects taught in the Department, since no matter into what branch of Civil Engineering the student may enter he is sure to find himself called upon to deal in some capacity or other with some of the structures considered in the course, and must have a thorough knowledge of the principles upon which their design is based.

The undergraduate course opens with a comprehensive study of the magnitude and character of the forces to which ordinary structures are subjected, such as locomotive and cars, snow, wind, and crowds of people. The effect of these loads upon beams and girders are next considered and the student is taught to design these simple structures. This is followed by an extensive treatment of simple bridges and roof trusses.

The more complicated structures, such as suspension and cantilever bridges, arches of steel, stone or concrete, and steel-frame buildings are treated less thoroughly than the simpler structures, but sufficient attention is given to these to outline the methods required for their design. Earth pressure and its effect upon retaining walls and the principles underlying the design of such walls and of masonry dams are also carefully considered. The problems which are included in the course and which are carefully corrected before returning, form an important portion of the work. These are planned to develop originality in the application of fundamental principles to unfamiliar types of construction.

In the parallel course of Bridge Design the student is required to make all the computations necessary to determine the size of the members of at least two trusses, and of one girder bridge, and to make careful drawings to scale to show

(Continued on page 6.)

INSTRUCTING STAFF

(Continued from page 4.)

and afterwards as Mechanical Engineer, with the American Tin Plate Company, following his graduation from the University of Wisconsin. After leaving the Institute he was employed in the engineering department of the Phoenix Bridge Company for a year and a quarter. He has also been connected with the engineering departments of the Illinois Central Railroad at various times as follows: in the road department, bridge department, and construction department, the latter being on heavy concrete work in connection with track elevation in Chicago. He spent one summer in the engineering department of the Western Electric Company and one in the office of the superintendent of the Bucyrus Steam Shovel Company's plant.

For the past two years he has been assistant engineer of bridges for the Massachusetts Railroad Commissioners and has been engaged in consulting work on bridges and foundations.

He is connected with the following societies: American Society of Civil Engineers, Webster Society of Engineers, Boston Society of Civil Engineers, Society for the Promotion of Engineering Education and the Technology Club.

Harold K. Barrows, S. B., who has just been appointed Associate Professor of Hydraulic Engineering, is a graduate of the Class of 1895, of Technology. During the following years he held the position of Assistant in the Civil Engineering department and since then has spent most of his time in professional work.

When he left the Institute in 1896 he entered the office of the City Engineer of Newton, remaining there for about

PROF. HAROLD K. BARROWS.

three years, during which time he held positions as transitman, masonry inspector and chief of party. After this Mr. Barrows spent two years with the Metropolitan Water Board in Boston as designer and computer, and had much to do with the designing of the Forest Hills Reservoir and Weston Aqueduct.

Mr. Barrows spent a year as Assistant Professor of Civil Engineering at the University of Vermont.

Since 1903 Professor Barrows has been an engineer of the United States Geological Survey and has been in charge of the hydrographic work in New England and New York. He has also been engaged in private practice for several years as consulting engineer. In this capacity he has conducted investigations and made reports on several water power projects and other hydraulic work, and has engaged in some construction work along these lines.

The professional societies to which Professor Barrows belongs are: the American Society of Civil Engineers, the Boston Society of Civil Engineers, the New England Water Works Association and the Society for the Promotion of Engineering Education.

The men in this department ranking as Instructors at the present time are Mr. Howard and Mr. Bradbury.

John W. Howard, S. B., graduated from the Institute in the Class of 1903 and during the next two years was Assistant in the Civil Engineering department. In 1905 Mr. Howard was made an Instructor. He has done a great deal of surveying for private parties in spare time and during the last five summers has been on the Massachusetts State Survey on town bounds. Mr. Howard has worked for the Pennsylvania R. R. on double-track work and at another time was on the original committee which investigated the New York water supply.

Royall D Bradbury, S. B., graduated with the Class of 1906. He was made Assistant the following school year and since 1907 has been an Instructor. Mr. Bradbury spent one summer as rodman on the Chicago, Rock Island and Pacific R. R. and another as draftsman with the Kansas City Bridge Co. He has also been draftsman for the A. M. Blodgett Construction Co. of Kansas City. At the present time Mr. Bradbury is engaged as consulting engineer for the Boston Elevated on the safety of bridges. He also does work for the Boston Consolidated Gas Co., Edison Electric Light Co. and others. Mr. Bradbury is also engaged in conducting a course in Concrete Engineering at the Boston Y. M. C. A. School.

In the department of Civil Engineering there are eight men ranking as assistants whose work is to take charge of and instruct the small parties of from three to six men sent out for field-work in second and third year surveying, hydraulic measurements, etc. They are also called upon to assist in the hydraulic laboratory and the drawing-room work in stereotomy.

The assistants at the present time are H. B. Alvord 1907, H. B. Luther 1908, R. L. Cary 1909, W. W. Clifford 1909, F. R. Faulkner 1909, F. S. Lovewell 1909, M. W. Rew 1909, and A. L. Shaw 1909.

CURRICULUM OF THE COURSES

Throughout the first year work at the Institute is practically the same for all courses. During that period general training is given in Mathematics, Drawing and Inorganic Chemistry, which are fundamental as preparation for the work of the succeeding years. The work in Chemistry includes lectures, recitations and laboratory periods. The work in Mathematics comprises a study of advanced algebra, the elements of Plane Analytic Geometry and Differential Calculus, and Plane Trigonometry, including the use of Logarithms. In addition to courses in Freehand and Mechanical Drawing, instruction, comprising lectures and drawing-room exercises, is given in Descriptive Geometry, which deals with the projection of points, lines and planes in space.

At the beginning of the second year, division into the various courses takes place. Training in Mathematics and Descriptive Geometry, including a study of Warped Surfaces, is continued in both the Civil and Sanitary Engineering Courses. The work in Mathematics includes instruction in Solid Analytic Geometry, Differential and Integral Calculus. Work in Physics, comprising lectures, recitations, and laboratory periods, is instituted and continued into the third year. The subjects covered are Mechanics, Wave-motion, Electricity, Optics and Heat. Practical work is introduced in the shape of field exercises in Topographical Surveying, including instruction in the use of the chain, tape, compass, solar compass, transit and level. With the opening of the second term, work is commenced in Applied Mechanics, comprising a study of static forces, stresses in frames, centers of gravity of various bodies, moments of inertia, laws governing rectilinear and curvilinear motion, work, power and energy.

The separation of the two courses is not very marked during the second year. With the exception of a short course in Spherical Trigonometry, the students in Sanitary Engineering cover all the work in the Civil Engineering Course, and in addition further pursue the study of Inorganic Chemistry in Qualitative and Quantitative Analysis of known and unknown substances.

During the third year, in addition to more advanced work in Topographical Engineering, courses are instituted in

(Continued on page 6.)

PROM ELECTIONS

HOWARD DAVID WILLIAMS
SCOTT PRESCOTT KIMBALL
RICHARD HARTSHORN GOULD
GORDON BALL WILKES
PETER DESMOND WHITE

There was great enthusiasm when the result of the Junior Prom election was anounced last night at the 1911 banquet. Every man on the committee is prominent in class and Institute affairs.

H. D. Williams has been manager as well as a player on the class foot-ball team, was secretary of the class last year, a member of the Technique Electoral Committee and has shown active interest in athletics generally. Williams received the highest number of the total 127 votes; his vote was 81.

S. P. Kimball, vice-president his first year, was elected to the Technique Electoral and Institute Committees last year. He received 56 votes. R. H. Gould, who has been prominent in athletics, was also on the Technique Electoral Committee. His vote stood at an even half-hundred. P. D. White and S. B. Wilkes, were very close, Wilkes received 47 and White 46 votes.

Following is the list of the other nominees, named in order from the highest down; E. A. Nash, 43 votes; L. G. Fitzherbert and J. A. Urquhart tied with 37 votes; M. A. Grossman tied with S. B. Putnam with 32 votes. C. F. Hobson, 31 votes; C. R. Perry, 24 votes; Kester Barr and W. H. Coburn received 23 votes each; C. R. Johnson had 22 votes; S. H. Cornell 19 votes and George Watson 17 votes.

UNION ENTERTAINMENT

"No man is self-made," said Mr. Lucius Tuttle, president of the Boston & Maine, last night at the Friday Evening Entertainment. "A man who has absorbed assistance from every one who can give him assistance, may be called a self-made man but, he has really only made the most of the help of others." Mr. Tuttle emphasized the fact that the young men, especially the educated young men of to-day, are to carry on the business of the next generation and of the next decade. Education will train thought, and thought will train leadership—either for good or evil.

Mr. Tuttle urged the men to cultivate the powers of observation, analysis, and deduction. "Learn the Why," he said, "Therein lies the most valuable asset of the man who is educated." These powers by developing a fund of experience, help one to decide promptly. The successful man is seldom the honor man at college, but rather the patient plodder who is able to make quick decisions—one who has not the paramount ability of guessing but rather, the paramount ability of quick judgement. It is better to make one mistake in a hundred, because of hasty decisions than to lose valuable time over every decision. There are only 24 hours in one day—make the most of them.

Be thrifty. Money is not the "root of all evil" although the improper love of money is. Mr. Tuttle said that its proper use is the "root of all success" and never has money been used with such success as in the United States to-day.

Be clean morally and physically. "A good hot bath cleans a man's conscience better than anything else."

Mr. Tuttle then spoke of cynicism. A pessimist has been epigrammatically defined as the wife of an optimist. This may be true, he said, but don't be a pessimist, because there is more good than bad in the world and cynical man needs praying for.

One of the greatest assets a man has is the ability to handle men and demonstrate to them that it is to their own best advantage to follow. This is a bigger problem than engineering.

The immigration question calls for serious consideration. Ignorant hordes are daily coming to this country attracted by the promise of liberty, which they construe as license.

In conclusion, Mr. Tuttle said, "Don't get impatient and don't expect to begin where your grand-daddy left off.

After the lecture, Gorton James 1910, chairman of the Entertainment Committee, announced for the Union Committee that no more refreshments will be served after the entertainments since only one has paid expenses this year.