problems in common, and needed an opportunity to establish mutual cooperation and assistance, and to determine their relationship to the press, and to the great municipal and national libraries and other institutions.

Subsequently, Allan Gomme, librarian to H. M. Patent Office, London, B. M. Headicar, of the London School of Economics, and Dr. S. C. Bradford, of the Science Museum, South Kensington, addressed the conference on their respective libraries.

Group meetings on the scientific, industrial and economic libraries were addressed by W. M. Corse, of the National Research Council, Miss L. Stubbs and H. G. Lyall. The session on economic and statistical libraries indicated valuable developments which are taking place with regard to forecasting of trade tendencies.

An address by Lieutenant-Colonel J. M. Mitchell, secretary to the Carnegie Trustees, outlined the policy of the trustees with regard to special libraries, and L. Stanley Jast, chief librarian in Manchester, and Lieutenant-Colonel E. L. Johnson, director of the Cleveland Technical Institution, dealt with special libraries in relation to other libraries and institutions.

Among the details of methods and equipment, Dr. J. C. Withers, of the British Cotton Industry Research Association, presented a paper on abstracting, and H. Rottenburg, of Cambridge, on a guide to scientific and technical literature. Bibliographical aids to special libraries, such as "The subject index to periodicals" and "World list of scientific periodicals" were considered.

The important function of the press in collecting and distributing information was dealt with by F. H. Masters, editor of *The Electrician,* and V. C. Faulkner, editor of *The Foundry Trades Journal,* and at the concluding session, Dr. E. A. Baker, director of the school of librarianship, University College, considered the question of training men and women for work in special libraries.

The conference, which was highly successful, provided abundant evidence of the interest in this field of work, and in order to ensure continuity of interest, without forming another association, a standing committee of the conference was appointed with power to consider matters in the interests of those engaged in directing or operating special libraries, and to convene a further conference at some future date. This committee is representative of a wide range of institutions, and has already held its first meeting.

The most striking feature of the conference was the keenness displayed by a large number of highly diversified interests, including scientific, technical, industrial, wholesale and retail commerce, railways, political, agricultural, governmental, universities, press, medical, sociological and banking. This diversity served merely to emphasize the common interest of all these agencies in receiving, treating and distributing documentary material.

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INVESTIGATION OF REINFORCEMENT IN CONCRETE ROADS BY THE NATIONAL RESEARCH COUNCIL

THE details of plan and procedure to be followed in the investigation of the economic value of reinforcement in concrete roads, being undertaken by the Highway Research Board of the National Research Council, are now completed and field examinations are about to commence. Director Chas. M. Upham reports that the various state highway commissions will actively cooperate with the board in conducting this investigation. Except in cases of actual failure, inspections will concern principally pavements having had at least five years of service, a great number of which are located in states such as New Jersey, Ohio, New York, Pennsylvania, Delaware, Wayne County, Michigan; Milwaukee County, Wisconsin; Iowa, Illinois and California.

In this intensive study an effort will be made to determine from a survey of existing roads the influence of steel reinforcement on the resistance of the slab to traffic, subgrade and climatic conditions; the conditions under which steel reinforcement is especially beneficial to concrete slabs; the effect of slab design on the efficiency of reinforcement, and, finally, the relative cost of plain and of reinforced concrete roads, considering the initial investment, and the annual maintenance and renewal charges.

The procedure will consist of a personal examination of a sufficient number of existing road surfaces to cover different slabs, traffic and climatic conditions. It is proposed to supplement the examination by photographs, sketches, soil determinations and other available data. In each case, attention will be given to a study of the subgrade to determine its general characteristics and properties as well as the existing drainage conditions. In the case of the slab, a study will be made of original data to determine the materials and proportions that entered into the concrete, the method of construction that was followed and the particular cross section used. Careful note will be made of joints, cracks, replacement areas and general surface conditions. The influencing factors of grade, alignment, location and maintenance will be noted, and the matter of age, traffic and climatic conditions will be given careful consideration. In the case of the reinforcement, a study will be made of the rela-

tive amounts of longitudinal and transverse steel, the method of treating reinforcement before placing, as well as its position in the slab. The form of the reinforcement will receive consideration to determine the relative values of fabric, rods and other types in use. An effort will be made to determine the comparative value of hard steel and of mild steel for reinforcement, and the influence of continuous and non-continuous reinforcement. Wherever possible, the present condition of the reinforcement will be noted for breaks, rust and other features of interest. Wherever obtainable, cost data will be secured covering the original as well as the maintenance investment.

The preliminary work of assembling data now available will soon be completed, at which time the field inspections will begin. The itinerary will be made out after further study, but it is proposed to pursue the investigation in the northern sections until cold weather, when attention will be turned to the southern locations. It is expected that a progress report will be ready for the annual meeting of the Advisory Board on Highway Research to be held at the building of the National Research Council on December 4 and 5.

INSTITUTE OF RESEARCH AT LEHIGH UNIVERSITY

ANNOUNCEMENT has been made of the establishment of the Lehigh Institute of Research by the administration of Lehigh University. In announcing the purposes of the institute, the Board of Trustees, of which E. G. Grace, president of the Bethlehem Steel Corporation, is president, stated that the object is

> to encourage and promote scientific research and scholarly achievement in every division of learning represented in the organization of the university; and in recognition of the need for further and more exact knowledge in science and in the applications of science to the affairs of modern life. It is believed that this organization will be helpful in stimulating interest in liberal and professional education; and that it will prove to be of value to the professions and industries of the nation.

The Lehigh Institute of Research will afford training in research methods to the following classes of individuals: the members of the teaching staff of the university; the members of the scientific staff of the institute, including research fellows, research assistants and research professors appointed by the university and paid by it from its own funds or from funds for the purpose supplied by an individual, a firm or a corporation; graduate students in the university; special investigators temporarily employed for work on a particular investigation. The founding of research fellowships or research professorships in the Lehigh Institute of Research is a means for encouraging research and for assisting promising men to secure advanced training in the methods of research. The first fellowship of this kind has been founded by the New Jersey Zinc Company, and is known as the New Jersey Zinc Company's Research Fellowship in Science and Technology.

To preserve the records of its investigations and to render them available to every one interested, the Lehigh Institute of Research proposes to publish and distribute from time to time bulletins presenting the results of investigations conducted by or under its direction, and to issue other material which may be helpful to the various interests which it seeks to serve. Under certain conditions, and with the approval of the executive board, reports of such investigations may be presented before professional or other learned societies and published by them.

The executive board of the Lehigh Institute of Research is composed of the following: Dr. Charles Russ Richards, president of the university; Harry Maas Ullmann, professor of chemistry; Ralph Justin Fogg, professor of civil engineering; William Esty, professor of electrical engineering; Lawrence Boylston Chapman, professor of marine engineering; Fred Viall Larkin, professor of mechanical engineering; Dr. Bradley Stoughton, professor of metallurgy; Howard Eckfeldt, professor of mining engineering; Barry MacNutt, professor of physics; Dr. Benjamin LeRoy Miller, professor of geology; Dr. Robert William Hall, professor of biology; Dr. Neil Carothers, professor of economics; Dr. Lawrence Henry Gipson, professor of history and government.

SCIENTIFIC NOTES AND NEWS

THE Rensselaer Polytechnic Institute held special convocations on the occasion of the celebration of the centenary of its foundation, on October 3 and 4. On the first day the degree of doctor of engineering was conferred upon President Sir Charles Langbridge Morgan, of the Institute of Civil Engineers of Great Britain; President Henri Abraham, of the Society of Electrical Engineers of France; President Luigi Luiggi, of the Society of Civil Engineers of Italy, and President Arthur Surveyer, of the Engineering Institute of Canada. On the second day the degree of doctor of philosophy was conferred upon President James R. Angell, of Yale University; President Edward A. Birge, of the University of Wisconsin; President Samuel W. Stratton, of the Massachusetts Institute of Technology, and President Livingston Farrand, of Cornell University; the degree of doctor of science on Albert A. Michelson, president of the National Academy of Sciences, and the degree of doctor of engineering on Carl E. Grunsky, president of the Amer-