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MRS. JOKSIMOVIC

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MRS. VERA NAJDANOVIC

ERVI NONVEILLER, Gregorjanćeva 28, Zagreb

MRS. ILONA NONVEILLER

DRAGO POPOVIC, He Gornja Zeta-Niksic

BOGDAN RAJCEVIC, Lole Ribara 1, Belgrade

MRS. BRANKE RAJCEVIC

MISS ANDJELIJA RAJCEVIC

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Bulevar Revolucije 70/II, Belgrade

A. G. STRMAC, 56 Savska. C, Zagreb

LUJO SUKLJE, University of Ljubljana, Soil Mechanics Labora-
tory, Ljubljana

MILAN VERCON, Dobracina br. 9, Belgrade

MRS. VERCON

A. VESIC, c/o Institut Géotechnique de l'Etat, 59 rue Neuve
St. Pierre, Gand, Belgium

MRS. VESIC

R. VUCETIC, Dobracina 13, Beograd.

GENERAL

General information

Address: The Institution of Civil Engineers,
Great George Street,
Westminster, London, S.W.1.

Telephone: TRAFalgar 1038 or 1039.

Office hours: 9.00–18.00 Monday to Friday inclusive.

Nearest Underground Stations: Westminster/St James's Park.

Bus routes: 3, 11, 12, 24, 29, 39, 53, 59, 59A, 76, 77, 77A, 88, 109, 134, 155, 159, 163, 168, 170, 171, 172, 177, 184, 285, 286, 287, 288, 290.

The Opening Session, the Technical Sessions, and the Closing Session, will be held in the Great Hall at the Institution of Civil Engineers.

Car parks

Car parks are available near at hand. All are free except the car park in Storey's Gate behind the Institution of Civil Engineers building where the charge is 2s. 0d. per day. Members are warned that these car parks fill early in the day and accommodation in them cannot be guaranteed. The Organizing Committee accepts no liability in respect of car parks. The instructions of the police must be obeyed, no special concessions having been granted for members attending the conference.

Restaurants

In the majority of the restaurants in the Westminster area accommodation is limited, and members are advised to give themselves as much time as possible for lunch. Prices vary, depending on the class of restaurant, from 6s. 0d. to £1.

Members' lounge

Members who wish to meet their friends informally may do so in the lounge in the Lecture Theatre of the Institution of Civil Engineers. There will be a buffet open during the period of the conference serving coffee, tea and cakes.

Languages

In accordance with Article I (3) of the Society's statutes the official languages are English and French. Interpreters will be available in the Registration Office.

Arrangements have been made for simultaneous translation through earphones from English into French and *vice versa*.

Conference badges

Members are asked to wear the conference badges, including the brooches bearing their names.

Dress

It is hoped that members and their ladies attending the Banquet and certain functions on the tours (indicated separately) will wear evening dress if available.

GENERALE

Information générale

Adresse: The Institution of Civil Engineers,
Great George Street,
Westminster, London, S.W.1.

Téléphone: TRAFalgar 1038 ou 1039.

Heures d'ouverture: 9.00–18.00 lundi à vendredi.

Métro: Westminster ou St. James's Park.

Autobus: 3, 11, 12, 24, 29, 39, 53, 59, 59A, 76, 77, 77A, 88, 109, 134, 155, 159, 163, 168, 170, 171, 172, 177, 184, 285, 286, 287, 288, 290.

Les Séances d'Ouverture et de Clôture du Congrès ainsi que les Séances Techniques prendront place dans la Salle du Congrès.

Parking pour automobiles

Certains parcs se trouvent dans les environs. Le stationnement y est gratuit à l'exception du parc situé à Storey's Gate, tout à côté de l'Institution of Civil Engineers, et où l'on devra payer 2s. 0d. par jour. Ces différents parcs sont souvent pleins dès le matin et il n'est pas certain que les délégués au congrès puissent y placer leurs voitures. Le Comité d'Organisation ne sera pas responsable pour les voitures garées dans ces parcs. Les instructions de la police doivent être obéies et aucune concession ne sera accordée aux membres du congrès.

Restaurants

Les restaurants dans Westminster ne sont pas très grands, ni très nombreux. Les congressistes seront donc bien avisés de se donner aussi longtemps que possible pour leur déjeuner. Les prix varient, suivant le genre du restaurant, entre 6s. 0d. et £1 par personne.

Salon pour les membres

Les personnes désirant rencontrer leur amis peuvent se donner rendez-vous dans le 'Lecture Theatre' de l'Institution of Civil Engineers, où il sera possible de déguster café, thé, gâteaux, etc., pendant la période du congrès.

Langues officielles

Conformément à l'Article I(3) des Statuts de la Société, les langues officielles du congrès sont l'Anglais et le Français. Il y aura des interprètes au bureau d'inscription.

Il sera possible d'obtenir une traduction simultanée d'anglais en français et vice-versa, au moyen d'écouteurs.

Insigne du congrès

Les membres seront priés de porter l'insigne du congrès et la broche qui portera leur nom.

Tenue de soirée

Les membres et les dames les accompagnant au Banquet et aux réceptions qui prendront place pendant les tours (voir détails donnés séparément) sont priés, dans la mesure du possible, de se mettre en tenue de soirée.

Exhibition

An exhibition of apparatus, models and other items of interest to delegates will be held in the Library of the Institution of Civil Engineers. For further details see page 51.

Films

During the period of the conference films of soil-mechanics interest will be shown at the Institution of Civil Engineers. The programme and times of showing will be announced daily.

Contributions to the discussion

The conference will meet for discussion at nine sessions. Divisions 1 and 3a will each occupy two sessions, and the other Divisions one session each.

Each session will be in the charge of a Chairman, who will maintain the order and conduct of the meeting.

After the session has been declared open, the General Reporter for the Division will introduce his report, after which the members of the conference may contribute to the discussion. At the end of the session the Vice-Chairman will give a brief comment on the outstanding points which have arisen in the discussion, and the Chairman will then close the session.

Procedure for those intending to take part in the discussion

To assist the Chairmen and to enable the sessions to proceed without loss of time, any member who wishes to contribute to the discussion should give notice of his intention by completing Form X, and handing this in at the Discussion Desk not later than 17.00 hours on the day before the session at which the contribution is to be given. This will enable the Chairman of the session to apportion the time among those wishing to speak, and allow the speakers to be introduced by name. A list giving the order in which speakers will be called will be posted at the door of the Conference Room before each session. Each speaker will be given about 7 minutes in which to present his contribution.

If in any session there is time available after those giving notice have spoken, the Chairman will invite other contributions from the meeting. In this case a member called to speak must announce his name clearly before giving his contribution.

A member when called upon to speak must go to the rostrum to give his contribution. The Chairman will announce at the commencement of each session the length of time available for each contribution, and will warn the speaker by means of a signal light on the rostrum when the period is ended. The speaker on seeing the light should bring his remarks to a close as quickly as possible.

Members may illustrate their contributions by slides or diagrams. Slides to be shown should be handed in at the Discussions Desk with Form X.

The record of the discussions

The record of the conference discussions for publication in Volume 3 of the Proceedings will be compiled in the first instance from shorthand notes taken during the sessions, and from written information given by each speaker. A member who has spoken in discussion should complete Form Y giving an outline of his contribution, with copies of the figures he wishes to be reproduced; this should then be handed in at the Discussions Desk or sent to the Secretary of the Papers Subcommittee as soon as possible after the contribution has been made. Only those figures essential to the written record should be given.

Exposition

Une exposition d'appareils, maquettes et autres articles qui pourront être d'intérêt aux délégués seront en vue dans la 'Library' de l'Institution of Civil Engineers. Voir détails page 51.

Films

On passera à l'Institution of Civil Engineers certains films sur la mécanique des sols pendant le congrès. Le programme et les heures des représentations seront annoncés le jour même.

Séances de discussions techniques

Les membres du congrès se rencontreront au cours de neuf séances. Les sections techniques occuperont chacune une séance sauf dans le cas des Sections Techniques Nos 1 et 3a qui en occuperont deux chacune.

Chaque séance sera en mains d'un Président qui dirigera la réunion et sera responsable de maintenir l'ordre. Après l'ouverture de la séance, le rapporteur présentera son rapport, et par la suite les membres pourront prendre la parole. A la fin de la séance, le Vice-Président relèvera les points les plus intéressants qui auront été mentionnés et le Président déclarera la séance terminée.

Méthode à adopter pour les membres désirant parler pendant les discussions

Afin d'assister le Président des séances et éviter toute perte de temps, chaque membre voulant prendre la parole pendant la discussion d'une section technique est prié de remplir la formule X et de la remettre au 'bureau des discussions' avant 17.00 heures la veille du jour de la séance. Il sera ainsi possible au Président d'allouer un certain temps à chaque participant à la discussion et de les présenter aux autres membres. Une liste indiquant l'ordre dans lequel chaque speaker devra parler sera affichée à l'entrée de la Salle du Congrès avant le commencement de chaque séance. Chaque membre sera alloté environ 7 minutes.

Dans certains cas, il y aura peut-être un certain temps disponible après la contribution de chaque membre inscrit; le Président alors invitera les autres membres présents à prendre parole s'ils le désirent. Le cas échéant, le membre sera prié d'énoncer son nom clairement avant de commencer.

Un membre étant appelé à parler devra aller au rostrum. Le Président aura fait connaître au début de la séance le temps assigné à chaque membre pour sa contribution; un signal lumineux sur le rostrum indiquera au speaker que sa période est terminée. A ce moment le membre devra mettre fin à son adresse aussitôt que possible.

Les membres pourront illustrer leurs contributions à l'aide de projections et de graphiques. Les vues à projeter devront être déposées au bureau des discussions avec la formule X.

Compte-rendu des discussions

Un compte-rendu des discussions du congrès sera publié dans le Volume No. 3 des Procès-verbaux. Celui-ci sera fait à partir des notes prises par les sténographes pendant les séances et à partir des notes et résumés que chaque membre participant aura présentés. Un membre qui aura pris la parole pendant une discussion est invité à remplir la formule y donnant le texte de ce qu'il désire voir publié; cette formule sera rendue au bureau des discussions ou, à défaut, renvoyée au Secrétaire du Sous-Comité des Communications aussitôt que possible après la terminaison de la séance.

A member who speaks in more than one session must use a separate Form Y for each session. If a member speaks in a session without giving prior notice he should be sure that he receives and completes Form Y so that the record may be complete.

A draft copy of the contribution as proposed for publication will be sent to the member making the contribution for checking as soon as possible after the conference.

Discussions desk

Members will find a Discussions Desk near the door of the Conference Room at which Forms X and Y should be handed in, and at which Officers will be present to deal with any other matters relating to the discussions.

Tours and visits

The place of assembly of parties participating in tours, visits and excursions is given on the tickets supplied to each delegate. The tickets must be shown at the place of assembly.

Delegates participating in the various events or visits during or after the conference are reminded that departure times will be strictly adhered to each day.

The Organizing Committee and Convoys Ltd. will not accept responsibility for any expenses incurred by delegates caused by the delegates' negligence.

The Organizing Committee and Convoys Ltd. shall not in any way be liable for injury, damage, loss, accident, delay or irregularity which may be occasioned by reason of any defect of any Company or person engaged in conveying the passenger, or of any Hotel Proprietor, servant or agent engaged in carrying out the purpose for which the Order is issued, or otherwise in connection therewith. Any dispute or difference arising hereunder shall be decided in accordance with the laws of England.

Proceedings of the conference

Volumes 1 and 2 have been supplied free to all members who have registered. Volume 3 of the Proceedings will be sent as soon as possible, but probably not before February 1958. Additional copies may be obtained on application to the Registration Office, price £17 10s. 0d. per set.

Un membre qui aura contribué à plus d'une discussion devra remplir autant de formules que de séances auxquelles il aura pris part. Si un membre contribue à une discussion sans avoir informé le Président ou le bureau des discussions au préalable, il devra remplir la formule Y par la suite.

Un exemplaire donnant le texte à publier de la contribution de chaque membre leur sera envoyé pour vérification aussitôt que possible après le congrès.

Bureau des discussions

Les membres trouveront un 'bureau des discussions' près de l'entrée de la salle du congrès où ils pourront remettre les formules X et Y. Le personnel présent se fera un plaisir de répondre à toute question relative aux discussions.

Tours et visites

L'endroit de rassemblement pour chaque tour, visite ou excursion est spécifié sur les tickets, en mains de chaque délégué. Ces tickets devront être présentés à l'endroit déterminé dans chaque cas.

On tient à rappeler aux délégués qui prendront part aux différentes visites ou excursions, soit pendant le congrès ou après, le besoin d'être ponctuel afin de ne pas retarder les départs.

Le Comité d'Organisation ainsi que Convoys Ltd. n'acceptera aucune responsabilité envers les délégués au cas où ceux-ci se verraient obligés de leur propre faute, à faire des dépenses supplémentaires.

Le Comité d'Organisation ainsi que Convoys Ltd. ne pourront être tenus responsables en cas de blessure, dommage, perte, accident, retard ou irrégularité qui pourront être occasionnés par la négligence d'une société ou par l'individu appelé à transporter un voyageur ou par tout propriétaire d'hôtel, son domestique ou autre personne appelée à mettre en œuvre l'objet pour lequel cette directive est publiée ou dans une autre manière en connexion avec la dite directive. Tout différend qui pourra naître sera décidé selon les lois anglaises.

Procès-verbaux du congrès

Les volumes Nos. 1 et 2 seront envoyés gratuitement à tous les membres qui se seront inscrits. Le troisième volume des Procès-verbaux sera expédié aussitôt que possible, mais pas avant février 1958. D'autres exemplaires, à £17.10.0 seront en vente au bureau d'inscription.

PROGRAMME

Monday, 12 August

10.30–13.00

Meeting of the Executive Committee in the Council Room of the Institution of Civil Engineers.

14.30–16.00

Opening session

Addresses by: SIR ARTHUR WHITAKER, K.C.B., President of the Institution of Civil Engineers.

PROFESSOR KARL TERZAGHI, President of the International Society and of the Conference.

20.30–22.30

Reception at the Tate Gallery, Millbank, at the invitation of the Chairman and members of the Public Works and Municipal Services Congress and Exhibition Council (Day Dress).

The Tate Gallery houses the national collection of British art, modern sculpture and modern foreign paintings, especially Impressionists and post-Impressionists.

Tuesday, 13 August

10.00–13.00

Session 1

In the Great Hall of the Institution of Civil Engineers.

Division 1: Soil properties and their measurement.

(General Reporter: I. Th. Rosenqvist.)

(Assistant Reporter: N. Janbu.)

Soils, their occurrence, classification and description; their physicochemical and mechanical properties, including permeability; methods and apparatus for the measurement of soil properties.

12.00 for 13.00

(1) Ladies' fork luncheon at 23 Knightsbridge.

14.00–16.00

(2) After the fork luncheon, ladies will be taken by coach on a 2-hour drive around London.

14.30–17.30

Session 2

Division 1: Soil properties and their measurement.

(General Reporter: I. Th. Rosenqvist.)

(Assistant Reporter: N. Janbu.)

Soils, their occurrence, classification and description; their physicochemical and mechanical properties, including permeability; methods and apparatus for the measurement of soil properties.

20.00–23.00

(3) Reception at Hurlingham Club.

The original Hurlingham House, which still forms part of the Club, was built in 1760 as a small country house by Dr. William Cadogan, a leading physician of his day. The house and grounds passed through several hands and were added to

PROGRAMME

Lundi, 12 août

10.30–13.00

Séance du Comité Exécutif dans la 'Council Room' de l'Institution of Civil Engineers.

14.30–16.00

Ouverture du Congrès

Allocutions par: SIR ARTHUR WHITAKER, K.C.B., Président de l'Institution of Civil Engineers.

PROFESSEUR KARL TERZAGHI, Président de la Société Internationale et du Congrès.

20.30–22.30

Réception dans la 'Tate Gallery', Millbank, à l'invitation du Président et des membres du 'Public Works and Municipal Services Congress and Exhibition Council' (Tenue de ville).

C'est dans la 'Tate Gallery' que l'on trouvera une collection nationale d'art britannique ainsi que de sculpture moderne et de peinture moderne étrangère, en particulier les Impressionistes et les post-Impressionistes.

Mardi, 13 août

10.00–13.00

Première Séance

Dans la Salle du Congrès 1^{ère} Section technique: Mesure et propriétés des sols.

(Rapporteur: I. Th. Rosenqvist.)

(Assistant Rapporteur: N. Janbu.)

La venue, classification et description des sols; leurs propriétés physicochimiques et mécaniques, y compris la perméabilité; méthodes et appareils pour la mesure des propriétés des sols.

12.00 pour 13.00

No. (1) Buffet lunch pour les dames à 23 Knightsbridge.

14.00–16.00

No. (2) Après le repas, un autocar sera à la disposition des dames pour faire une tournée de 2 heures dans Londres.

14.30–17.30

Deuxième Séance

1^{ère} Section technique: Mesure et propriétés des sols.

(Rapporteur: I. Th. Rosenqvist.)

(Assistant Rapporteur: N. Janbu.)

La venue, classification et description des sols; leurs propriétés physicochimiques et mécaniques, y compris la perméabilité; méthodes et appareils pour la mesure des propriétés des sols.

20.00–23.00

No. (3) Réception à Hurlingham Club.

Hurlingham House, qui forme toujours partie du Club, fut construit en 1760 comme maison de campagne pour le docteur William Cadogan, docteur très recherché à cette époque. La maison et ses dépendances passa entre les mains de différents

until the final lessee of the property, Mr. Frank Heathcote, who was interested in promoting shooting matches, founded a pigeon-shooting club at Hurlingham in 1869 of which he became the first Secretary and Manager. This was the beginning of the Hurlingham Club, and the Minutes of all the committee meetings since the beginning are still among the archives.

From the turn of the century letters of protest had been received condemning pigeon shooting as barbarous, and a resolution was passed by the committee on 15 April 1905 that pigeon shooting should be discontinued after 31 December 1905. After some stormy protests the resolution was carried into effect.

Polo, which originated in Persia and flourished in India during the sixteenth century, first came to Hurlingham on 6 June 1874, the game being played in the presence of the Prince and Princess of Wales, the Duke and Duchess of Edinburgh, and a large gathering. Many crowned heads and princes of the blood visited the Club in the ensuing years, and the Patrons have included His Majesty King Edward VII, His Majesty King George V and H.R.H. the Duke of Edinburgh.

In May 1909 the Club was awarded a Gold Olympic Commemorative Medal, which still hangs in the Club today. On the outbreak of war in 1939 polo came to an end at Hurlingham and the grounds were leased to the Fulham Borough Council for use as allotments, at the 'peppercorn' rent of one shilling a year. The two polo fields were compulsorily acquired by the London County Council in 1951.

Of the other games played at Hurlingham, croquet was introduced in July 1901, and still flourishes. Lawn tennis was introduced at the Club in April 1877, and today there are 18 grass and 18 hard courts. The reception for the overseas tennis players at the Wimbledon Tournament is held each year at the Club on the Sunday preceding 'Wimbledon Fortnight'. Squash rackets, bowls, golf, putting, swimming and cricket are still played, although lacrosse and the polo races have been discontinued. The Coaching Club continues to meet at Hurlingham each year; it first visited there on 16 June 1870. Archery competitions take place each autumn, and the Cambridge Boat Race crew is accommodated during training for the annual Oxford and Cambridge Boat Race on the Thames.

Wednesday, 14 August

9.00-12.30

(4A) Ladies' visit to Hampton Court Palace.

Hampton Court Palace was originally occupied by the Order of St John of Jerusalem, and leased from them in 1515 by Cardinal Wolsey, who made considerable additions to the building. Wolsey, in a desperate bid to regain his lost influence with Henry VIII, presented the King with the Manor of Hampton Court. Henry VIII made many alterations to the Palace, as did William III, who preferred Hampton Court to Whitehall or Windsor.

Sir Christopher Wren, the great English architect, was responsible for building the Fountain Court, the southern and eastern fronts of the Palace, and for laying out the gardens.

Events of historical interest in the Palace include the birth in 1537 of Edward VI; the secret marriage of Henry VIII to Catherine Howard; and the honeymoon of Mary I and her consort, Philip II of Spain. Charles I lived at the Palace when he was king, and was later imprisoned there.

Now, in its age, Hampton Court is one of the greatest showpieces in England. Its famous rooms include the great Picture Gallery; the Haunted Gallery; and the Great Hall (with its magnificent hammerbeam roof), where plays were performed on the stage during the reign of James I, and where Shakespeare is believed to have acted.

propriétaires jusqu'à ce que, finalement, Mr. Frank Heathcote, qui s'intéressait beaucoup au tir, fonde un club pour pratiquer le tir aux pigeons à Hurlingham en 1869 dont il devint le premier secrétaire et directeur. Ainsi commença Hurlingham Club et les procès-verbaux de toutes les séances sont conservés dans les archives.

Dès le début du vingtième siècle, il y eu des protestations condamnant les tirs aux pigeons comme cruels. Ainsi, le 15 avril, 1905, une assemblée passa une Résolution qui mit fin, à partir du 31 décembre 1905 aux tirs aux pigeons. Après un nombre de protestations quelque peu orageuses, cette décision fut finalement acceptée et mise en opération.

Le polo, originaire de Perse et qui se vit très populaire aux Indes au XVIème siècle, fut joué pour la première fois à Hurlingham le 6 juin 1874, en présence du Prince et de la Princesse de Galles, du Duc et de la Duchesse d'Edimbourg, et d'une large compagnie. Plusieurs rois et reines et princes de sang royal ont rendu visite au Club au cours des années et parmi ses Patrons l'on retrouve S.M. le Roi Edouard VII, S.M. le Roi Georges V et S.A.R. le Duc d'Edimbourg.

En mai, 1909, une Médaille d'Or Commémorative des Jeux Olympiques fut décernée au Club, où elle y est conservée. A la déclaration de la guerre en 1939, on cessa d'y jouer au polo et le terrain fut loué aux autorités municipales de Fulham, à la charge nominale de 1 shilling par an, pour être divisé en 'allotments' et cultivé. Les deux pelouses de polo furent acquises de force par le London County Council en 1951.

Le croquet fut introduit à Hurlingham en juillet 1901, et l'on y joue toujours aujourd'hui. Le tennis, en avril 1877; il y a maintenant 18 courts sur gazon et 18 en terre battue. Une réception pour les participants d'outre-mer à la Quinziane de Tennis de Wimbledon, prend place chaque année au Club le dernier dimanche avant l'ouverture du tournoi. On y joue également au squash, aux boules, au golf, au putting ainsi qu'au cricket. Il y a aussi une piscine mais le jeu de lacrosse et les courses de polo sur poneys ne se pratiquent plus. Le 'Coaching Club' s'y rassemble chaque année depuis le 16 juin 1870. Un concours de tir à l'arc y prend place chaque automne et l'équipe du bateau de l'université de Cambridge y est hébergée pendant la période d'entraînement qui précède la course annuelle sur la Tamise avec Oxford.

Mercredi, 14 août

9.00-12.30

No. (4A) Excursion pour les dames au Palais de Hampton Court.

Le Palais de Hampton Court abrita originalement l'Ordre de St Jean de Jérusalem de qui le Cardinal Wolsey en obtint la jouissance en 1515. Celui-ci y fit beaucoup de transformations. Wolsey, dans le fervent espoir de retrouver faveur auprès de Henri VIII donna au roi ce manoir. Henri VIII y fit de nombreux changements ainsi que Guillaume III, ce dernier préférant à vivre Hampton Court qu'à Windsor. La 'Fountain Court' est l'œuvre de Sir Christopher Wren, le célèbre architecte anglais, ainsi que les faces sud et est du Palais. C'est lui, également, qui a dressé les plans des jardins tels que le visiteur d'aujourd'hui les voit. Parmi les événements historiques qui prirent place au Palais, on signale la naissance d'Edouard VI en 1537, le mariage secret de Henri VIII et Catherine Howard, les lunes de miel de Marie Tudor et de son mari, Phillippe II d'Espagne. Charles Ier y vécut pendant son règne et plus tard il y fut interné.

De nos jours, Hampton Court est un des monuments historiques les plus importants en Angleterre. On y trouve la grande Gallerie des peintures, une des plus belles de l'Angleterre, la Gallerie hantée, le 'Great Hall' (avec son magnifique plafond 'hammerbeam') qui, du temps de Jacques Ier servait de théâtre et où l'on pense que Shakespeare a joué.

The gardens extending over an area of 44 acres are famous for their display of flowers, and for the Great Maze.

9.00–12.30

(4B) Ladies' tour of London.

This tour by coach, with a guide, will follow the route:

Trafalgar Square, St. James's Palace, Buckingham Palace (Changing of the Guard), Piccadilly Circus, Regent Street, Oxford Street, Marble Arch, Hyde Park, Park Lane, Chelsea, Kensington Museums, River Thames, Tate Gallery, Lambeth Palace, Houses of Parliament, Westminster Abbey, Whitehall, Downing Street.

10.00–13.00

Session 3

Division 2: Techniques of field measurement and sampling.

(General Reporter: Milton Vargas.)

Methods and equipment used in the field; surveying by seismic, resistivity and other methods, soil sampling; methods for the *in situ* measurement of strength, permeability, water and earth pressure, settlement and deformation.

13.00–17.00

Technical Visits.

Details of the individual visits are given below:

15.00

(5A) Imperial College, University of London, Kensington.

The laboratory contains five triaxial machines fully equipped to measure pore-pressure volume changes and five oedometers, including one in which pressures of 100 tons/sq. ft. can be applied, as well as the usual equipment. The laboratory is used in teaching, research, and for a small amount of special testing in connection with consulting work.

14.30

(5B) Soil Mechanics Ltd., Chelsea.

This laboratory, founded by John Mowlem & Co., Ltd., in 1938, is the oldest commercial soil mechanics laboratory in the United Kingdom.

In addition to soil testing, work is carried out in connection with geotechnical processes and specialized forms of civil engineering construction.

13.30

(5C) George Wimpey & Co. Ltd., Southall.

The soil mechanics laboratory is comprehensively equipped for all forms of testing. There is also a geological laboratory, an equipment depot for the maintenance of various types of boring and drilling equipment, apparatus for sampling and *in situ* testing, and grouting and well-pointing plant, etc. Concrete, asphalt, building materials, structural testing, and metallurgical testing facilities may also be seen.

13.45

(5D) Building Research Station, Garston.

The Building Research Station of the British Government's Department of Scientific and Industrial Research is at Garston,

Il y a de nombreux appartements à visiter ainsi que les jardins qui ont une superficie d'environ 16 hectares et qui sont renommés pour la grande variété de ses plantes et fleurs et pour le Grand Labyrinthe.

9.00–12.30

No. (4B) Excursion pour les dames dans Londres.

Cette excursion, en autocar, avec guide, suivra la route suivante:

Trafalgar Square, St James Palace, Buckingham Palace où l'on assistera au Changement de la Garde, Piccadilly Circus, Regent Street, Oxford Street, Marble Arch, Hyde Park, Park Lane, Chelsea, Kensington Museums, la Tamise, Tate Gallery, Lambeth Palace, les Chambres du Parlement, Westminster Abbey, Whitehall, Downing Street.

10.00–13.00

Troisième Séance

2^eème Section technique: Méthodes pour mesures sur place et prélèvement d'échantillons.

(Rapporteur: Milton Vargas.)

Méthodes et équipement utilisés sur place; prospection sismique, prospection par mesure de la résistivité et autres méthodes; prélèvement d'échantillon de sol; méthodes pour les mesures de résistance en place, perméabilité, poussée d'eau et des terres, tassement et déformation.

13.00–17.00

Visites de laboratoires, etc.

L'heure de départ de l'Institution of Civil Engineers pour les visites suivantes est indiquée ci-dessous, dans chaque cas:

15.00

(5A) Imperial College, University of London, Kensington.

Le laboratoire contient cinq machines triaxiales permettant la mesure des changements de volume de la pression interstitielle et cinq oedomètres, dont un avec lequel on peut exercer une pression de 1100 t/m² et l'équipement habituel d'un laboratoire. Le laboratoire est utilisé pour l'instruction, les recherches ainsi que quelques expériences spéciales pour le travail d'ingénieur conseil.

14.30

(5B) Soil Mechanics Ltd., Chelsea.

Ce laboratoire fondé par John Mowlem, Société anonyme, en 1938, est le plus ancien laboratoire de mécanique des sols dans le commerce en Grande Bretagne.

En plus d'études sur les sols, on y travaille également sur les procédés géotechniques et sur des problèmes ayant spécialement rapport aux travaux de construction dans le génie civil.

13.30

(5C) George Wimpey & Co. Ltd., Southall.

Le laboratoire de mécanique des sols est très bien équipé pour faire toutes sortes d'expériences. Il y a également un laboratoire géologique et tout l'équipement divers pour des sondages et forages, les appareils pour prélever des échantillons et faire des essais *in situ*, les installations pour injection et puits filtrant, etc. On y verra également du ciment, des matériaux de construction et des installations pour essais de structure et métallurgiques.

13.45

(5D) Building Research Station, Garston.

Le 'Building Research Station' qui fait partie du 'Department of Scientific and Industrial Research' du gouvernement est situé

near Watford, Hertfordshire, and conducts research into all aspects of building and the allied branches of civil engineering. The Soil Mechanics Laboratory at the Station was the first to be formed in Great Britain in 1933.

14.00

(5E) Road Research Laboratory, Harmondsworth.

The soil mechanics section of the Road Research Laboratory undertakes basic researches into problems connected with the design and construction of foundations for roads and airfields. The researches fall into four main groups: (a) moisture movements in soils and subsoil drainage, (b) pavement design, (c) earth works, including studies of soil compaction, and (d) soil stabilization.

14.15

(5F) British Railways, Paddington.

The laboratory acts as a centre for the District Engineers and the technical sections of the Civil Engineer's Department in finding the solution to the problems relating to soil behaviour. Approximately 50 are employed on this and on the development of special machines for railway civil engineering investigations and new processes.

13.30

(5G) Metropolitan Water Board Works.

Members will visit the Walton south reservoir and the Thames-to-Lee tunnel main, which are under construction.

13.00

(5H) Port of London Authority.

During the afternoon members will be the guests of the Port of London Authority, who will arrange a 10 mile (16 km) cruise on the River Thames in the Authority's steam yacht 'St. Katherine', and a tour by water of part of the Royal Docks system.

Thursday, 15 August

9.00-12.30

(6A) Ladies' country tour.

The route to be followed is wholly south of the River Thames in the counties of Surrey and Kent, and passes through Sutton, Reigate (where coffee will be taken at Bridge House Restaurant), Redhill, Bletchingly, Godstone, Westerham and Bromley.

9.00-12.30

(6B) Ladies' tour of London.

This tour by coach, with a guide, will follow the route: Trafalgar Square, Victoria Embankment, The Temple, Queen Victoria Street, Cannon Street, The London Stone, The Monument, Eastcheap, The Tower of London (visit), Royal Exchange, Bank of England, Mansion House, Bow Church, St. Paul's Cathedral, Ludgate Hill, Fleet Street, Law Courts, Dicken's Old Curiosity Shop (visit).

10.00-13.00

Session 4

Division 3a: Foundations of structures: General subjects and foundations other than piled foundations.

(General Reporter: J. Brinch Hansen.)

(Assistant Reporter: Bent Hansen.)

à Garston, près de Watford, Hertfordshire, s'occupe de recherches dans les différents aspects de construction du génie civil. Le laboratoire de la Mécanique des Sols à Garston fut le premier en Grande Bretagne et date de 1933.

14.00

(5E) Road Research Laboratory, Harmondsworth.

La section du 'Road Research Laboratory' qui s'occupe de la mécanique des sols fait des recherches sur les différents problèmes qui se présentent dans la construction de fondations pour routes et pistes d'envol. On peut grouper les recherches en quatre groupes principaux: (a) mouvement de l'eau dans les sols et le drainage des sous-sols (b) construction de revêtement, (c) terrassements, études de compactage des sols et (d) stabilisation du sol.

14.15

(5F) British Railways, Paddington.

Ce laboratoire s'occupe de toutes les questions et problèmes de mécanique des sols pour les chemins de fer nationaux. Le personnel de cinquante employés se charge de ces études ainsi que du développement de machines utilisées dans les recherches du génie civil dans les chemins de fer et des nouveaux procédés.

13.30

(5G) Entreprises du Metropolitan Water Board.

Les congressistes visiteront le réservoir de Walton South et le tunnel pour l'aqueduc entre la Tamise et le fleuve 'Lee'. Tous deux sont en construction.

13.00

(5H) Port of London Authority.

Pendant l'après-midi les congressistes seront reçus par le 'Port of London Authority' qui ont organisé une croisière de 16 km (10 miles) sur la Tamise dans le yacht à vapeur 'St. Katherine' ainsi qu'une visite en bateau des 'Royal Docks'.

Jeudi, 15 août

9.00-12.30

No. (6A) Excursion pour les dames dans la campagne aux environs de Londres.

La route qui sera suivie est entièrement au sud de la Tamise et traverse les comtés du Surrey et du Kent, en passant par Sutton, Reigate où l'on s'arrêtera pour prendre une tasse de thé ou café au 'Bridge House Restaurant', Redhill, Bletchingly, Godstone, Westerham, et Bromley.

9.00-12.30

No. (6B) Excursion dans Londres pour les dames.

Ce tour, en autocar, avec guide suivra la route suivante: Trafalgar Square, Victoria Embankment, The Temple, Queen Victoria Street, Cannon Street, The London Stone, The Monument, Eastcheap, The Tower of London (visite), Royal Exchange, Bank of England, Mansion House, Bow Church, St Paul's Cathedral, Ludgate Hill, Fleet Street, Law Courts, Dickens's Old Curiosity Shop (visite).

10.00-13.00

Quatrième Séance

3^e éme a Section technique: Fondations de constructions. Sujets généraux et fondations autres que fondations sur pieux.

(Rapporteur: J. Brinch Hansen.)

(Assistant Rapporteur: Bent Hansen.)

The theory and practice of foundations for building and other works excluding earth dams and pavements; bearing capacity, pressure distribution, consolidation and settlement; underpinning; laboratory and field studies of foundations.

14.00–15.30

(7A) Ladies' visit to the Palace of Westminster, followed by tea at Church House Restaurant at 15.45 (see also after (7B)).

15.30–16.45

(7B) Ladies' visit to the Palace of Westminster, followed by tea at Church House Restaurant at 17.00.

A great part of the old Palace of Westminster (once a royal dwelling), Parliament House, and the Court of Justice, was burnt down on October 16 1834. Fortunately Westminster Hall, the architectural glory of the old Palace, was saved from the flames, as were St. Stephens' Cloister and the Chapel of St. Mary Undercroft.

The new Palace of Westminster, comprising the House of Lords and the House of Commons, is the largest Gothic building erected in England since the Middle Ages. The Architect was Sir Charles Barry, assisted by Augustus Pugin who was responsible for the interior finishings. The Palace covers an area of 8 acres. It is the official residence of the Lord Chancellor, the Speaker, and the Serjeant-at-Arms. In all, there are 1,100 apartments, 100 staircases, and 2 miles of passages.

When Parliament is sitting the Union Jack is flown from the Victoria Tower; at night the intimation is by a light in the lantern on the Clock Tower.

The Queen's Robing Room, so called because it is there that Her Majesty assumes the Robes of State before opening Parliament, contains fresco paintings by William Dyce, R.A., which show allegories from the legends of King Arthur of Generosity, Religion, Courtesy, Mercy and Hospitality.

The House of Lords excels all the other State apartments for magnificence. It contains stained-glass windows showing English, Scottish and United Kingdom sovereigns and their consorts.

Westminster Hall was built by William II (Rufus), and the original roof was made of oak from the Sussex Weald. It is 240 ft. long and 68 ft. wide. It was the Great Hall of the old Palace and, as such, it was used for banquets, including the Coronation banquets which began with Stephen (1135) and ended with George IV (1821). It was also used for meetings of the Council and of Parliament, the Court of Justice and the Court of Finance. It is as a Court of Justice, however, that the Hall is generally remembered. Within it took place the trials of William Wallace, Sir Thomas More, the Protector Somerset, Strafford, Charles I and Warren Hastings.

Both parties will be conducted round the Palace by Sir Harold Webbe, Member of Parliament for the Cities of London and Westminster.

14.30–17.30

Session 5

Division 3a: Foundations of structures: General subjects and foundations other than piled foundations.

(General Reporter: J. Brinch Hansen.)

(Assistant Reporter: Bent Hansen.)

The theory and practice of foundations for building and other works excluding earth dams and pavements; bearing

La théorie et la pratique des fondations pour bâtiments et autres travaux à l'exception de barrages en terre et revêtements; capacité portante; répartition de pression, consolidation et tassement; reprise en sous-œuvre; études de fondations en laboratoires et sur place.

14.00–15.30

No. (7A) Visite pour les dames au Palais de Westminster. A 15.45 les visiteurs prendront le thé au 'Church House Restaurant' (voir également No. (7B)).

15.30–16.45

No. (7B) Visite pour les dames au Palais de Westminster. A 17.00 les visiteurs prendront le thé au 'Church House Restaurant'.

Une grande partie de l'ancien Palais de Westminster, autrefois occupé par le Roi, ainsi que 'Parliament House' et 'Court of Justice' furent détruits par un incendie le 16 octobre 1834. Il est heureux que Westminster Hall, chef d'œuvre de l'ancien Palais ne succomba pas aux flammes; il en est de même des cloîtres de St Etienne et de la chapelle St Mary Undercroft. Le nouveau Palais de Westminster, qui comprend la Chambre des Lords et la Chambre des Communes est le plus grand monument gothique construit en Angleterre depuis le Moyen-Age. Les architectes en furent Sir Charles Barry et Augustus Pugin qui, lui, fut responsable pour les decorations intérieures. Le Palais a une superficie d'environ 325 ares. Le Lord Chancellor, le Speaker ainsi que le Serjeant-at-Arms y ont leurs résidences officielles. Ce palais comprend 1100 appartements de diverses dimensions, 100 escaliers, et environ 3 km de corridor.

L'Union Jack, flottant au haut de la Tour Victoire, indique que le Parlement est en session; la nuit, c'est une lumière dans la lanterne de la Tour de l'Horloge, qui prend la place du drapeau.

La 'Robing Room' de la Reine, ainsi appelée parce que c'est ici que la Reine revêt ses 'Robes d'Etat' lorsque Sa Majesté ouvre le Parlement, contient des fresques par William Dyce, R.A., représentant des allégories de la Générosité, la Religion, la Courtoisie, la Pitié et l'Hospitalité, toutes peintes selon les légendes du roi Arthur.

La Chambre des Lords est ce qu'il ya de plus beau dans le Palais.

Westminster Hall fut bâti au temps de Guillaume II (Rufus) et le plafond fut construit avec le bois des chênes des anciennes forêts de Sussex (Sussex Weald). Il à environ 72 mètres de long et 20 mètres de large. Ce Hall formait le 'Great Hall' de l'ancien Palais et servait de salle de banquet. C'est dans ce Hall que les banquets après couronnements des rois depuis Etienne (1135) jusqu'à Georges IV (1821) se célébraient. Ce Hall a également servi pour les Séances du Conseil, comme Parlement, comme Cours de Justice et pour certaines Séances Financières. On se rappellera ce Hall principalement comme Cours de Justice car c'est là que les jugements de William Wallace, Sir Thomas More, du Protecteur Somerset, Strafford, Charles Ier et Warren Hastings eurent lieu.

Chacune de ces deux visites sera sous la direction de Sir Harold Webbe, Membre du Parlement pour les cités de Londres et Westminster.

14.30–17.30

Cinquième Séance

3 ème a Section technique: Fondations de constructions. Sujets généraux et fondations autres que fondations sur pieux.

(Rapporteur: J. Brinch Hansen.)

(Assistant Rapporteur: Bent Hansen.)

La théorie et la pratique des fondations pour bâtiments et autres travaux à l'exception de barrages en terre et revêtements:

capacity, pressure distribution, consolidation and settlement; underpinning; laboratory and field studies of foundations.

Friday, 16 August

9.00–19.00

(8A) Ladies' excursion to Arundel Castle.

This is a tour through some of the most beautiful country in the South of England. The route from London is via Esher, Guildford and Petworth.

The town of Arundel, built beside the River Arun from which it derives its name, is dominated by the famous Castle owned by the Duke of Norfolk, Earl Marshal of England. The first known references to the Castle are in the Domesday Survey of 1086, and it is thought that King Alfred was the builder of the original structure.

William the Conqueror gave the Castle to Roger Montgomery, a nobleman who had come with him from Normandy. The King created him Earl of Arundel, and since that day the title has always gone to the owner of the Castle. It was rebuilt in the eighteenth century and contains a Keep, Barons Hall (133 ft. long), Armoury, Picture Gallery, Private Chapel and Tilting Yard.

Coffee will be taken on the outward journey at the Talbot Hotel at Ripley, and lunch and tea at the Norfolk Hotel in Arundel.

The return journey to London is via Bury Hill, Pulborough, Dorking, Box Hill and Leatherhead.

9.00–18.30

(8B) Ladies' excursion to Blenheim Palace.

The route to Woodstock, where Blenheim Palace is situated, is through Gerrards Cross, Beaconsfield, High Wycombe, a centre of the furniture industry, and Oxford.

Woodstock, where lunch will be taken at the Bear Inn, was a borough long before the Norman Conquest, and many royalties—among them Ethelred, Alfred the Great, Queen Eleanor and the Black Prince—were associated with it. The Tudor Princess, Elizabeth, was imprisoned at the Old Manor during the years of Mary's persecution, and Woodstock House was the scene of a bitter siege during the Civil War.

Blenheim Palace was built early in the eighteenth century by Sir John Vanbrugh for the Duke of Marlborough, the victor of the battle of Blenheim. It was given to him as a reward by Queen Anne. The gardens cover 300 acres, and the park, including woods and artificial lakes, is almost 10 miles in circumference.

Tea will be taken at the Palace.

10.00–13.00

Session 6

Division 3b: Foundations of structures: Piling and piled foundations.

(General Reporter: P. C. Rutledge.)

The theory and practice of piles and piling operations; bearing capacity; settlement; testing.

14.30–17.30

Session 7

Division 4: Roads, runways and rail-tracks.

(General Reporter: R. Peltier.)

The theory and practice of foundations for pavements or tracks; bearing capacity, deformation and settlement; construction in relation to soil properties and climate; compaction and drainage of subgrades; stabilized soil, field investigations and performance studies.

capacité portante; répartition de pression, consolidation et tassement; reprise en sous-œuvre; études de fondations en laboratoires et sur place.

Vendredi, 16 août

9.00–19.00

No. (8A) Excursion pour les dames au Château de Arundel.

Excursion à travers une des parties sud de l'Angleterre les plus pittoresques. On passera par Esher, Guildford et Petworth.

La ville de Arundel, arrosée par la rivière Arun d'où elle dérive son nom, est dominée par le fameux château, propriété du duc de Norfolk, Earl Marshal d'Angleterre. La première référence que l'on a pu tracer à ce sujet se trouve dans le 'Domesday Survey' de 1086, et l'on pense que le roi Alfred en a inspiré la construction.

Guillaume le Conquérant donna le château à Roger Montgomery, un de ces nobles venus avec lui de Normandie. Le roi le créa comte de Arundel et depuis lors ce titre a toujours échu au propriétaire du château. Il fut rebâti au XVIIIème siècle et contient un donjon, le Hall des Barons qui a environ 40 mètres de long, une Armurerie, une Galerie de Peintures, une Chapelle et une Lice.

On s'arrêtera le matin pour le café à l'hôtel Talbot à Ripley et pour le déjeuner et le thé l'après-midi à l'hôtel Norfolk à Arundel. Le retour se fera par Bury Hill, Pulborough, Dorking, Box Hill et Leatherhead.

9.00–18.30

No. (8B) Excursion pour les dames au Palais de Blenheim.

La route pour Woodstock, où est situé le Palais de Blenheim, passe par Gerrards Cross, Beaconsfield, High Wycombe—centre de manufacture de meubles—et Oxford.

Woodstock, où l'on déjeunera au 'Bear Inn', était un bourg avant la conquête normande et a toujours été associé avec différents personnages royaux, entre autres Ethelred, Alfred le Grand, la Reine Eléonore et le Prince Noir. La Princesse Elizabeth Tudor y fut emprisonnée au vieux manoir pendant les années de persécution du règne de la Reine Marie et Woodstock House à souffert un cruel siège pendant la Guerre Civile. Le Palais de Blenheim fut construit au XVIIIème siècle par Sir John Vanbrugh pour le Duc de Marlborough, le vainqueur de la bataille de Blenheim. La Reine Anne le présenta au duc en appréciation de ses services. Les jardins ont une superficie de 120 hectares et le parc, avec ses bois et lacs artificiels, à environ 16 kilomètres de circonférence.

On prendra le thé au Palais.

10.00–13.00

Sixième Séance

3ème b Section technique: Fondations de construction. Le pieu et fondations sur pieux.

(Rapporteur: P. C. Rutledge.)

La théorie et la pratique de pieux et battages de pieux; capacité portante; tassement; essais.

14.30–17.30

Septième Séance

4ème Section technique: Routes, pistes d'envol et voies ferrées.

(Rapporteur: R. Peltier.)

La théorie et la pratique des fondations pour revêtements ou voies ferrées; capacité portante, déformation et tassement; construction en relation aux propriétés de sol et au climat; compactage et drainage de terrains de fondations; sols stabilisés; recherches sur place et études.

Saturday, 17 August

9.30–20.15

(9A) Conference excursion to Canterbury and Folkestone.

10.30–21.15

(9B) Conference excursion to Canterbury and Folkestone.

Both parties will cover the same route.

The route followed by the coaches will be along the main road from London to the continent of Europe, and lies wholly within the County of Kent, often called the Garden of England because of its many orchards and hop gardens.

After crossing the North Downs at Wrotham, from which a fine view of the Weald can be obtained, the road enters Maidstone over an old bridge over the River Medway.

Lunch will be taken at the small village of Bearsted between Maidstone and Folkestone.

Before entering Folkestone the road runs along the coast and the opportunity will be taken to visit the site of the Folkestone Warren landslip. Details of this are given in a separate note below.

Leaving the Warren members will take tea at Folkestone which is one of the principal ports for cross-Channel passenger traffic and is also a popular seaside resort. From Folkestone to Canterbury the road again crosses the North Downs. Canterbury which is 20 miles from Folkestone is the seat of the senior Archbishop of the Church of England, and was an important city before the Roman conquest. Inevitably the cathedral, parts of which date back to Norman days, is the principal place of interest to visitors but other places of interest are the King's School, which was founded in the sixth century, and the walls of the ancient city. Unfortunately the mediaeval centre of the city was largely destroyed by bombing and so many of the buildings surrounding the cathedral are modern.

After leaving Canterbury the road follows the ancient Roman road from Dover to London along the ridge of the North Downs, with frequent views over the Thames Estuary to the right. The road passes through Rochester, famous for its castle and its historic crossing of the River Medway.

Notes on the geology of the route

Outward to Sidcup the route is on Lower Tertiary formations beginning with the London clay. From Sidcup the chalk begins to emerge and, after crossing the Darent Valley, the route gradually climbs the dip slope of the chalk (the northern limb of the Weald anticline) and descends the chalk scarp to Wrotham. The route then follows the geological strike to Folkestone, partly on the Gault clay (beneath the chalk), with the chalk scarp on the left and the Lower Greensand hills on the right. To the east of Folkestone are high chalk cliffs with major landslips on the underlying Gault clay. Folkestone is on the Lower Greensand. The chalk scarp is then climbed out of Folkestone and the gentle dip slope is descended to Canterbury. Most of the return journey from Canterbury is partly on chalk and partly on Lower Tertiaries, which thicken towards the Thames on the right. On the left is the chalk dip slope. At Crayford on the River Darent the route climbs the main scarp of the Lower Tertiaries.

Notes on the Folkestone Warren landslips

General—From Martello tunnel, Folkestone, to Abbotscliff tunnel, which is about 2 miles nearer Dover, the Southern Region main railway line runs through an unstable area of

Samedi, 17 août

9.30–20.15

No. (9A) Excursion du congrès à Canterbury et Folkestone.

10.30–21.15

No. (9B) Excursion du congrès à Canterbury et Folkestone.

Ces 2 groupes feront la même route.

Les autocars suivront la route principale de Londres aux ports qui relient la Grande Bretagne à l'Europe et qui traverse le comté du Kent, souvent surnommé le jardin de l'Angleterre à cause de ses nombreux vergers et champs de houblon.

Après la traversée des 'Downs du Nord' à Wrotham d'où l'on apercevra une vue magnifique des Bois (Weald), l'entrée dans Maidstone se fait en passant sur un vieux pont sur la rivière Medway.

Le déjeuner sera à Bearsted entre Maidstone et Folkestone. Avant d'arriver à Folkestone, la route longe la côte et l'on visitera les travaux qui ont été occasionnés par les glissements de terrain à Folkestone Warren. (Voir notes plus loin.)

Après cette visite on prendra le thé à Folkestone, un des ports principaux pour le trafic des passagers entre la France et l'Angleterre, et qui est également une station balnéaire populaire. De Folkestone à Canterbury la route traverse à nouveau les Downs du Nord. Canterbury, à environ 30 kilomètres de Folkestone, est le siège du premier archevêché de l'Église Anglicane, et était une ville importante avant la conquête romaine. La cathédrale est le monument le plus important de la ville mais on devra également signaler King's School qui fut fondée au VI^{ème} siècle, et les murs de l'ancienne ville. La ville ayant subi de sérieux bombardements pendant la dernière guerre, il est à regretter qu'un grand nombre des édifices à l'entour de la cathédrale aient été détruits. La cathédrale se trouve maintenant entourée de nouvelles constructions modernes.

La route en quittant Canterbury suit l'ancienne route romaine de Douvres à Londres en longeant les Downs du Nord et donne diverses aperçues sur l'estuaire de la Tamise, sur la droite. On passera également par Rochester, ville rendue fameuse par son château et ses associations historiques.

Notes sur la géologie de la route

La route jusqu'à Sidcup est construite sur des formations tertiaires inférieures commençant avec l'argile de Londres. A partir de Sidcup on commence à apercevoir la craie et après avoir traversé la vallée du Darent, la route monte graduellement le long de l'inclinaison de la craie (flanc nord de l'anticline wealdien) et redescend le long de l'escarpement de craie de Wrotham. La route ensuite suit l'inclinaison de couche jusqu'à Folkestone en partie sur l'argile gault (en dessous de la craie) entre l'escarpement crayeux sur la gauche et les collines de grès vert inférieur sur la droite. A l'est de Folkestone, on remarquera les hautes falaises de craie avec des glissements importants de terrain sur l'argile gault de la couche inférieure. Folkestone se trouve bâtie sur le grès vert inférieur. La route continue sur l'escarpement de craie jusqu'à la sortie de Folkestone et redescend ensuite une pente douce jusqu'à Canterbury. La plus grande partie de la route du retour à partir de Canterbury est, soit craie, soit formations tertiaires inférieures qui s'épaississent du côté de la Tamise sur la droite. Sur la gauche, on remarquera la pente de craie. A Crayford, sur la rivière Darent, la route monte l'escarpement principal des formations tertiaires inférieures.

Notes sur les glissements à Folkestone Warren

A partir du tunnel de Martello à Folkestone jusqu'à celui de Abbotscliff qui se trouve à environ 3 kilomètres plus près de Douvres, la grande ligne de chemin de fer du Southern Region

undercliff known as Folkestone Warren, which has been, from time to time, the scene of extensive landslips, probably since the breaking of the Straits of Dover in Neolithic times.

The railway, which was opened in 1844, runs partly in cutting and partly on a semi-plateau resulting from recent engineering operations, and it falls from a level of about 130 O.D. at Martello tunnel to about 90 O.D. at Abbotscliff. Two major landslips, in 1877 and 1915, disrupted traffic, and there have been a number of lesser slips and chalk falls from the high cliffs which rise to a height of 550 O.D. at the back of the Warren. Large slips in 1936-37 followed by a slow creep movement of the western half of the length of the Warren, seaward of the railway, prompted a comprehensive soil mechanics investigation as a result of which remedial works were commenced in 1948.

Geology—The high cliffs, representing the unslipped strata, consist of Middle and Lower chalk at the base of which is a layer of glauconitic sandy marl mis-named Chlonitic Marl. This rests on the Gault clay attaining a thickness of 150 ft. which, in turn, rests on the almost plane surface of the Lower Greensand, having a dip of about 1 in 60 N.N.E. The 'Warren' owes its existence to the progressive and repeated shear failure of the Gault under the combined effects of the weight of the superincumbent strata, water from the high cliffs and rain directly on the Warren, and gradual erosion of the toe of the slips by the sea.

Slips—In 1877 about 100 acres of the south-west end of the Warren slipped and a length of 160 yd. of Martello tunnel collapsed. In 1915 virtually the entire area of the Warren slid as a body towards the sea, whilst falls of chalk near the middle of the Warren buried the main line and formed a peninsula 400 yd. out to sea. The Warren Halt, which is to the west of the middle of the Warren, and the railway in its vicinity were carried 55 yd. seawards of their original positions: traffic could not be restored until 1919.

There have been subsequent slips, and during a slip in 1937 the maximum forward displacement was opposite Martello tunnel where the sea wall was thrust forward 90 ft.

Research—Research by means of deep borings together with undisturbed soil sampling and testing was commenced in 1938 in the area of the subsidiary slips between Martello tunnel and the sea. This sufficed to show that the slips involved the shearing of the Gault along its basement bed and that the causes were toe erosion coupled with high ground-water levels at the back of the slips.

In 1948 this research was continued with deeper borings covering the western half of the main slips also. The earlier conclusions as to the nature of the movements were found to apply to the main slips also, and all slip surfaces in the area explored were found to pass down to the base of the Gault with upheaval of the foreshore by underthrusting from behind on old slip surfaces.

Remedial measures—Since 1948 the following remedial works have been carried out to (a) provide toe weight on the slipping masses, (b) minimize foreshore and undercliff erosion and (c) reduce the head of ground-water at the back of the slips.

(1) Deposition of a very large mass of chalk fill on the fore-

passé à travers des falaises de sol très instable, appelées Folkestone Warren. À maintes reprises Folkestone Warren a subi des glissements de terrain et très probablement depuis la formation du Détroit du Pas-de-Calais à l'époque néolithique.

La ligne de chemin de fer ouverte en 1844, a été posée en partie en tranchée et en partie sur un demi-plateau formé, depuis quelques années, par la main de l'homme. Le chemin de fer descend d'un niveau de 130 O.D. (environ 40 mètres O.D.) au tunnel Martello à environ 90 O.D. (environ 27 mètres O.D.) à Abbotscliff. Deux glissements importants en 1877 et 1915 interrompirent le trafic. La Warren a également souffert des glissements de terrain moindres et des éboulements de craie du haut des grandes falaises qui atteignent une hauteur d'environ 167 mètres (550 O.D.) à l'arrière de la Warren. D'importants glissements en 1936-37, suivis d'un lent cheminement dans la longueur de la Warren du côté ouest et du côté 'mer' de la ligne de chemin de fer ont finalement abouti à une investigation de mécanique des sols. En 1948, les travaux ont commencé.

Géologie—Les hautes falaises représentant les strates n'ayant pas glissées sont de craie moyenne et inférieure à la base de laquelle on trouve une couche de marécages sablonneux glauconifères appelés, à tort 'craie chloritée'. Celle-ci repose sur l'argile gault, atteignant par endroit environ 46 mètres d'épaisseur. L'argile à son tour repose sur la surface presque plane du grès vert inférieur ayant une pente d'environ 1, 66% N.N.E. La Warren est formée par le déformation de cisaillement progressive et répétée du gault sous l'influence combinée du poids des strates superposées, de l'eau des hautes falaises et de la pluie tombant sur la Warren ainsi que par l'érosion graduelle par la mer à la base des glissements.

Glissements—En 1877, environ 40 hectares du côté sud ouest de la Warren glissèrent et le tunnel Martello s'écroula sur une longueur d'environ 100 mètres. En 1915, pour ainsi dire toute la Warren glissa vers la mer tandis que des éboulements de craie dans son milieu engouffraient la grande ligne formant une péninsule de 365 mètres en mer. La station 'Warren Halt', située dans la moitié ouest de la Warren et la ligne de chemin de fer à l'entour furent déplacées d'environ 50 mètres en direction de la mer et le trafic ne fut restauré qu'en 1919.

Il y a eu d'autres glissements et en 1937, il y eut une déplacement qui atteignit son maximum face au tunnel Martello et où la digue fut déplacée d'environ 28 mètres.

Recherches—On fit des recherches, au moyen de sondages profonds ainsi que des prélèvements d'échantillon de sol et les expériences commencèrent en 1938 dans les glissements moindres, entre le tunnel et la mer. Cela fut suffisant pour prouver que ces glissements concernaient le cisaillement du gault le long de la couche de fondation et que les causes en étaient l'érosion à la base ainsi que le haut niveau de la nappe aquifère à l'arrière des glissements.

En 1948, on continua les recherches en faisant des sondages plus profonds du côté des glissements principaux. Les conclusions dérivées après les recherches sur ces glissements furent les mêmes que celles des glissements moindres. On a ainsi découvert que toutes les surfaces de glissement dans la partie qui avait été explorée avaient une base commune dans le gault causant un bouleversement de la plage en poussant de l'arrière sur les anciennes surfaces de glissement.

Mesures de protection et de réparation—Depuis 1948 les réparations suivantes ont été effectuées pour (a) donner de la résistance à la base des masses glissantes (b) réduire l'érosion sur la plage et sous les falaises (c) réduire la pression du niveau de la nappe aquifère à l'arrière des glissements.

(1) Dépôt d'une grande quantité de craie pour remblayer la

shore; (2) protection of this fill by means of a new sea wall with toe apron to minimize risk of its undermining by erosion; (3) top protection of the chalk fill by means of a concrete slab; (4) construction of a 6 ft. 6 in. shield-driven concrete-lined drainage tunnel 850 ft. long near the west end of the Warren; (5) overhaul and extension of existing drainage headings which run back from the top of the old sea wall, at varying distances, into the slipped ground.

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Sunday, 18 August

13.30-18.00

(10A) Conference excursion to Windsor.

This tour embraces Stoke Poges, associated with the poet Gray; Eton College, founded in the fifteenth century by Henry VI; and Windsor Castle, Britain's oldest royal residence. On the homeward journey visitors will see Windsor Park, Runnymede, Kingston and Chelsea.

Stoke Poges Church, a thirteenth-century structure, stands in the Stoke Park Estate, purchased in 1760 by Thomas Penn (son of the founder of Pennsylvania) and owned by the family ever since. The beautiful churchyard presumably furnished the scene for Thomas Gray's *Elegy in a country churchyard*. The poet is buried there.

Eton College, facing Windsor across the Thames, was founded in 1440 by Henry VI. The towers of the stately Chapel are a lovely sight from the battlements of Windsor Castle.

The Royal Borough of Windsor is about 21 miles from London. The incomparable Castle, one of the most magnificent royal residences in the world, covers an area of over 13 acres, and has been the home of English monarchs for nearly 900 years. It houses priceless collections of paintings, china, furniture, armour and tapestries. St. George's Chapel, a magnificent example of Perpendicular architecture, was begun in 1477 by Edward IV. Above the oak stalls hang the banners of the Knights of the Garter, an Order founded by Edward III in 1349.

At Runnymede one of the most historic events in English history took place—in 1215 King John was compelled by his Barons to sign Magna Carta.

Notes on the geology of the route

The first half of the outward route is chiefly on the Taplow Terrace on which London Airport is constructed. It is a Late

plage; (2) protection de ce blocage par une nouvelle digue avec renforcement à sa base pour réduire les risques de minage par l'érosion; (3) protection supérieure de ce blocage de craie avec une dalle de béton; (4) construction par bouclier d'un tunnel d'écoulement de 2 mètres (6 ft. 6 in.) de large, en béton à l'intérieur et d'environ 258 mètres de long, près de l'extrémité ouest de la Warren; (5) inspection détaillée et extension des avancements en galeries pour l'écoulement qui partent du haut et en direction arrière de l'ancienne digue, irrégulièrement espacés, et qui aboutissent dans le terrain qui a glissé.

Ouvrages de référence

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Dimanche, 18 août

13.30-18.00

No. (10A) Excursion du congrès à Windsor.

Cette excursion comprendra une visite à Stoke Poges, qui a toujours été associé avec le poète Gray; le Collège de Eton, fondé au XVème siècle par Henri VI; le château de Windsor, résidence royale la plus ancienne de Grande Bretagne. Le retour se fera en passant par le Parc de Windsor, Runnymede, Kingston et Chelsea.

Stoke Poges: l'église, édifice du XIIIème siècle, se trouve située dans les dépendances de Stoke Park, qui fut acheté en 1760 par Thomas Penn, fils du fondateur de la Pennsylvanie et qui a depuis toujours appartenu à la famille. Le pittoresque cimetière a été, on le pense, l'inspiration du poète Thomas Gray pour son *Elegy in a country churchyard*. Le visiteur remarquera sa tombe dans le cimetière.

Le Collège de Eton: le Collège qui fait face au Château de Windsor, de l'autre côté de la Tamise, fut fondé en 1440 par Henri VI. Des remparts du château, on pourra admirer les tours de la magnifique chapelle du Collège d'Eton.

Le Château de Windsor: Le bourg royal de Windsor se trouve à environ 34 kilomètres de Londres. Cet unique château, qui est incontestablement un des plus grandioses du monde, a une superficie de plus de 525 ares et a été la résidence des monarques anglais depuis près de 900 ans. On y verra une collection magnifique de peintures, porcelaines, mobilier, armures et tapisseries. La chapelle de St Georges, un des plus beaux édifices de l'architecture gothique perpendiculaire fut commencée en 1477 sous le règne d'Edouard IV. Dans le chœur, au dessus des stalles en bois de chêne, reposent les étendards des Chevaliers de la Jarretière, ordre qui fut fondé par Edouard III en 1349.

Runnymede: c'est ici qu'un des événements historiques les plus importants de l'histoire de l'Angleterre s'est déroulé: en 1215, le roi Jean signa 'Magna Carta'.

Notes sur la géologie de la route

La première partie de la route en allant à Windsor, est principalement formée par la Terrasse de Taplow, sur laquelle

Pleistocene gravel terrace of the Thames which overlies the London clay (marine Eocene). About 2 miles before Staines the road descends to the younger, lower level of the Flood Plain Terrace. Windsor Castle is on an upfolded inlier of the chalk. It normally underlies the London clay and other lower Tertiaries. The hills on the road approaching Runnymede from Windsor are London clay capped by Bagshot sands (marine Eocene) and Plateau gravels (older Pleistocene). A number of gravel pits can be seen in the Flood Plain gravels near Chertsey.

14.15–17.15

(10B) Conference tour of London.

The route for this tour will include Trafalgar Square, Piccadilly Circus, the West End, Buckingham Palace, Westminster Catholic Cathedral, Westminster Abbey, Whitehall, Fleet Street, St. Paul's Cathedral, Tower of London, Embankment, Westminster.

Monday, 19 August

10.00–13.00

Session 8

Division 5: Earth pressure on structures and tunnels.

(General Reporter: J. Kérisel.)

Earth pressure on retaining walls, strutted excavations, bulkheads and tunnel linings; pressure in silos and bins, theoretical, model and field investigations of earth pressure and its distribution; construction problems.

10.30–18.00

(11A) Ladies' excursion to Windsor Castle.

The road to Windsor will be through Staines and Egham. Lunch will be taken at Great Fosters, Egham, a Tudor house which was originally the hunting lodge of Anne Boleyn, King Henry VIII's second wife. At Runnymede King John signed Magna Carta in 1215—one of the most historic events in English history.

The Royal Borough of Windsor is about 21 miles from London. The Castle covers an area of over 13 acres and has been the home of English monarchs for nearly 900 years. It houses unique collections of paintings, china, furniture, armour and tapestries. St. George's Chapel, a magnificent example of Perpendicular architecture, was begun in 1477 by Edward IV. Above the oak stalls hang the banners of the Knights of the Garter, an Order founded by Edward III in 1349.

Tea will be taken at the Castle Hotel, Windsor.

10.30–18.00

(11B) Ladies' excursion to the Royal Horticultural Society's Gardens at Wisley.

The Gardens of the Society are situated between Cobham and Ripley in Surrey, a distance of 20 miles from London.

From 1824 until 1870 they were situated at Chiswick, in London, but were then moved to a 60-acre estate at Wisley, which today extends over 200 acres.

Wisley was not created to be merely a garden of great beauty. It is also the principal centre of practical horticulture in Great Britain today, and many activities are carried out

est construite l'aéroport de Londres. Cette terrasse est formée de gravier de la Tamise de la fin de l'époque pléistocène qui recouvre l'argile de Londres (époque marine eocène). A environ 3 kilomètres avant d'arriver à Staines, la route descend à un niveau plus jeune et inférieur de la Terrasse alluviale. Le Château de Windsor se trouve sur une fenêtre repliée de craie qui est habituellement en-dessous de l'argile de Londres et autres formations tertiaires. Les collines le long de la route en approchant Runnymede, venant de Windsor, sont d'argile de Londres, recouverte de sable de Bagshot (époque marine eocène) et de gravier de plateau (époque pléistocène plus ancienne). Un certain nombre de carrières de gravier sont à voir dans les graviers d'alluvion près de Chertsey.

14.15–17.15

No. (10B) Visite de la ville de Londres par le congrès.

La route pour ce tour comprendra Trafalgar Square, Piccadilly Circus, the West End, Buckingham Palace, Westminster Catholic Cathedral, Westminster Abbey, Whitehall, Fleet Street, St Paul's Cathedral, Tower of London, Embankment, Westminster.

Lundi, 19 août

10.00–13.00

Huitième Séance

5^{ème} Section technique: Poussée des terres sur les ouvrages et tunnels.

(Rapporteur: J. Kérisel.)

La poussée des terres sur murs de soutènement, excavations en contre-fiche, rideaux de batardeau, tubage de tunnels; pression de silo et trémie; recherches théoriques sur modèle et sur place de la poussée des terres et sa distribution; problèmes de construction.

10.30–18.00

No. (11A) Excursion pour les dames au château de Windsor.

La route pour Windsor passera par Staines et Egham. On déjeunera à Great Fosters, Egham, maison de l'époque tudor qui fut d'abord un rendez-vous de chasse à Anne Boleyn, seconde femme de Henri VIII. Le roi Jean, à Runnymede, signa en 1215, la 'Magna Carta', un des événements historiques les plus importants de l'histoire de l'Angleterre.

Le Bourg Royal de Windsor est situé à environ 34 kilomètres de Londres. Le château à une superficie de plus de 525 ares et à été demeure royal depuis près de 900 ans. On y verra une collection magnifique de peintures, porcelaines, mobilier, armures et tapisseries. La chapelle de St Georges, magnifique exemplaire d'architecture gothique perpendiculaire fut commencée en 1477, sous le règne d'Edouard IV. Dans le chœur, audessus des stalles en bois de chêne, on remarquera les étendards des Chevaliers de la Jarretière ordre qui fut fondé par Edouard III en 1349. On s'arrêtera pour le thé au 'Castle Hotel' à Windsor.

10.30–18.00

No. (11B) Excursion pour les dames aux Jardins de la Société Royale d'Horticulture à Wisley.

Les jardins de la société sont situés entre Cobham et Ripley dans le Surrey, à une distance de 32 kilomètres de Londres. De 1824 à 1870, ils se trouvaient à Chiswick, Londres. Au début, les jardins à Wisley n'avaient qu'une superficie de 25 hectares. De nos jours ils en recouvrent 80.

Wisley tout en étant un jardin de grande beauté est également de nos jours centre principal d'horticulture en Grande Bretagne où se pratiquent des recherches concernant l'horticulture et les

there, including research work in horticulture and the related sciences.

Lunch will be taken at the Talbot Hotel in Ripley, and tea in the Restaurant at Wisley.

9.45

(11C) Ladies' visit to the Victoria and Albert Museum.

The galleries of the Victoria and Albert Museum are chiefly concerned with applied art and interior decoration of all periods and styles.

The collections are grouped in eight departments: (1) Architecture and Sculpture, (2) Ceramics, (3) Engravings, Illustration and Design, (4) Library, (5) Metalwork, (6) Paintings, (7) Textiles, (8) Woodwork and an Indian Section.

The Victoria and Albert is one of the most interesting museums in London. The visitor should make a point of seeing the fine collection of water-colours by Cotman and numerous sketches and studies by Constable; two miniatures by Holbein, which are possibly the finest miniatures ever painted; Houdon's bust of Voltaire; a bust of Charles I by Le Sueur; and the famous bust of Charles II by Honore Pelle.

Tuesday, 20 August

10.00–13.00

(12A) Ladies' visit to the Royal Naval College, Greenwich.

The visit to this famous College will be by river steamer from Westminster. En route visitors will pass the Tower of London, Tower Bridge, etc., and the journey takes nearly an hour.

The Palace of Palcentia was begun in 1428 in the reign of Henry VI, and the original plans included a small castle on top of the hill, where the famous Greenwich Observatory now stands. Successive sovereigns have enlarged it and numerous architects, including Sir John Denham, John Webb, and Sir Christopher Wren, have been concerned in the construction of the present buildings.

In 1873 the Royal Naval College situated at Portsmouth was transferred to Greenwich.

The Painted Hall, which is world famous, was designed by Wren and completed in August 1703. The work of painting it was entrusted to Sir James Thornhill—the best known mural artist of his day. This occupied the years 1708 to 1727, during which time the Hall was closed. Since 1937 it has been the Dining Hall of the College, and has been the scene of many banquets.

The National Maritime Museum forms part of the buildings and contains a magnificent collection of maritime treasures.

The famous Tea Clipper 'Cutty Sark' can be seen in dry dock alongside the Naval College.

The return journey to London will be by coach.

9.00–12.30

(12B) Ladies' visit to Kew Gardens and Ham House.

The Royal Botanical Gardens at Kew cover an area of 288 acres. Although the main purpose of the Gardens is scientific, the rare plants and shrubs growing in beautiful surroundings attract crowds of visitors. The Pagoda, an early example of Chinese-inspired architecture, was built in 1761. The Dutch house, built in 1631, contains many royal mementos.

The Original Ham House was built in 1610 as a modest country residence by Sir Thomas Vavasour. In the middle of the century it was bequeathed to Elizabeth, Countess of Dysart, by her father. After her marriage to the Duke of Lauderdale, Charles II's minister, she enlarged the house and redecorated it

sciences qui s'y rapportent. On déjeunera à l'hôtel Talbot à Ripley, et on prendra le thé dans le restaurant à Wisley.

9.45

No. (11C) Visite pour les dames au Musée Victoria et Albert.

Les galleries du musée Victoria et Albert renferment surtout des collections relatives aux arts appliqués et aux décorations intérieures en tous genres et de toutes époques. On les a groupés huit sections: (1) architecture et sculpture, (2) céramiques, (3) gravures, illustrations et dessins, (4) bibliothèque, (5) métaux, (6) peintures, (7) textiles, (8) mobilier et travaux sur bois auxquelles ont été ajoutés une section indienne.

Le musée Victoria et Albert est un des plus intéressants de Londres. On signale aux visiteurs la belle collection d'aquarelles de Cotman et de nombreux dessins et études de Constable; deux miniatures de Holbein, qui sont probablement les plus belles qui aient jamais été peintes; le buste de Voltaire par Houdon; un, de Charles I par Le Sueur et le fameux buste de Charles II par Honoré Pelle.

Mardi, 20 août

10.00–13.00

No. (12A) Visite pour les dames au Collège Royal Naval de Greenwich.

La visite à ce fameux collège se fera en bateau de Westminster, ce qui prend environ 1 heure. En cours de route, l'on remarquera la Tour de Londres, le Tower Bridge, etc.

Le Palais de Palcentia fut commencé en 1428 sous le règne de Henri VI et les premiers dessins indiquent un petit château sur la hauteur, où maintenant se trouve le fameux Observatoire de Greenwich. Différents souverains l'ont fait agrandir et plusieurs architectes ont été responsables pour les édifices que nous voyons aujourd'hui.

En 1873, le collège naval royal à Portsmouth fut transféré à Greenwich.

Le 'Painted Hall' connu dans le monde entier, est l'œuvre de Wren et fut terminé en 1703. Les peintures furent l'œuvre de Sir James Thornhill qui était, à cette époque, l'artiste le plus recherché pour peintures murales. Le Hall fut fermé en 1708 pour permettre à l'artiste d'achever les peintures et il ne fut ré-ouvert qu'en 1727.

Depuis 1937, il est devenu le 'Dining Hall' du Collège. C'est ici que les grands banquets en l'honneur de personnages importants se célèbrent.

Le musée maritime national est situé dans l'un des édifices et l'on y trouve une belle collection d'articles concernant la marine.

Le fameux voilier 'Cutty Sark' est armarré dans une calle sèche près du collège.

Le retour se fera par autocar.

9.00–12.30

No. (12B) Visite pour les dames aux Jardins Botaniques de Kew et à Ham House.

Les jardins botaniques de Kew ont une superficie de 116 hectares environ. On y trouvera de beaux spécimens de plantes et arbustes rares dans un site des plus pittoresque. Kew est sans aucun doute, en premier lieu, un centre de recherches scientifiques comme Wisley. La Pagode, exemplaire d'architecture chinoise, fut construite en 1761. La Maison hollandaise, construite en 1631, contient des souvenirs de diverses personnes royales.

La première Ham House fut construite en 1610, comme maison de campagne pour Sir Thomas Vavasour. Au milieu du XVII^{ème} siècle, elle fut laissée, par son père, à Elizabeth,

(1673–75) in the flamboyant baroque style of the period. Time has effaced some of the splendour that made Ham a synonym for prodigality in its day, but through the preservation of much of the original furniture and interior ornament the house has retained its character.

10.00–13.00

Session 9

Division 6: Earth dams, slopes, and open excavations.

(General Reporter: F. C. Walker.)

The stability of earth banks during construction and in use; earth dams and levees and associated foundation and seepage problems; compaction, pore-water pressure, draw-down; the stability of natural slopes, cuttings and open excavations not strutted or retained.

13.00–17.00

Technical Visits.

Details of individual visits are given below:

15.00

(13A) Imperial College, University of London, Kensington.

The laboratory contains five triaxial machines fully equipped to measure pore-pressure volume changes and five oedometers, including one in which pressures of 100 tons/sq. ft. can be applied, as well as the usual equipment. The laboratory is used in teaching, research, and for a small amount of special testing in connection with consulting work.

14.30

(13B) Soil Mechanics Ltd., Chelsea.

This laboratory, founded by John Mowlem & Co. Ltd., in 1938, is the oldest commercial soil mechanics laboratory in the United Kingdom.

In addition to soil testing, work is carried out in connection with geotechnical processes and specialized forms of civil engineering construction.

13.30

(13C) George Wimpey & Co. Ltd., Southall.

The soil mechanics laboratory is comprehensively equipped for all forms of testing. There is also a geological laboratory, an equipment depot for the maintenance of various types of boring and drilling equipment, apparatus for sampling and *in situ* testing, and grouting and well-pointing plant, etc. Concrete, asphalt, building materials, structural testing, and metallurgical testing facilities may also be seen.

13.45

(13D) Building Research Station, Garston.

The Building Research Station of the British Government's Department of Scientific and Industrial Research is at Garston, near Watford, Hertfordshire, and conducts research into all aspects of building and the allied branches of civil engineering. The Soil Mechanics Laboratory at the Station was the first to be formed in Great Britain in 1933.

14.00

(13E) Road Research Laboratory, Harmondsworth.

The soil mechanics section of the Road Research Laboratory undertakes basic researches into problems connected with the

Comtesse de Dysart qui, après son mariage avec le Duc de Lauderdale, ministre de Charles II, fit agrandir la maison dans le style flamboyant et baroque de l'époque (1673–75). Le passage des années a effacé la splendeur qui était devenue, à l'époque, synonyme avec Ham mais une grande partie du mobilier et des décorations intérieures a été préservée.

10.00–13.00

Neuvième Séance

6^{ème} Section technique: Barrages en terre, talus et tranchées ouvertes.

(Rapporteur: F. C. Walker.)

La stabilité de digues en terre pendant la construction et après; barrages en terre et levées et fondations associées et problèmes de filtration; compactage, pression de l'eau interstitielle, affaissement; la stabilité des talus naturels, tailles et excavations ouvertes sans étai ou soutien.

13.00–17.00

Visites des laboratoires, etc.

Les détails sur chaque visite sont indiqués ci-dessous:

15.00

(13A) Imperial College, University of London, Kensington.

Le laboratoire contient cinq machines triaxiales permettant la mesure des changements de volume de la pression interstitielle et cinq oedomètres, dont un avec lequel on peut exercer une pression de 1100 t/m² et l'équipement habituel d'un laboratoire. Le laboratoire est utilisé pour l'instruction, les recherches ainsi que quelques expériences spéciales pour le travail d'ingénieur conseil.

14.30

(13B) Soil Mechanics Ltd., Chelsea.

Ce laboratoire fondé par John Mowlem, Société anonyme, en 1938, est le plus ancien laboratoire de mécanique des sols dans le commerce en Grande Bretagne.

En plus d'études sur les sols, on y travaille également sur les procédés géotechniques et sur des problèmes ayant spécialement rapport aux travaux de construction dans le génie civil.

13.30

(13C) George Wimpey & Co. Ltd., Southall.

Le laboratoire de mécanique des sols est très bien équipé pour faire toutes sortes d'expériences. Il y a également un laboratoire géologique et tout l'équipement divers pour des sondages et forages, les appareils pour prélever des échantillons et faire des essais *in situ*, les installations pour injection et puits filtrant, etc. On y verra également du ciment, des matériaux de construction et des installations pour essais de structure et métallurgiques.

13.45

(13D) Building Research Station, Garston.

Le 'Building Research Station' qui fait partie du 'Department of Scientific and Industrial Research' du gouvernement est situé à Garston, près de Watford, Hertfordshire, s'occupe de recherches dans les différents aspects de construction du génie civil. Le laboratoire de la Mécanique des Sols à Garston fut le premier en Grande Bretagne et date de 1933.

14.00

(13E) Road Research Laboratory, Harmondsworth.

La section du 'Road Research Laboratory' qui s'occupe de la mécanique des sols fait des recherches sur les différents

design and construction of foundations for roads and airfields. The researches fall into four main groups: (a) moisture movements in soils and subsoil drainage, (b) pavement design, (c) earth works, including studies of soil compaction, and (d) soil stabilization.

14.15

(13F) British Railways, Paddington.

The laboratory acts as a centre for the District Engineers and the technical sections of the Civil Engineer's Department in finding the solution to the problems relating to soil behaviour. Approximately 50 are employed on this and on the development of special machines for railway civil engineering investigations and new processes.

13.30

(13G) Metropolitan Water Board Works.

Members will visit the Walton south reservoir and the Thames-to-Lee tunnel main, which are under construction.

13.00

(13H) Port of London Authority.

During the afternoon members will be the guests of the Port of London Authority who will arrange a 10 mile (16 km) cruise on the River Thames in the Authority's steam yacht 'St. Katherine', and a tour by water of part of the Royal Docks system.

14.30-16.30

Meeting of the Executive Committee in the Council Room of the Institution of Civil Engineers.

Wednesday, 21 August

10.00-13.00

Closing Session

Resolutions and Report of the Executive Committee, including officers appointed for the next 4 years and place of the fifth Conference. Followed by an Address by the President of the Society.

19.30 for 20.00

(14) Conference Banquet at Grosvenor House, Park Lane.

Thursday, 22 August

(15A) and (15B) Tours of Scotland.

(15F) Tour of East Anglia.

Details of these tours will be supplied to the members and ladies participating in them.

problèmes qui se présentent dans la construction de fondations pour routes et pistes d'envol. On peut grouper les recherches en quatre groupes principaux: (a) mouvement de l'eau dans les sols et le drainage des sous-sols, (b) construction de revêtement, (c) terrassements, études de compactage des sols et (d) stabilisation du sol.

14.15

(13F) British Railways, Paddington.

Ce laboratoire s'occupe de toutes les questions et problèmes de mécanique des sols pour les chemins de fer nationaux. Le personnel de cinquante employés se charge de ces études ainsi que du développement de machines utilisées dans les recherches du génie civil dans les chemins de fer et des nouveaux procédés.

13.30

(13G) Entreprises du Metropolitan Water Board.

Les congressistes visiteront le réservoir de Walton South et le tunnel pour l'aqueduc entre la Tamise et le fleuve 'Lee'. Tous deux sont en construction.

13.00

(13H) Port of London Authority.

Pendant l'après-midi, les congressistes seront reçus par le 'Port of London Authority' qui ont organisé une croisière de 16 km (10 miles) sur la Tamise dans le yacht à vapeur 'St Katherine' ainsi qu'une visite en bateau des 'Royal Docks'.

14.30-16.30

Séance du Comité Exécutif dans la 'Council Room' de l'Institution of Civil Engineers.

Mercredi, 21 août

10.00-13.00

Séance de Clôture du Congrès

Résolutions et rapport du Comité Exécutif; noms des officiers appointés pour les quatre années suivantes et siège du cinquième congrès.

Allocution par le Président de la Société.

19.30 pour 20.00

(14) Banquet du Congrès à Grosvenor House, Park Lane.

Jeudi, 22 août

Nos. (15A) et (15B) Tours d'Ecosse.

No. (15F) Tour en East Anglia.

Les détails de ces tours seront donnés aux membres et aux dames y prenant part.

CONFERENCE TOURS

A programme of alternative tours was planned for the days immediately following the conference in London, but the number of members who wished to take part was very much smaller than was anticipated. Three tours were finally arranged, two in Scotland and one in East Anglia.

Tours in Scotland

On 22 August 110 members and ladies travelled by special train from London to Glasgow, which was the starting-off point for the two Scottish tours 15A and 15B.

On the evening of their arrival in Glasgow the party was received in the City Chambers by the Lord Provost and Magistrates of the City.

Glasgow is the commercial centre of Scotland situated on the River Clyde, and of world renown for its outstanding ship-building and engineering activities. The City possesses many fine buildings: the Cathedral is regarded as a perfect example of pre-Reformation architecture, and mention might be made of the City Chambers, the University overlooking Kelvingrove Park, and closely adjacent to it the Art Galleries and Museum which house many outstanding works of art.

Tour 15A

On the first day following their arrival in Glasgow, the party visited Edinburgh, the Scottish capital, renowned for its beauty and historical associations.

On route to Edinburgh the men visited the Oil Refinery at Grangemouth—a recent development on the River Forth where difficult foundation problems had to be overcome in construction. The route from Grangemouth to Edinburgh passed the Forth Bridge which, 1½ miles long, is an outstanding example of a cantilever bridge. It took 7 years to build and was opened in 1890.

The ladies went direct from Glasgow to Edinburgh and spent the day there shopping and sight-seeing. By the courtesy of the Over-Seas League, Over-Seas House in Princes Street was open to the ladies as a centre for the day and they had facilities there for resting and lunching informally. Visits were made in the afternoon to Edinburgh Castle, the Scottish Crafts Centre at Aitcheson House, the Palace at Holyrood House, and Queen's Park. The ladies were joined by the men for dinner at the North British Hotel and in the evening the party attended the Military Tattoo which was staged on the forecourt of the Castle. The Tattoo was part of the programme of the annual International Festival of Music and Drama which took place in Edinburgh concurrently with the Conference Tours. After the Tattoo the party re-assembled in the North British Hotel and thereafter returned to Glasgow.

On the second day the party left Glasgow on a circular tour,

LES TOURS ORGANISÉS À L'OCCASION DE LA CONFÉRENCE

Le programme comprenait un choix de tours projetés pour les jours immédiatement après la conférence de Londres, mais, comme le nombre des membres désirant prendre part à ces tours était beaucoup plus petit qu'on ne s'y était attendu, on s'est finalement arrêté à trois tours seulement, deux en Écosse et un en East Anglia.

Tours en Écosse

Cent et dix délégués et dames ont fait le voyage de Londres à Glasgow par train spécial, le 22 août. La ville de Glasgow avait été choisie comme point de départ pour les deux tours d'Écosse, 15A et 15B.

Dans la soirée du jour de leur arrivée à Glasgow, les délégués se rendirent à une réception officielle donnée par le 'Lord Provost' et les magistrats de la ville dans les 'City Chambers'.

La ville de Glasgow est la centre commerciale de l'Écosse, située sur le Clyde renommée dans le monde entier pour ses constructions navales et ses industries. Elle possède plusieurs beaux monuments. La cathédrale est un parfait exemple de l'architecture d'avant la Réformation, et les City Chambers, l'Université donnant sur Kelvingrove Park, ainsi que la Galerie de Peintures et le Musée qui contiennent plusieurs œuvres de grand mérite artistique, sont tous des bâtiments dignes de mention.

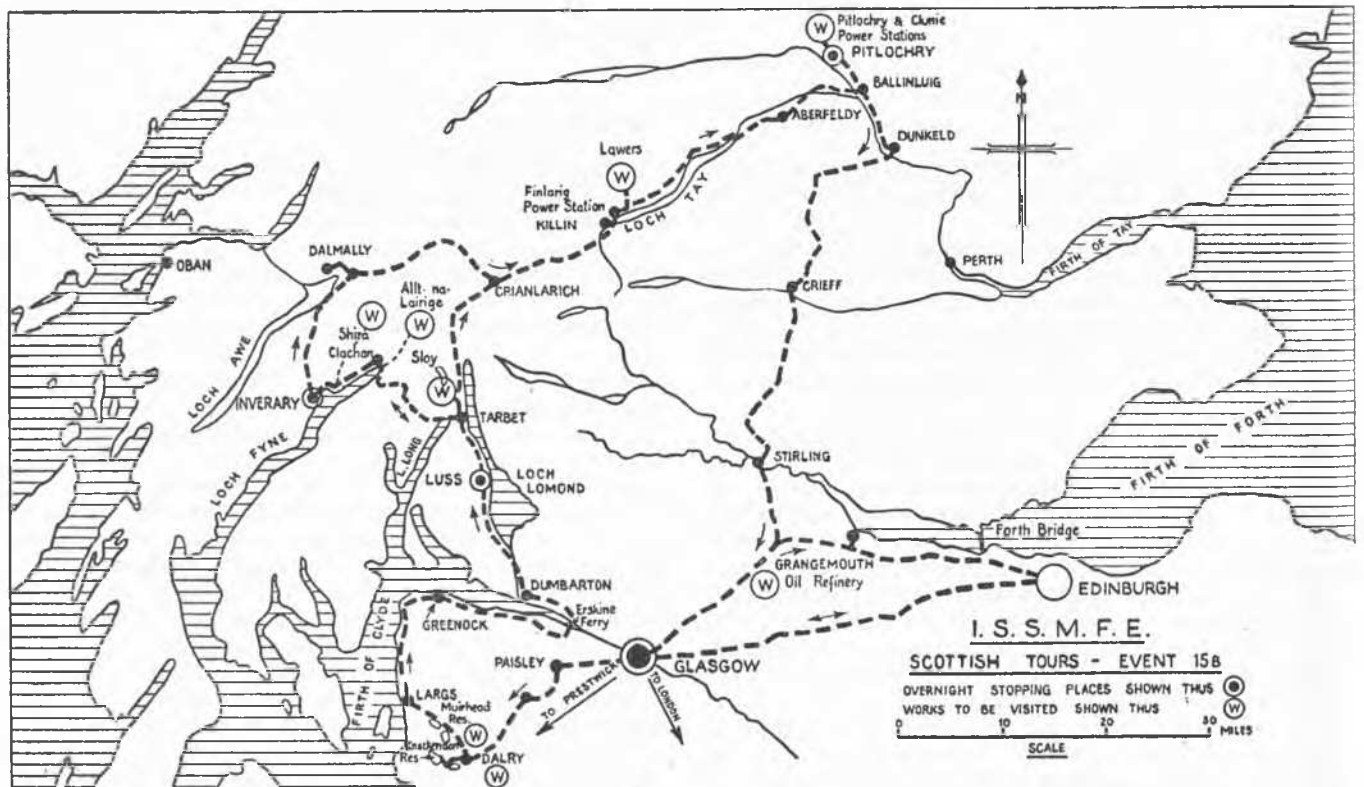
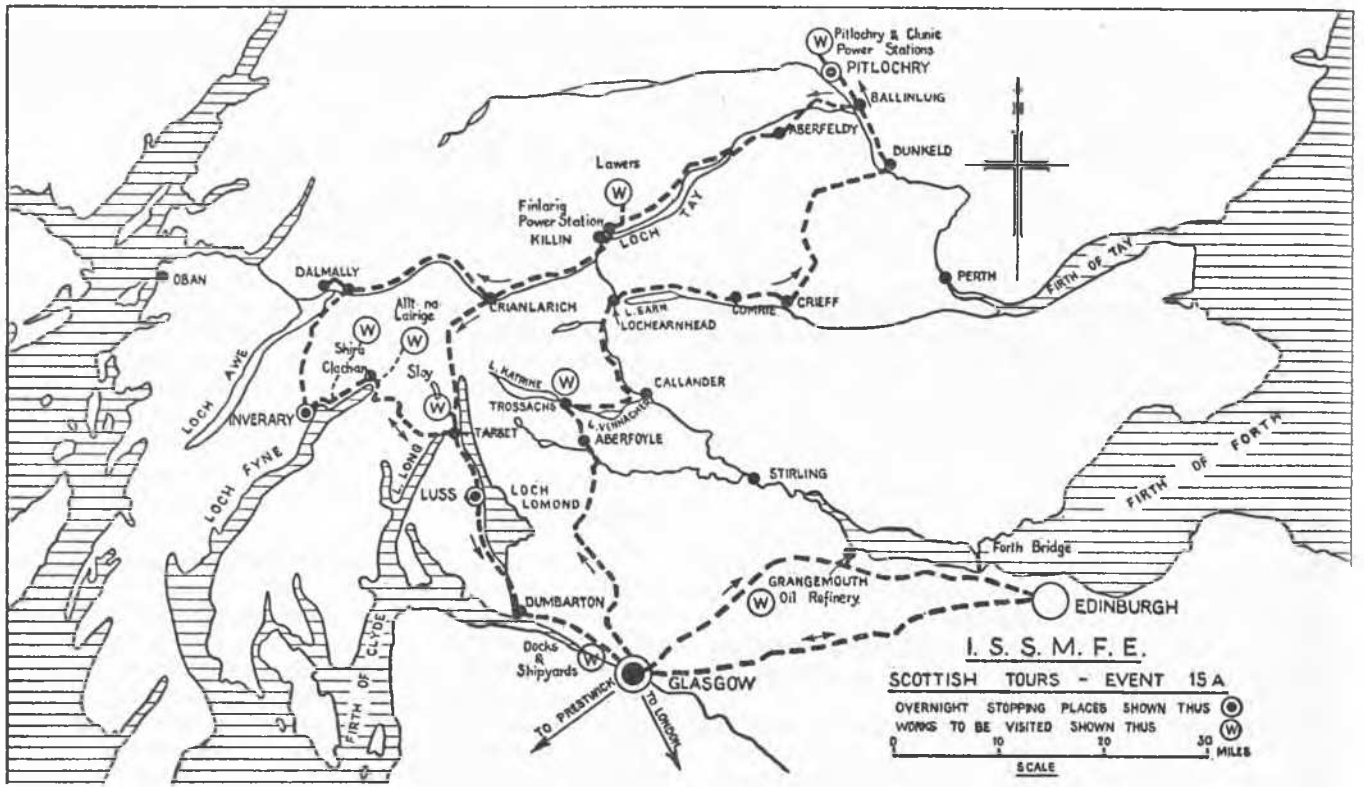
Tour 15A

Le jour après leur arrivée à Glasgow, les visiteurs se sont rendus à Edimbourg, la capitale de l'Écosse, renommée pour sa beauté et la richesse de son histoire.

En cours de route, les messieurs visitèrent la raffinerie de pétrole à Grangemouth, dont la construction récente sur la rive du Forth avait posé d'intéressants problèmes relatifs aux fondations. La route de Grangemouth à Edimbourg passe sur le grand pont du Forth qui est long de 2.4 km et représente un bel exemple de ponts en porte-à-faux. Il fallut sept ans pour le construire et il fut terminé en 1890.

Les dames se rendirent directement à Edimbourg et passèrent la journée à visiter la ville et les magasins. La 'Over-Seas League' leur avait ouvert ses portes et elles purent se servir de ce cercle comme centre social et pour déjeuner dans l'intimité. Dans l'après-midi, il y eût des visites au Château qui domine la ville, au Centre des Artisans de l'Écosse à Aitcheson House, au Palais de Holyrood et au Parc. Les messieurs rejoignirent les dames pour le dîner au 'North British Hotel' et plus tard, les visiteurs purent admirer le défilé militaire dans la cour du Château. Ce défilé faisait partie du programme du Festival International de la Musique et du Théâtre qui avait lieu en ce moment dans la ville. Après le défilé, on se réunit à nouveau au 'North British Hotel' pour le retour à Glasgow.

Le second jour, les délégués quittèrent Glasgow pour un tour vers le nord, commençant par les Trossachs, une belle région très boisée entre les lacs Loch Achray et Loch Katrine et



travelling northwards to the Trossachs, a beautifully wooded district lying between Loch Achray and Loch Katrine and dominated by Ben Venue. Loch Katrine is the principal source of Glasgow's water supply and tunnel works under construction to augment the supply were visited. The route from the Trossachs followed eastwards along the shores of Loch Venacher and northwards via Lochearnhead and Loch Earn to Crieff, a noted Highland health resort where lunch was served. In the afternoon the route continued northwards through the Sma' Glen via Dunkeld to Pitlochry where the Pitlochry and Clunie Power Stations of the North of Scotland Hydro-Electric Board were visited. At the former there was a noted fish ladder with chambers where the passage of fish could be observed.

An overnight stay was made at Pitlochry which is a typical Scottish Highland town and popular health resort. In the evening the party attended the Pitlochry Festival Theatre (Scotland's Theatre in the Hills). The play being produced on the occasion was *The Playboy of the Western World* by John M. Synge.

On the next day of the tour, which was a Sunday, the party left Pitlochry before midday and travelled to Aberfeldy where lunch was served. In the afternoon the route followed the north side of Loch Tay, and visits were made to the North of Scotland Hydro-Electric Board's works at Lawers and Finlarig. On reaching Crianlarich the party divided—one portion travelling via the north end of Loch Awe to Inveraray and the other southwards via Loch Lomond to Luss, these being the centres for the next two days. Inveraray, situated on Loch Fyne, is the Headquarters of the Clan Campbell and the Castle, which is the seat of the Duke of Argyll, head of the Clan, was visited by the ladies of both parties. Luss, an attractive village on the shores of Loch Lomond, is in the territory of the Colquhouns.

On Monday 26 August visits were made to the Shira, All-na-Lairige and Loch Sloy hydro-electric schemes and a picnic lunch was served adjacent to Clachan Underground Power Station which lies at the head of Loch Fyne.

On the final day of the circular tour the parties returned in the morning from Inveraray and Luss to Glasgow. In the afternoon the men, by courtesy of the Clyde Trust, sailed on the Tug 'Clyde' around the Clyde docks and shipyards. They disembarked at a convenient point to visit the Tunnel under the Clyde recently constructed to accommodate some of Glasgow Corporation's water mains. The party entered the Tunnel from the south side and passed through it to Clydeholm shipyard on the north bank of the river where extensive shipyard construction works were in progress.

The ladies spent the afternoon in Glasgow and visits were made to the Cathedral, the University and the Art Galleries. In the evening the party were the guests of the Over-Seas League at a reception.

Tour 15B

This event also included a circular tour which commenced on the day following arrival in Glasgow.

The party travelled westwards from Glasgow into Renfrewshire and North Ayrshire, visiting in the morning the Knockendon Reservoir of the Irvine and District Water Board and the Muirhead Reservoir of the Corporation of Paisley. Lunch was served at Largs, a noted Clyde coast resort. In the afternoon the route followed the Clyde coast, crossed the river at Erskine Ferry about 7 miles downstream from Glasgow and thereafter continued northwards to Luss and Inveraray, which were the centres for the next two days.

The programme from these centres was the same as has been described for Tour 15A, but on their journey northwards to Pitlochry the party travelled by way of Crianlarich and Loch Tay, making the circular tour in the reverse direction.

dominée par la montagne Ben Venue. Loch Katrine est le principal réservoir d'eau pour la ville de Glasgow et les délégués purent visiter un tunnel, en cours de construction, destiné à augmenter la quantité d'eau pour la ville. La route des Trossachs se poursuit vers d'est, le long des rives de Loch Venacher et vers le nord, via Lochearnhead et Loch Earn, jusqu'à Crieff, un lieu de villégiature bien connu où les voyageurs prirent le déjeuner. Dans l'après-midi, ils continuèrent leur route vers le nord, à travers la vallée le Sma' Glen, via Dunkeld jusqu'à Pitlochry où ils visitèrent les centrales électriques du 'North of Scotland Hydro-Electric Board'. La première possède une 'échelle' pour les poissons très renommée, pourvue de chambres d'observation où on peut observer le passage des poissons remontant le courant.

Les délégués passèrent la nuit à Pitlochry, une ville typique de la haute Écosse et un lieu de villégiature. Dans la soirée, ils se rendirent au Festival Théâtre pour voir une pièce de John M. Synge, *Le baladin du Monde Occidental*.

Le jour suivant était un Dimanche; les délégués quittèrent Pitlochry tard dans la matinée et arrivèrent à Aberfeldy à temps pour le déjeuner. La route suivie l'après-midi passe sur la rive du nord de Loch Tay et les délégués visitèrent les installations hydroélectriques de Lawers et Finlarig. A l'arrivée à Crianlarich, le groupe se divisa en deux parties. Un des groupes continua vers le nord de Loch Awe jusqu'à Inveraray, l'autre se dirigea vers le sud, via Loch Lomond jusqu'à Luss, ces deux villes furent le centre pour les deux jours suivants. Inveraray est située sur la rive de Loch Fyne. La ville est le quartier général du clan Campbell et son château est la résidence du Chef du Clan, le duc d'Argyle. Les dames visitèrent le Château. Le village de Luss est très pittoresque et se trouve dans le territoire des Colquhouns.

Le Lundi 26 août on visita les installations hydro-électriques de Shira, All-na-Lairige et Loch Sloy. Un pique-nique fut servi dans le voisinage de la centrale électrique souterraine de Clachan, sur Loch Fyne.

Le dernier jour, les deux groupes retournèrent à Glasgow. Dans l'après-midi les messieurs visitèrent les Docks et les Chantiers Navals de la Clyde dans une vedette appartenant au Clyde Trust. Ils débarquèrent pour visiter le tunnel construit récemment sous la Clyde pour recevoir les conduites des services des eaux de Glasgow. Les délégués entrèrent dans le tunnel par l'entrée sud pour ressortir dans un Chantier Naval sur la rive du nord, où ils purent inspecter les travaux en cours.

Les dames passèrent l'après-midi à Glasgow et visitèrent la Cathédrale, l'Université et les Musées. Dans la soirée, les délégués assistèrent à une réception offerte par la 'Over-Seas League'.

Tour 15B

Ce tour comprenait également un voyage circulaire commençant dès le lendemain de l'arrivée à Glasgow.

Le voyage se fit vers l'ouest, dans le Renfrewshire et North Ayrshire et les délégués eurent l'occasion de visiter les Réservoirs de Knockendon et de Muirhead. Le déjeuner fut servi à Largs, un lieu de villégiature bien connu sur la Clyde. Dans l'après-midi, le voyage continua le long de la Clyde. On franchit la fleuve à Erskine Ferry, 11.3 km environ en aval de Glasgow et on continua vers le nord vers Luss et Inveraray qui étaient les centres pour les deux jours suivants. Après cela, le programme était le même que pour le Tour 15A, mais le voyage vers le nord jusqu'à Pitlochry se fit par Crianlarich et Loch Tay, c'est à dire dans la direction inverse.

Les voyageurs passèrent la nuit à Pitlochry et la matinée du dernier jour se passa en visites aux installations électriques de

The party stayed overnight at Pitlochry, and on the last day of the circular tour the morning was spent visiting the Pitlochry and Clunie Power Stations (referred to above) and after lunch the party returned to Glasgow, travelling via Crieff and Stirling, a town famous in Scottish history. As the town was approached, the monument to Sir William Wallace, Scotland's National Hero, and the fifteenth century castle came prominently into view.

The final day of the tour was occupied with a visit to Grangemouth and Edinburgh as described for Tour 15A. After attending the Military Tattoo the Party returned to Glasgow at a late hour.

The combined party of both Tours 15A and 15B left Glasgow on the morning of Wednesday 28 August for London.

SUMMARY

Tour 15A

Thursday, 22 August

10.00

Leave London (Euston) by train, Lunch served en route.

17.40

Arrive Glasgow (Central). Dinner in Hotels.

20.00–24.00

Reception in the City Chambers by the Lord Provost and Magistrates of the City of Glasgow (Evening Dress). Overnight Glasgow.

Friday, 23 August

Men:

Glasgow–Grangemouth–Edinburgh–Glasgow (95 miles).

9.00

Leave Glasgow by coach for Grangemouth and visit the Oil Refinery. The Party will be received by Officials of B.P. Refinery (Grangemouth) Ltd., and will be entertained to Lunch by the Company.

15.00–16.00

Leave Grangemouth and travel, passing Forth Bridge, to Edinburgh.

18.00

Join Ladies for Dinner at North British Hotel.

Ladies:

9.00

Leave Glasgow by coach for Edinburgh. Shopping before an informal Lunch at Over-Seas House, 100 Princes Street, as guests of the Over-Seas League.

14.15–17.30

Leave Over-Seas House, visiting Edinburgh Castle, Royal Mile, Aitcheson House (Scottish Crafts Centre), Palace of Holyrood House and Queen's Park, and then to North British Hotel.

18.00

Join Men for Dinner.

Whole party:

20.15

Attend Festival Tattoo.

22.00–22.30

Return to North British Hotel for light refreshments. Leave Edinburgh for Glasgow, and stay overnight.

Pitlochry et Clunie. Après le déjeuner les délégués retournèrent à Glasgow via Crieff et Stirling, ville historique importante dans l'histoire de l'Écosse, dominée par son Château du XV^{ème} siècle et le monument de Sir William Wallace, héros national de l'Écosse.

Le dernier jour, on visita Grangemouth et Edimbourg. Le programme de cette visite est le même que pour le Tour 15A. Après avoir vu le défilé militaire, les délégués retournèrent à Glasgow tard dans la nuit.

Les voyageurs ayant pris part aux deux Tours 15A et 15B firent ensemble le voyage du retour à Londres, quittant Glasgow dans la matinée du Mercredi 28 août.

Saturday, 24 August

Glasgow–Trossachs–Pitlochry (120 miles).

9.00–11.45

Leave Glasgow for Loch Katrine and visit Tunnel Outlet. Morning Coffee as guests of Glasgow Corporation.

13.20–15.50

Arrive at Crieff for Lunch; then travel via Sma' Glen and Dunkeld to Pitlochry. Visit Pitlochry and Clunie Power Stations.

18.30

Dinner in Hotels—Pitlochry.

20.00

Festival Theatre. Overnight Pitlochry.

Sunday, 25 August

Pitlochry–Inveraray (85 miles).

Pitlochry–Luss (77 miles).

11.30–13.45

Leave Pitlochry for Aberfeldy: Lunch at Moness House Hotel.

14.45–17.15

Lawers Dam, pass Party 15B, to Finlarig Power Station. Afternoon Tea at Finlarig Power Station as guests of N. of S.H.E. Board. On arrival at Crianlarich the party divides.

18.15–18.30

Arrive Colquhoun Arms Hotel, Luss, and Inveraray Hotels. Dinner in Hotels. Overnight Luss and Inveraray.

Monday, 26 August

Inveraray Party

Men—Day's Tour (90 miles).

9.00–11.30

Leave Inveraray for Shira Camp (Inveraray). Visit Shira Lower and Main Dams. Morning Coffee at Shira Camp as guests of Contractors.

11.30–14.15

Leave Shira Camp for Lairige Road end. Visit Allt-na-Lairige Dam, and then to Clachan. Picnic Lunch at Clachan Power Station.

14.15–18.15

Leave Clachan for visit to Loch Sloy Power Station and Sloy Dam. Afternoon Tea at Power Station as guests of N. of S.H.E. Board. Leave Sloy and travel via Arrochar to Inveraray Hotels.

Ladies—Day's Tour (66 miles).

Forenoon in Inveraray. Visit Inveraray Castle.

12.45–13.15

Leave Inveraray. Arrive Clachan and join Men for Picnic Lunch.

[Afternoon Programme same as for Men.]

Whole party:

Overnight Inveraray Hotels.

Luss Party:

9.30–12.30

Leave Luss for visit to Loch Sloy Power Station, and Sloy Dam, then to Clachan. Picnic Lunch at Clachan Power Station.

Men—Day's Tour (108 miles).

13.15–19.00

Leave Clachan for visit to Allt-na-Lairige Dam, then to Clachan Road end and Shira Camp. Visit Shira Lower and Main Dams. Afternoon Tea at Shira Camp as guests of Contractors. Leave Shira Camp for Luss.

Ladies—Day's Tour (84 miles).

13.30–18.00

Leave Clachan for Inveraray, visiting Inveraray Castle. Afternoon Tea at Inveraray and then to Luss.

Whole party:

Overnight Luss.

Tuesday, 27 August

Inveraray–Glasgow (58 miles).

Luss–Glasgow (26 miles).

Inveraray Party:

9.00–12.00

Leave Inveraray for Luss, and join Luss Party; then to Glasgow. Lunch in Hotels.

Men:

14.10–18.00

Leave Hotels for Bridge Wharf: embark on Tug 'Clyde' for cruise around Clyde Docks as guests of Clyde Navigation Trust. Disembark at Riverside Quay for visit to Clyde Tunnel (Glasgow Corporation Water Department) and Shipyard Construction Works. Leave Shipyard for Hotels.

Ladies:

Afternoon

Free in Glasgow or visits to Glasgow University, Art Galleries and Glasgow Cathedral.

Whole party:

Dinner in Hotels.

20.00

Farewell Reception as guests of Over-Seas League. Highland Dancing, Music, and Light Refreshments (Dress—Informal). Overnight Glasgow.

Wednesday, 28 August

Leave Glasgow (Central) 9.30 (approx.) and arrive London (Euston) 17.00.

Tour 15B

Thursday, 22 August

10.00

Leave London (Euston) by train, Lunch served en route.

17.40

Arrive Glasgow (Central). Dinner in Hotels.

20.00–24.00

Reception in the City Chambers by the Lord Provost and Magistrates of the City of Glasgow (Evening Dress). Overnight Glasgow.

Friday, 23 August

Glasgow–Largs–Erskine Ferry–Luss (97 Miles).

Glasgow–Largs–Erskine Ferry–Inveraray (130 miles).

9.00–10.30

Leave Glasgow for Knockendon Reservoir. Morning Coffee as guests of Irvine and District Water Board.

11.30–13.00

Leave Knockendon Reservoir for Muirhead Reservoir and Largs. Lunch at Largs as guests of the Corporation of Paisley.

14.45–17.15

Leave Largs for Erskine Ferry and Luss.

17.30

Inveraray Party leaves Luss.

Overnight Luss and Inveraray.

Saturday, 24 August

Luss Party:

9.30–12.30

Leave Luss for visit to Loch Sloy Power Station and Sloy Dam, then to Clachan. Picnic Lunch at Clachan Power Station.

Men—Day's Tour (108 miles).

13.15–19.00

Leave Clachan and visit Allt-na-Lairige Dam, then to Clachan Road end and Shira Camp, visiting Shira Lower and Main Dams. Afternoon Tea at Shira Camp as guests of Contractors. Leave Shira Camp for Luss.

Ladies—Day's Tour (84 miles).

Forenoon Programme same as for Men.

13.30–18.00

Leave Clachan for Inveraray and visit Inveraray Castle. Afternoon Tea at Inveraray. Leave Inveraray for Luss.

Whole party:

Overnight Luss.

Inveraray Party:

Men—Day's Tour (90 miles).

9.00–13.30

Leave Inveraray for Shira Camp and visit Shira Lower and Main Dams. Morning Coffee at Shira Camp as guests of

Contractors. Leave Shira Camp for Lairige Road end, visit Allt-na-Lairige Dam, and then to Clachan. Picnic Lunch at Clachan Power Station.

14.15–18.15

Leave Clachan for visit to Loch Sloy Power Station and Sloy Dam. Afternoon Tea at Sloy Power Station as guests of N. of S.H.E. Board. Leave Sloy for Inveraray Hotels.

Ladies—Day's Tour (60 miles).

Forenoon in Inveraray: visit to Inveraray Castle.

12.45

Leave Inveraray for Clachan and join Men for Picnic Lunch.

Afternoon

Programme same as for Men.

Whole party:

Overnight Inveraray Hotels.

Sunday, 25 August

Inveraray–Pitlochry (85 miles).

Luss–Pitlochry (77 miles).

10.45–12.00

Leave Inveraray and travel via Dalmally to Luss and Criarlach. Parties join.

12.30–15.40

Arrive Killin. Picnic Lunch. Afterwards to Finlarig and then foot of access road to road to Lawers Dam. Afternoon Tea at Lawers Dam as guests of Contractors.

16.30

Leave Lawers Dam for Pitlochry. Dinner in Hotels. Overnight Pitlochry.

Monday, 26 August

Pitlochry–Crieff–Glasgow (88 miles).

9.45–13.00

Leave Hotels. Visit Clunie and Pitlochry Power Stations. Morning Coffee at Clunie Power Station as guests of N. of S.H.E. Board. Lunch at Pitlochry.

East Anglian Tour

A party of 44 members and 10 ladies, representative of 16 different countries, took part in the East Anglian Tour which was centred on Cambridge from 22 to 25 August. They were accommodated in Emmanuel College and hotels. Emmanuel College was founded in 1584 by Sir Walter Mildmay, Chancellor of the Exchequer in the reign of Queen Elizabeth I: John Harvard was a student there about 1600. The Master and Fellows of the college had graciously placed all the college amenities at the disposal of the party which became the social centre for the tour. At the same time the University Engineering Laboratory, by the kind permission of Professor J. F. Baker, the Head of the Department of Engineering, became the focus for the technical discussions.

Upon arrival in Cambridge on Thursday, 22 August, the delegates attended a reception by Professor C. E. Tilley, Vice-Master of Emmanuel College (representing the Vice-Chancellor of Cambridge University), and Mrs. Tilley, in the Picture

14.45–17.00

Leave Pitlochry and travel via Dunkeld and Sma' Glen, to Crieff. Afternoon Tea.

17.00–19.00

Leave Crieff for Glasgow. Dinner in Hotels. Stay overnight.

Tuesday, 27 August

Men:

Glasgow–Grangemouth–Edinburgh–Glasgow (95 miles).

9.00

Leave Glasgow by coach for Grangemouth and visit the Oil Refinery. The Party will be received by Officials of B.P. Refinery (Grangemouth) Ltd., and will be entertained to Lunch by the Company.

15.00–16.00

Leave Grangemouth and travel, passing Forth Bridge, to Edinburgh.

18.00

Join Ladies for Dinner at North British Hotel.

Ladies:

9.00

Leave Glasgow by coach for Edinburgh Shopping before an informal Lunch at Over-Seas House, 100 Princes Street, as guests of Over-Seas League.

14.15–17.30

Leave Over-Seas House, visiting Edinburgh Castle, Royal Mile, Aitcheson House (Scottish Crafts Centre), Palace of Holyrood House and Queen's Park, and then to North British Hotel.

18.30

Join Men for Dinner.

Whole party:

21.00

Attend Festival Tattoo.

22.45–23.15

Return to North British Hotel for light refreshments. Leave Edinburgh for Glasgow, and stay overnight.

Wednesday, 28 August

Leave Glasgow (Central) 9.30 (approx.) and arrive London (Euston) 17.00.

Tour en East Anglia

Cinquante quatre délégués, parmi lesquels il y avait une dizaine de dames, et représentant seize pays différents, ont participé à l'excursion en East Anglia, du 22 au 25 août. Cette excursion avait pour centre la ville de Cambridge et les délégués ont été logés à Emmanuel Collège ou à l'hôtel. Emmanuel Collège fut fondé en 1584 par Sir Walter Mildmay, Chancelier de l'Echiquier au temps d'Elisabeth I. John Harvard y fut étudiant vers 1600. Les autorités du Collège avaient gracieusement mis à la disposition des délégués les facilités du collège qui devint le centre social de ce tour. Par la même occasion, le laboratoire du Génie Civil de l'Université servit de centre pour les discussions techniques, grâce à l'amabilité de son chef, le professeur J. F. Baker.

Après leur arrivée à Cambridge, le Mardi 22 août, les délégués se sont rendus à une réception donnée par le professeur C. E. Tilley ('Vice-Master' d'Emmanuel Collège, représentant le Vice-Chancelier de l'Université) et Mrs. Tilley dans la

Gallery at Emmanuel College. The gallery, cloisters and chapel were designed by Sir Christopher Wren as a single building standing at the entrance of the beautiful college gardens.

After luncheon in the College Hall, Dr. R. F. Rattray gave an entertaining talk which introduced the delegates to the University and colleges of Cambridge. He pointed out that there were 21 surviving separate colleges within the University. Peterhouse was the first of these to be granted a Royal Charter in 1284. A further 15 colleges were founded before 1594 and the remaining 5 since 1800; 3 of the latter are for women. Each college is a self-governing body subject only to the Sovereign in Council for amendment of its statutes. The colleges together with the Faculties and Laboratories form the University. Almost all the main buildings of the University lie within a loop of the River Cam enclosing an area of a little over one square mile. The grounds of several neighbouring colleges extend on either side of the river for a distance of about one mile, forming the famous Cambridge 'Backs' which is one of the most beautiful and peaceful scenes in the world.

The party then toured some of the colleges in small groups which all met together for tea in the Hall of Queens' College which lies at one end of the 'Backs'.

Later in the evening a reception was held at the Engineering Laboratory. Owing to the sudden illness of Professor E. B. Moullin the guests were received by Mr. and Mrs. K. H. Roscoe. A buffet supper followed and during the evening small groups were conducted by members of the teaching staff round the extensive laboratories which cover all branches of engineering.

Visit to Great Ouse Flood Protection Scheme. On Friday, 23 August, the programme commenced with a lecture by Mr. A. C. Meigh, at the Engineering Laboratories, on the soil mechanics problems arising from the Great Ouse Flood Protection Scheme.

A brief outline was given by Mr. W. E. Doran of the Scheme itself, the importance of which can be assessed by the cost which is estimated to be about £8 million. The area to be protected from flooding by this scheme is approximately 1,300 square miles in extent and is known generically as 'the Fens'. Owing to the nature of the subsoil which consists largely of peat and buttery clay it is not possible to prevent floods by increasing the height of the existing embankments. The solution adopted has been to make an intercepting channel 29 miles long round the edge of the fen basin, to widen and deepen part of the existing river system for a distance of 19 miles, and to cut a new 'relief channel' 10½ miles long and 300 ft. wide to provide a new outlet to the sea. Mr. Meigh then outlined the geology of the area and described the types of soils encountered in the excavation of the relief channel which is now more than half completed. As an illustration of the extreme variability of the soil along a comparatively short length of channel, he showed a slide with a series of cross-sections showing the modifications which had to be made in the side slopes, the berm widths and dimensions of spoil bank so as to secure stability in the channel slopes.

Considerable use had been made of vane test methods particularly applicable to the silty clays encountered in the work. Tests and analyses were also required in connection with the design of the foundations of the tail sluice and the head sluice and also the various road bridges. It had originally been hoped that these bridges could have been built without piled foundations, but subsequent investigation showed that piles were necessary.

Galerie des Tableaux du collège. Cette galerie, ainsi que le cloître et la chapelle, sont l'œuvre du fameux architecte Sir Christopher Wren et forment un seul bâtiment à l'entrée des beaux jardins appartenant au collège.

Le déjeuner dans le réfectoire du collège fut suivi d'un petit discours par le docteur R. F. Rattray pour faire connaître aux délégués l'Université de Cambridge et ses collèges. L'orateur déclara qu'il y avait à présent vingt et un collèges autonomes faisant partie de l'Université. Le premier collège à recevoir une charte Royale fut Peterhouse, en 1284. Quinze autres collèges furent fondés avant 1595, et les cinq qui restent ont été fondés depuis 1800. Trois de ces collèges sont pour femmes. Chaque collège est entièrement autonome et responsable seulement au Souverain en Conseil pour toute modification aux Statuts. L'Université de Cambridge se compose de l'ensemble de ces collèges, des Facultés et des Laboratoires. Presque tous ses bâtiments principaux se situent dans une anse formée par la rivière Cam, ayant une superficie d'un peu plus de 2.50 km². Plusieurs collèges adjacents possèdent des parcs qui s'étendent sur plus d'un kilomètre de l'autre côté de la rivière, ce qui forme ce que l'on appelle 'the backs', un des paysages les plus beaux et les plus paisibles du monde.

Les délégués ont alors visité plusieurs collèges par petits groupes. Ces groupes se sont réunis plus tard pour prendre le thé dans le réfectoire de Queens' Collège.

Plus tard dans la soirée, ils se sont rendus à une réception au Laboratoire du Génie Civil. En l'absence du professeur E. B. Moullin qui était souffrant, les délégués ont été accueillis par Mr. et Mrs. K. H. Roscoe. La réception fut suivie d'un buffet et, au cours de la soirée, de petits groupes ont visité, sous la conduite de membres du personnel enseignant, le vaste ensemble des laboratoires qui convient toutes les différentes branches du Génie Civil.

Visite au Projet de Protection contre les crûes de la Grande Ouse (Great Ouse Flood Protection Scheme). Le Vendredi, 23 août, le programme a commencé par une conférence par Mr. A. C. Meigh sur les problèmes de Mécanique des Sols qui se présentent dans le Projet de Protection. Mr. W. E. Doran qui fait partie des personnel du Projet a donné un aperçu des travaux. L'importance du projet se traduit par le coût qu'on estime à huit millions de livres sterling. La zone à protéger a une superficie d'environ 3400 km², c'est le district qu'on appelle les 'fens'. A cause de la nature du sous-sol qui consiste principalement en tourbe et argilles molles, il n'est pas possible de combattre les inondations en augmentant la hauteur des remblais existants. On a adopté une solution qui comprend un chenal d'interception de 49 km de long sur le pourtour de la région des 'fens'; en même temps, le projet prévoit de creuser et d'élargir le réseau de rivières existant sur une longueur de 30.5 km et de creuser un nouveau chenal supplémentaire de 17.3 km de long, avec une largeur de 91.5 m afin d'obtenir un nouveau passage d'évacuation vers la mer. Mr. Meigh donna ensuite une idée de la géologie de la région et décrit les différents types de sol rencontrés en cours d'excavation du nouveau chenal qui est achevé pour plus de la moitié. Pour illustrer la grande variété des sols le long d'un tronçon de chenal relativement court, il fit voir un cliché montrant les modifications qu'il avait fallu apporter aux versants et largeurs des talus et aux dimensions des remblais pour assurer la sécurité des talus bordant le chenal.

On avait fait un usage étendu des essais à moulinet (vane test) qui se prêtait particulièrement bien aux essais sur les argilles limoneuses rencontrées au cours des travaux. Il fallut également faire des essais et des analyses pour le calcul des fondations des vannes amont et aval ainsi que pour les ponts. On avait d'abord espéré de pouvoir construire ces ponts sans devoir recourir aux fondations sur pieux, mais, après un examen

After the lecture the party travelled by coaches to King's Lynn, where there was a civic reception by the Mayor and Mayoress of King's Lynn. Much interest was aroused by the historic thirteenth century cup called the 'King John Cup' and also by the ceremonial swords and items of civic plate.

The reception was followed by lunch at the Globe Hotel, at which the Mayor and Mayoress were present, together with the Chairman and Vice-Chairman of the Great Ouse River Board.

An inspection of the Flood Protection Scheme followed, the first point to be visited being the tail sluice, where the new flood relief channel will enter the tidal river. This sluice provides seven openings each 30 ft. wide by 22 ft. high and will be fitted with automatic flap gates to provide for the automatic regulation of discharge from the channel with the rise and fall of the tide, and with lift gates fitted in front of the flap gates for control purposes.

The party then proceeded along the works en route for St. Germans Pumping Station and were able to see some of the reinforced concrete bridges which carry roads across the channel.

Tea was served at the Middle Level Pumping Station at St. Germans, and much interest was displayed in the station, which, in fact, is the largest pumping station for drainage purposes in England.

After tea, further sections of the work were seen on the return journey via Stowbridge and Downham Market to Cambridge.

In the evening after a formal dinner in the Hall of Emmanuel College the delegates attended a reception by the Mayor and Mayoress of Cambridge in the Guildhall. During the reception an excellent series of coloured slides was shown depicting the beauties of Cambridge and other places in East Anglia.

On Saturday, 24 August, the day began with a lecture at the Engineering Laboratory by Mr. K. H. Roscoe, Mr. A. N. Schofield and Mr. C. P. Wroth describing recent work in soil mechanics at Cambridge University. Mr. Roscoe began with a brief summary of the history and purpose of the Department of Engineering as a whole. He also outlined the alternative courses available to students and the methods of teaching engineering in the laboratories, and mentioned that the first course in this subject at Cambridge began in 1796. The courses in soil mechanics were described in greater detail and it was emphasized that no empirical aspect of the subject was taught in Cambridge which could be more easily learnt by experience elsewhere. Mr. Roscoe then outlined recent research work in soil mechanics. The work of A. A. Wells and B. B. Overy on several modes of tillage of soil was briefly described. This was followed by a summary of a theory of metal surfaced runways by M. E. Tickell.

After indicating the comprehensive nature of the series of investigations, which have been carried out by Professor J. F. Baker and his team, into the plastic collapse of steel frame structures, Mr. Roscoe described two single-storey portal frame tests in which the footings rested in real soil. The previous tests had all been carried out with the stanchion bases artificially fixed or pin-jointed to a rigid base. In the tests with real footings it was found that pier type foundations were more economical than pad type foundations when the footings were subjected to a relatively high eccentricity of loading provided the soil had a reasonably high bearing capacity. Slides were shown to indicate that although the pier foundations yielded considerably they were strong enough to withstand the full plastic moment at the stanchion bases and the frames had collapsed as if the stanchion bases had been rigidly fixed. Some individual pier tests were then described in which piers were subjected to overturning moments sufficient to cause soil failure.

Mr. A. N. Schofield described some model lateral pressure tests in which by careful control of the movements of the footing

plus approfondi, en décida qu'il serait nécessaire d'employer des pieux.

Après cette conférence, les délégués se rendirent à King's Lynn en autocar où ils furent reçus officiellement par le maire de la ville, accompagné de sa femme. Une coupe historique datant du XIII^{ème} siècle, la coupe de 'King John', les épées de cérémonie et des pièces d'argenterie appartenant au trésor de la ville furent examinés avec le plus grand intérêt par les visiteurs.

La réception officielle fut suivie du déjeuner au 'Globe Hotel' auquel assistèrent le maire et sa femme ainsi que le Président et Vice-Président du 'Great Ouse River Board'.

Les délégués purent ensuite inspecter les travaux en cours. Le tour d'inspection commença par une visite à la vanne d'aval où le nouveau chenal doit rejoindre la partie de la rivière sensible aux marées. Cette vanne a sept ouvertures de 9.5 m de large et 6.7 m de hauteur et sera pourvue de portes rabattantes, permettant de régler automatiquement le débit du chenal avec les mouvements de la marée, ainsi que des portes levantes, placés devant les portes rabattantes pour servir de moyen de contrôle.

Au cours du chemin vers la station de pompage de St. Germans, les visiteurs eurent l'occasion de voir un certain nombre des ponts en béton armé qui permettent aux routes existantes de franchir le nouveau chenal.

Le thé fut servi à la station de pompage à St. Germans et la station elle-même suscita beaucoup d'intérêt parmi les délégués car elle est la plus grande des installations de son genre, servant à l'évacuation des eaux, dans toute l'Angleterre.

Après le thé, on visita d'autres travaux sur le chemin du retour à Cambridge, via Stowbridge et Downham Market.

Dans la soirée, après un dîner officiel dans le réfectoire d'Emmanuel Collège, les délégués se rendirent à une réception offerte par le maire au 'Guildhall', au cours de laquelle on leur montra une excellente série de clichés montrant des vues de Cambridge et de la contrée environnante.

Le Samedi, 24 août, les activités commencèrent par une conférence donnée par Mr. K. H. Roscoe, Mr. A. N. Schofield et Mr. C. P. Wroth, dans le Laboratoire du Génie Civil, sur les derniers travaux de l'Université de Cambridge dans le domaine de la mécanique des sols. Mr. Roscoe commença par donner un bref aperçu sur l'histoire et les buts du Département. Il expliqua également les cours que pouvaient suivre les étudiants et les méthodes d'enseignement employées dans ces laboratoires. Le premier cours de Génie Civil fut institué à Cambridge en 1796. Cet exposé fut suivi d'un examen plus détaillé des cours de mécanique des sols et mit en évidence le fait qu'aucun des aspects empiriques du sujet, qui pouvaient être étudiés plus facilement ailleurs par expérience pratique ne sont enseignés à l'Université. Mr. Roscoe continua son discours par une description des recherches récentes dans le domaine de la mécanique des sols, entre autres les travaux de A. A. Wells et B. B. Overy sur plusieurs méthodes de culture de la terre. Ceci fut suivi d'un résumé d'une théorie pour terrains d'atterrissement à revêtement métallique, présenté par M. E. Tickell.

Après avoir indiqué l'étendue de l'étude de professeur Baker et de son équipe sur l'affaissement plastique des constructions à charpente métallique, Mr. Roscoe donna une brève description de deux essais sur des portiques dont les fondations reposaient vraiment dans le sol. Les essais précédents avaient été faits avec les bases des poteaux fixées artificiellement ou fixées sur une base rigide au moyen de goujons. Les essais avec fondations dans les vraies conditions pratiques ont montré qu'il était plus économique d'employer des fondations verticales plutôt qu'horizontales lorsque les fondations étaient sollicitées pas des charges plutôt excentriques, à condition que le sol ait une capacité portante relativement élevée. Une série de clichés démontra qu'en dépit d'une certaine déformation, les fondations

he had been able to determine the variations of the magnitude, direction and point of application of the resultant lateral force exerted by the soil as the footing movements increased.

Mr. Roscoe described a simple shear apparatus which had been designed to apply uniform strain throughout a soil sample and thereby make it possible to check the validity of Hvorslev's concepts of the shear failure of soils. He emphasized that the triaxial machine could only impose such uniform conditions in certain, but not all, types of test. Mr. C. P. Wroth then outlined how he had developed this apparatus to become a stress measuring instrument, and showed slides which clearly indicated that a granular material during continuous shear deformation has a characteristic critical voids ratio which depends upon the magnitude of the normal stress imposed upon the sample. He also described some cyclic shear strain tests on steel balls in which the density increased but the shear decreased with increase in the number of cycles.

The remainder of Saturday morning was spent in visits to the River Board's tidal model of the Wash and River Great Ouse and to the Department of Soil Physics. In describing the model Mr. W. E. Doran said that it included the Wash from approximately Hunstanton to Friskney Flats near Skegness and the tidal compartment of the River Ouse. It was constructed to a horizontal scale of 1/2500 and a vertical scale of 1/60, giving an exaggeration of 1/41.7. The tidal period was 138 seconds. The operation of the tides was effected by a displacer system, the weight of the displacer being 12½ tons. The cycle of tides from neap to spring was produced through the operation of a train of gears which altered the stroke of the displacer.

This model has been used for the determination of levels occurring in the relief channel under various discharges and conditions of tide, and particularly for experiments in connection with the variations which occur in the shipping channel in the Wash and the possible means of constructing protective works in the Wash in order to obviate any adverse effects which might arise from the high flood discharges resulting from the Flood Protection Scheme works.

At the time of the visit, the experiment in progress was the checking of rates of erosion on the model with measurements taken in nature, and it was seen from charts that good correspondence was being obtained.

The visitors were also shown some experiments in progress in connection with the calibration of weirs for river discharge measurements.

The visit to the fluid flow experimental centre of the Department of Soil Physics was by kind permission of Dr. E. C. Childs. The large seepage tank was 40 ft. by 40 ft. by 6 ft. deep and was filled with a uniform sand. High rates of artificial rainfall could be imposed on the sand surface and automatic pore water pressure devices were installed throughout the sand. By this means many problems connected with an unsteady state of flow of water through sand had been solved.

In the afternoon the delegates visited Ely Cathedral and later had tea at Ely. In the evening, after being entertained by Mrs. Roscoe at her home, the delegates attended the final farewell dinner in the Hall of Emmanuel College. The principal speakers were Professor B. Popov, The Right Worshipful the Mayor of Cambridge, Professor G. P. Tschobotarioff and the Vice-Master of Emmanuel College.

On Sunday the delegates broke their journey to London by paying a visit to the mansion at Audley End which was constructed in the period 1603-1660 for Baron Audley of Walden on the site of a former Benedictine abbey.

verticales étaient capables de résister à la totalité du moment plastique à la base des poteaux et que les charpentes s'étaient affaissées comme si les bases des poteaux avaient été fixées rigidement. Certains essais décrits au cours de cette conférence concernaient des fondations verticales soumises à des moments de renversement suffisants pour causer la rupture du sol.

Après cela Mr. A. N. Schofield donna un aperçu de certains essais de pression latérale sur maquette, au cours desquelles, grâce au contrôle rigoureux des mouvements, on avait pu déterminer les variations de l'importance, de la direction et du point d'application des forces latérales exercées par le sol à mesure que les mouvements des fondations augmentent.

Mr. Roscoe décrit un appareil de cisaillement très simple, permettant d'obtenir une contrainte uniforme à travers l'échantillon et, par conséquent, de vérifier la validité des théories de Hvorslev sur la rupture des sols par cisaillement. Il mit en évidence le fait que la boîte triaxiale ne pouvait imposer des conditions aussi uniformes que pour certains genres d'essais mais pas pour tous. Mr. C. P. Wroth expliqua comment il avait mis au point cet appareil destiné à mesurer les efforts et montra une série de clichés qui indiquaient clairement qu'un matériau granulé soumis à une déformation de cisaillement continue, présente un pourcentage critique de vides qui dépend de la valeur de la sollicitation normale appliquée à l'échantillon. Il décrit également un nombre d'essais au cours desquels des billes d'acier étaient soumises à des cycles de cisaillement, montrant que la densité augmentait mais que le cisaillement diminuait à mesure que le nombre de cycles croissait.

Le restant de la matinée du Samedi se passa en visites à la maquette des rivières Wash et Great Ouse et au 'Department of Soil Physics'. En décrivant la maquette, Mr. W. E. Doran précisa qu'elle reproduisait tous les détails de la rivière Wash depuis Hunstanton jusqu'à Friskney Flats, près de Skegness, ainsi que la partie de la rivière Ouse sujette aux marées. La maquette est construite sur une échelle de 1/2500 dans le sens horizontal et 1/60 dans le sens vertical, ce qui donne une exagération de 1/41.7. La période correspondant aux marées est de 138 secondes et les marées sont reproduites au moyen d'un appareil avec un plongeur de 12½ tonnes. Les changements saisonniers des marées sont obtenus au moyen d'un arrangement de roues dentées.

Cette maquette a été employée pour déterminer les niveaux qui se présentent dans le Chenal d'évacuation pour différents débits et conditions de marées, et pour des expériences relatives aux conditions dans le Chenal de navigation du fleuve Wash, afin d'étudier les travaux qui pourraient éliminer certains désavantages causés par des débits trop importants résultant des travaux de Protection.

A l'époque de cette visite, l'essai en cours avait pour but de vérifier les vitesses d'érosion mesurées sur la maquette avec celles qui se présentent en réalité. Un examen des résultats montra que la correspondance était en effet très bonne.

On montra également aux délégués certains essais en cours sur l'étalonnage des barrages pour mesurer le débit des rivières.

La visite au centre expérimental hydraulique du 'Department of Soil Physics' fut organisée grâce au concours du docteur E. C. Childs. Le grand réservoir pour l'étude de la filtration mesure 11.9 m × 11.9 m × 1.8 m; ce réservoir est rempli de sable tout à fait uniforme. Il est possible d'en exposer la surface à des pluies artificielles très violentes et des instruments automatiques pour mesurer les pressions interstitielles sont distribués à intervalles réguliers dans la masse du sable. Cette installation permet de résoudre un grand nombre de problèmes relatifs à l'écoulement en régime irrégulier de l'eau à travers du sable.

Dans l'après midi, les délégués eurent l'occasion de visiter la cathédrale d'Ely et de prendre le thé dans cette ville. Dans la

SUMMARY

Thursday, 22 August

9.30–11.30

Travel by coach from London to Cambridge. Proceed to hotels or Emmanuel College.

12.30

Reception by Professor C. E. Tilley (Vice-Master of Emmanuel College) and Mrs. Tilley in the Picture Gallery at Emmanuel College.

13.00

Lunch in the Hall of Emmanuel College followed by a talk by Dr. R. F. Rattray on The University of Cambridge.

14.45–16.30

Tour of some of the Colleges. Tea in Queens' College Hall.

19.45 for 20.00

Visit to the University Engineering Laboratory. Reception by Mr. and Mrs. K. H. Roscoe. Buffet supper followed by a tour of the Laboratory.

Friday, 23 August

9.00

Lecture in Lecture Theatre 1 at the Engineering Laboratory by Mr. W. E. Doran (Chief Engineer of the Great Ouse River Board) and Mr. A. C. Meigh (Soil Mechanics Ltd.) on 'The Great Ouse Flood Protection Scheme' with particular reference to the soil mechanics problems arising.

10.30–12.30

Travel by coach to King's Lynn. Civic Reception by the Mayor and Mayoress of King's Lynn in the Guildhall, followed by lunch at the Globe Hotel.

14.00–18.00

Visit to 'The Great Ouse Flood Protection Scheme' works between King's Lynn and Denver. Tea at St. Germans Pumping Station, then back to Cambridge.

soirée, après une réception donnée par Mrs. Roscoe, ils assistèrent au dîner d'adieu dans le réfectoire d'Emmanuel Collège. Les discours principaux furent prononcés par le professeur Popov, le maire de Cambridge, le professeur G. P. Tschebotarioff et le Vice-Président d'Emmanuel Collège.

Le voyage de retour à Londres, le Dimanche, fut interrompu pour une visite à Audley End, un manoir datant de 1603–1660 bâti par le Baron Audley of Walden sur le terrain d'une ancienne abbaye de l'ordre des Bénédictins.

20.00

Dinner in Emmanuel College Hall

21.30–23.30

Civic Reception by the Mayor and Mayoress of Cambridge in the Guildhall.

Saturday, 24 August

9.15–10.45

Lecture at the Engineering Laboratory by Messrs. K. H. Roscoe, A. N. Schofield and C. P. Wroth (Dept. of Engineering) on recent work in soil mechanics at Cambridge University. Coffee in Lecture Theatre 2.

10.45–13.00

Visit to (i) the Tidal Model of the Wash and the River Great Ouse, and (ii) the fluid flow experimental centre of the University Department of Soil Physics.

13.00

Lunch privately in hotels or Emmanuel College.

14.30–16.00

Visit to Ely Cathedral. Tea at Ely.

19.00 Mrs. K. H. Roscoe at home.

20.00 for 20.15

Formal dinner in Emmanuel College Hall. Sherry served at 20.00 in the Picture Gallery.

Alternative Ladies' Programme

9.45–12.00

Alternative or combined visits to Fitzwilliam Museum, Scott Polar Institute, University Library, The Senate House, Sedgewick Museum, Sawston Hall, further College visits or shopping.

Sunday, 25 August

Return by coach to London, visiting Audley End.

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EXHIBITORS EXPOSANTS

In the Upper and Tait Libraries on the second floor

BRITISH TRANSPORT COMMISSION

Photographs of the application of electro-osmosis for drying an embankment, by the Scottish Region (Chief Civil Engineer, M. G. Maycock, B.Sc., M.I.C.E.).

Model of reconstruction of Bo-Peep Tunnel, Hastings, Sussex.

Model of Folkestone Warren, Kent.

Pulsator apparatus for testing soils from railway roadbeds, by the Southern Region (Chief Civil Engineer, F. E. Campion, M.I.C.E.).

Automatic pore-water pressure measuring apparatus.

Automatic recorder for the consolidation test.

Model showing equipment for injecting clay banks with aerated cement grout.

Model illustrating the principle of a method for locating the shear planes of active slips, by the Western Region (Chief Civil Engineer, M. G. R. Smith, M.B.E., B.Sc., M.I.C.E.).

Photographs and drawings illustrating measures taken to check the movement of a slip in a cutting at Uxbridge, Middlesex.

FREEMAN, FOX AND PARTNERS IN ASSOCIATION WITH JAMES WILLIAMSON AND PARTNERS, AND KENNEDY AND DONKIN, CONSULTING ENGINEERS

Model showing upper and lower reservoirs, penstocks and power station.

Ffestiniog Pumped Storage Project (300 MW) for Central Electricity Authority.

SIR WILLIAM HALCROW AND PARTNERS, CONSULTING ENGINEERS

A diorama illustrating the Quoich Dam, a large rockfill structure built for the North of Scotland Hydro-Electric Board.

Photographs and diagrams illustrating compaction and pore-pressure studies on trial embankment of clay for projected rockfill dam shown in diorama.

HUSBAND AND Co., CONSULTING ENGINEERS

A model showing the piled foundations for the 250 ft. Radio Telescope at Jodrell Bank, near Holmes Chapel, Cheshire.

LEWIS AND DUVIVIER, CONSULTING ENGINEERS

Photographs, diagrams and profiles illustrating an investigation into subsoil conditions on the eroding West Shore at Fleetwood, Lancashire.

METROPOLITAN WATER BOARD

Model of a ring of concrete non-bolted 'wedge block' tunnel lining fitted with vibrating wire load gauges.

Details of gauge, oscillator and micrometer equipment.

L. G. MOUCHEL AND PARTNERS LTD., CONSULTING ENGINEERS

Model showing a new method of piled jetting to facilitate driving through thick bands of silt or sand where normal jetting methods are unworkable.

MAURICE NACHSHEN AND PARTNERS, CONSULTING ENGINEERS

Models showing stabilization of high river banks at Tyne-mouth and Cod Beck by regrading and drainage.

SCOTT AND WILSON, KIRKPATRICK AND PARTNERS, CONSULTING ENGINEERS

Illustrations of a runway at Hong Kong Airport to be constructed on reclaimed land.

In the Main Library and Lounge on the first floor

ACROW (ENGINEERS), LTD.

Photographs and drawings of work in progress of a design of foundation consisting of a circular arrangement of 12 bases carried on piles as found in the construction of London Planetarium.

AVELING-BARFORD LTD.

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Model of 99H all-wheel drive grader.

Photographs showing site applications of rollers and graders.

JOHN BLACKWOOD HODGE AND Co., LTD.

Photographic display showing selection of equipment distributed and serviced in operation on various sites.

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CLOCKHOUSE ENGINEERING, LTD.

Examples of the following apparatus.

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A pocket hand vane, a field vane apparatus, a 4 in. dia. stationary piston sampler, and an undisturbed sand sampler are shown.

Photographs illustrate the application of soil mechanics studies on a number of projects.

DORMAN LONG (BRIDGE AND ENGINEERING), LTD.

Photographs of Sydney Harbour, New Tyne, Birchenough and Storstron bridges.

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JOHN LAING AND SON, LTD.

The exhibit includes a diamond drill, seismic apparatus, vibration apparatus and a vane tester.

A. MONK AND COMPANY, LTD.

Model of the reconstruction of the Riverside Quay and Albert Dock at Hull for the British Transport Commission. Model of the railway underpass at the Shell Refining Company's Stanlow Refinery.

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Sampling equipment for taking 4 in. undisturbed clay samples. Sampling equipment for standard penetration tests. Photographs of the Pilcon drilling and boring equipment.

RUDDOCK AND MEIGHAN, LTD.

Illustrations of the applications of Stearine Amine M.L. additives.

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Display panels describing buoyant foundations, clay grouting, corrosion surveys, resources surveys.

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Photographs of drill bits used for prospecting by soil mechanics.

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A selection of diamond drilling tools. Core-samples of concretes and rocks varying from very soft to very hard from sites in India, Africa, Scandinavia and Europe.

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Working model of steam piling frame. Illustrations and tableau showing application of West shell piling.

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Diorama of Oil Harbour at Aden. Selection of soil sampling equipment. Diamond core bit and a selection of cores. Wimpey washer-type wellpoint.

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Examples of equipment including triaxial compression test, pore-water pressure measurement, unconfined compression, California bearing ratio, laboratory vane test, consolidation test, liquid limit and permeability test apparatus.

OPENING SESSION

At the Institution of Civil Engineers, Monday, 12 August, at 2.30 p.m.

ADDRESSES BY:

SIR ARTHUR WHITAKER, K.C.B., President of the Institution of Civil Engineers

PROFESSOR KARL TERZAGHI, President of the International Society and of the Conference

SIR ARTHUR WHITAKER, K.C.B., President of the Institution of Civil Engineers, who took the Chair at the commencement of the Session, said: It gives me very great pleasure, as President of the Institution of Civil Engineers, to welcome you here as members of the International Conference on Soil Mechanics and Foundation Engineering. When in 1953 the Executive Committee of your organization accepted the suggestion of the British National Committee to hold the conference in England, we were very pleased indeed, and we are very glad to welcome you to this Institution.

I understand from W. H. Glanville, who is Chairman of the British Organizing Committee, that there has been great activity, that there are 41 nations represented here today, and that 179 papers have been submitted to the conference for consideration. The British Organizing Committee, too, has for some considerable time been doing what it could to further the preliminary preparations for this conference, and we would like to thank the very many people—consulting engineers, civil engineering contractors, and many other organizations—for the help that they have given to the British Organizing Committee, thus helping it to hold this conference in the manner that we think it should be.

This conference is taking place roughly 21 years after the International Society was created in Cambridge, Massachusetts, in 1936, and I like to feel that perhaps at this conference it has come to maturity. Certainly, if you think of 179 papers to be considered in the next few days, I think you will agree that it is quite a healthy young man. I believe that this is a good sign, and that the evidence is there, that this organization will go from strength to strength.

I should like to welcome the Executive Committee of the conference, because on them so much rests for keeping the organization going and directing the efforts of all the members into proper channels. I hope that their deliberations while they are in London will be a great success.

In welcoming you to this Institution I would say that you come just at a time when we are holding an exhibition in honour of our first President. He was born 200 years ago last Friday, and downstairs we are celebrating his bicentenary. He was a famous engineer for us. He did a tremendous amount of work in the days when engineers had to rely on their innate genius rather than on the science that has been developed. It is really since his time that the science of engineering has developed, and I think it is well within your knowledge that the science of soil mechanics and foundation engineering has really developed since Professor Terzaghi turned his thoughts towards it.

We in the Institution of Civil Engineers have been very pleased indeed to act as secretariat for the organization, and we trust that our efforts to that extent have met with your approval.

In this building you will see the various exhibits that have

been put together for your examination and consideration by the various authorities and contractors in this country, and we trust that you will find it quite helpful to you.

It is now my pleasure to call upon your President, Professor Terzaghi, to take the Chair of the conference, and in doing so I have pleasure in declaring the conference open.

PROFESSOR KARL TERZAGHI, President of the International Society and of the Conference, then took the Chair.

In his Opening Address, he said: On behalf of all those present I wish to thank Sir Arthur for his warm words of welcome. The Institution of Civil Engineers has always been one of the strongest pillars of the International Society, and the contributions of its members and of the British Research Centres to our knowledge of soil mechanics are outstanding; therefore, it is a pleasure for all of us to be the guests of the Institution and to visit the places where so much of our progress had originated.

More than 20 years have elapsed since this conference convened for the first time, in June 1936, in Cambridge, Mass. During this period it was my privilege to stay with you and to co-operate with you in a consulting capacity. At each of our conferences I felt the urge to look back over the ground we had covered and to make a guess, by extrapolation, as to what lay ahead of us.

At this conference the period of our travel companionship approaches its end because none of us lasts for ever. Hence in the forthcoming review I shall reach back to the beginning of my own journey, which started at the beginning of this century. I shall stress especially the setbacks and defeats, because it is the defeats and not the victories which make us conscious of the necessity for improvements.

If you peruse any textbook on foundations and earthwork engineering published prior to or at the turn of our century you cannot help noticing that in those days every decision in these fields of engineering was entirely based on what could be called a primitive geological survey. The materials of the earth located beneath the site of proposed construction operations were divided into several categories such as coarse sand, fine sand, silt, soft or stiff clay and the design was based on empirical rules or equations containing only one variable, the type of soil. This procedure was most clearly demonstrated by the tables of 'Allowable Bearing Values', which can still be found on exhibit, like palaeontological specimens, in the building codes of some cities.

The only analytical tool at the disposal of the earthwork engineers of those days was the theory of earth pressure on retaining walls published by Coulomb in 1776. However, this theory had hardly any existence outside of the classroom and as late as 1881 its practical usefulness was emphatically denied



The President making his address at the opening Session.

Left to right: Professor Milton Vargas, Dr. W. H. Glanville, Mr. A. McDonald, Sir Arthur Whitaker, Mr. A. Banister, Professor A. W. Skempton, Professor Karl Terzaghi

by Sir Benjamin Baker, in his classical paper 'The Actual Lateral Pressure of Earthwork' published in the *Transactions of the Institution of Civil Engineers*, Vol. LXV. The arguments presented by Baker were convincing indeed.

On account of the decisive influence of geological factors on the success of earthwork operations it was more than a coincidence that the first geological map was prepared, and published in 1813, by an engineer, William Smith, and not by a geologist. For similar reasons most of the major engineering operations involving deep excavation or tunnelling were preceded by a painstaking geological survey and disappointing results such as important differences between actual and estimated costs of a project were often attributed to inadequate geological investigation of the site.

Such was the status of earthwork engineering in 1900, when I entered the university. Every student in civil engineering was compelled to take a stiff course in geology. Considering in retrospect the topics covered in the course, it is obvious that the teacher had not the foggiest idea of the function of geology in engineering practice. The course was given by an expert in the realm of crystallography and the scope of his course reflected this fact. The poor student was unable to discriminate between what is useful and what is irrelevant. All he could do was grin and bear it.

In 1905, after I left college, I joined the staff of a contractor. In the field of contracting every misjudgement has very tangible consequences and operating in this field I soon found out that most of what I learned in the course on geology was irrelevant. After six years of coping with foundations and earthwork problems in the Alps, in Croatia and in Russia, I realized that my incompetence in this field, like that of my bosses and colleagues, was appalling. Yet the influence of geological factors on the success or failure of our operations was obvious. Therefore, I concluded erroneously that our incompetence could be due only to gaps in our knowledge of the relationship between geological conditions and engineering consequences. These gaps, I thought, could be closed by collecting and

digesting case records in which each event, such as a foundation failure or the failure of an earth dam, was meticulously correlated with the geological conditions prevailing at the site.

Once I arrived at that conclusion, in the fall of 1911, I decided to leave temporarily the congenial field of contracting and to spend a couple of years collecting case records. At that time the U.S. Reclamation Service (now called the U.S. Bureau of Reclamation) was engaged in large-scale experimentation. It involved the construction of a great number of dams and irrigation works on both sides of the Rocky Mountains under geological conditions covering as wide a range as any textbook on geology. This large-scale experiment appeared to offer a unique opportunity to carry out my plan. Hence in January 1912 I moved from Europe to the U.S.A.

In the U.S.A. I went first to Washington, D.C., and explained my intentions to Mr. F. H. Newell, director of the U.S. Reclamation Service. At that time, four years had elapsed since the experiment had started and Mr. Newell was already as deeply impressed by the incompetence of the engineering profession in the field of earthwork engineering as I was. Furthermore, he had arrived at some erroneous conclusion regarding the causes of the incompetence as I had; therefore, he promised me his wholehearted support. He gave me letters of introduction to the resident engineers on important projects sponsored by the service and requested their co-operation. The next two years I spent in the western United States, observing, digesting and recording with the industry of a bee.

At the end of the two years I took my bulky collection of data back to Europe, but when I started separating the wheat from the chaff I realized with dismay that there was practically no wheat. As a matter of fact, the net result of two years of hard labour was so disappointing that it was not even worth while publishing it. At that time, in 1914, World War I broke out. I was sucked up, like most able-bodied members of my generation, by the maelstrom, and landed in the air force of the Austrian Army.

In the fall of 1916, to my great surprise, I was ordered by my government to accept a position as a professor of earthwork and foundation engineering at the Turkish Engineering School in Istanbul. I myself felt no urge whatsoever to teach because I was too deeply pre-occupied with my own ignorance. At a later date I learned that the order was issued upon request of one of my former teachers, Philip Forchheimer, who at that time was engaged in reorganizing the Turkish institution. Forchheimer had followed my struggles with increasing curiosity and he felt that a period of peaceful contemplation might help me in my pursuits.

After I arrived in Istanbul, late in the fall of 1916, the first topic of my contemplation was the dismal failure of my attempt to get useful information out of my collection of case records. Going over my data once more, I realized, quite suddenly and surprisingly, the cause of their deficiency. The observations were correct but the classification of the materials whose performance was observed was from an engineering point of view inadequate although for geological purposes it was quite satisfactory. The subsurface materials encountered at the sites of the construction operations were divided into categories such as coarse and fine sand, or soft and stiff clay, each of which included materials of widely different engineering properties. Hence, I concluded, this time correctly, that engineering geology cannot possibly become a reliable tool in the hands of earthwork engineers unless and until we acquire the capacity to assign to each material of the earth numerical values which make it impossible to mistake it for another one with significantly different engineering properties.

This conclusion represents the fundamental discovery. In retrospect the discovered fact appears to be obvious and commonplace, like the discovery, ascribed to Pierre Perrault and published in 1674, that the water feeding our rivers comes from the clouds and not from the bowels of the earth. Yet without this discovery, the revolution in the realm of earthwork engineering, symbolized by the establishment of our society, would not have started.

Every major discovery leading to a revolution in a field of endeavour is made repeatedly. The discovery of the evolution of species in the realm of biology is an example. First it was made off and on before the time was ripe, and therefore it remained inconsequential. Once the time was ripe, the crucial thought cropped up in many heads more or less simultaneously and the mental revolution started. Therefore, the credit for such vital discoveries belongs to the entire generation, and not to an individual, nor even to a nation.

My own role in the series of developments which led up to the present status of soil mechanics, like that of Darwin in the realm of biology, was determined by the fact that I had the urge, the opportunity, and the patience in addition to the qualifications required for engineering the revolution which had already become inevitable. As soon as I realized, in the spring of 1918, that the adaptation of engineering geology to engineering requirements could only be accomplished by systematic experimentation, I wrote down in one day and on one sheet of paper a list of the experiments which would have to be performed. Then I started constructing the apparatus, confident that the experimental work could be accomplished in two or three years.

My estimate of time requirements turned out to be far off the mark. Instead of three years I had to live through seven years of strenuous experimentation alternating with attempts, often futile and sometimes successful, to discover the laws accounting for the observed phenomena. Working in the post-war period in Istanbul, I had for years no professional contacts with the outside world and no access to contemporary engineering literature. This appeared to be a handicap, but in retrospect I realize that it was an asset, although it is responsible for various gaps and imperfections in my early writings. Finally,

when I published the results of my labours, in 1925 in my book *Erdbaumechanik*, I had to confess to myself that I had only laid the foundations: the edifice remained to be created. The rest of the story you know. I have described it in considerable detail in the paper 'Origin and Functions of Soil Mechanics', which I presented in Chicago in 1952, at the hundredth anniversary of the American Society of Civil Engineers.

During the decade which followed the first International Conference on Soil Mechanics in Cambridge, Mass., in 1936, strenuous efforts were made, in almost every large country on this globe, to solve the problems of earthwork engineering, like those in bridge design, on a purely mathematical basis. However, nature has set rather narrow limits to the number of problems which can be successfully solved in this manner. This is due to the fact that the instances are rare in which the significant properties of the subsoil can be accurately determined in advance of construction. The evaluation of the factor of safety of slopes on natural ground is an example. If the subsoil is homogeneous, the problem can be solved by computation. However, in practice, slopes are commonly located on deposits with an intricate pattern of stratification, involving an equally intricate and inadequately known distribution of the pore water pressures. The factor of safety of such slopes cannot be reliably computed. Similar conditions are encountered in almost every other branch of earthwork engineering. Thus we arrived at the borderline between science and art.

I use the term 'art' to indicate mental processes leading to satisfactory results without the assistance of step-for-step logical reasoning. Prior to the advent of applied mechanics, in the nineteenth century, structural engineering, including the design of towers, domes and vaults was an art, and the design of foundations was also an art. However, the art of structural design was carried to an amazingly high degree of perfection whereas the art of designing foundations seldom rose above the level of bungling. The reason is obvious. Design on a purely empirical basis is inevitably guided by the results of observation of the performance of structures which have previously been built. The designers knew from experience that the performance depended on the strength of the construction materials. Therefore when facing the problem of designing a new structure they considered as prototypes only those structures which were made out of similar construction materials, and, as a consequence, their design was commonly satisfactory.

In connection with the design of foundations, conditions were radically different, because the performance of a foundation depends on the average mechanical properties and the pattern of stratification of the soil located between the base of the foundation and a considerable depth below the base. The properties of this body of soil were commonly unknown, because adequate methods of subsoil exploration did not then exist. Therefore, some of the foundations designed in the pre-scientific period were wasteful and others fatally weak.

The methods of subsoil exploration developed during the last decades eliminated the uncertainties involved in the design of foundations before the mechanical properties and the pattern of stratification of the subsoil received adequate attention. Therefore, we are justified in concluding that the percentage of failures in the realm of earthwork engineering will dwindle in spite of the fact that our knowledge of the subsoil conditions is seldom complete enough to permit a rigorous solution of the foundation problems. This conclusion leads me to the last but rather important topic of this address, to the question as to how we can pass on our newly acquired knowledge and insight to the next generation in the most efficient manner in spite of the existing handicaps. In order to answer that question we must consider the pre-requisites for artistic activity in the broadest sense of the word.

To practise an art successfully one must possess the capacity,

ascribed to Theodore Roosevelt, for thinking with the hips. In other words, one must be able to arrive at correct conclusions without preceding logical reasoning. Let me illustrate this process by a trivial example.

When I was a youngster, still engaged in a great variety of engineering activities, I had to design and supervise the construction of an exceptionally intricate reinforced concrete edifice in St. Petersburg (Russia). The computations were made by a group of ambitious but rather unreliable college graduates and the time at my disposal was so short that it was impracticable to check the results of all their computations; therefore, I adopted the following procedure. After the forms were erected and the steel was placed in accordance with the unchecked drawings, I examined the accumulation of timber and steel and selected at the site, on the basis of visual inspection, which of the members appeared to be too weak and which were excessively reinforced. Then I checked the computation of the selected beams and the result almost invariably corroborated my forecast, because I had already learnt, in the field of reinforced concrete, to think with my hips. However, this capacity can only be acquired by first absorbing with the head everything that is to be known and then to get it into the subconscious by continuously practising it. To accelerate the process at the outset of my professional career I never used ready-made equations. I derived them over and over again until they were part of my system. There are no short cuts to competence in the field of engineering.

Later on, when I concentrated on earthwork engineering, I underwent a similar development. During the earlier stages I used extensively theoretical procedures some of which I had to invent myself, but during the last decades I solved almost all of my practical problems without elaborate computations. I was also compelled to adapt myself to the fact that the properties of the materials subject to investigation in my new field of endeavour are far more complex than those of reinforced concrete. To acquire competence in the field of earthwork engineering one must live with the soil. One must love it and observe its performance not only in the laboratory but also in the field, to become familiar with those of its manifold properties which are not disclosed by boring records and laboratory tests. The experience one acquires in this manner is similar to the knowledge the farmer accumulates in the course of time concerning the piece of land he loves and cultivates. Every experienced farmer knows many vital characteristics of his property in addition to those which the soil scientist can find out by means of chemical analysis and laboratory tests. I also realized, in the course of the years, that the knowledge accumulated in a human brain has no practical value unless its owner has the moral courage to use it as a basis for decisions. Last but not least, I became more and more impressed by the importance of never missing an opportunity to find out, by direct observation, the difference between forecasts and the real developments.

These are the stages through which I passed in succession after I decided to concentrate on earthwork engineering. The same pattern of development can be detected in the life of almost every engineer who had acquired a justified reputation for 'sound judgement'. As a student in the classroom, he worked with his head, advancing as far as logical reasoning could take him. After he embarked on his professional career the useful portion of what he had learned became part of his subconscious and then, but not earlier, he could attempt, without serious risk, the solution of problems in the field of engineering which cannot be solved by rational procedures. Students who observe such an engineer in action may arrive at the conclusion that the time they have to spend on absorbing theory is wasted, but this conclusion would be erroneous indeed. The object of their scrutiny would never have risen to his high level of perfection

without having first learned and thoroughly digested every bit of information with a direct bearing on his professional activities. The details of the theories may escape his memory, but the essence becomes more and more active as the years go by. Therefore, the secret of efficient professional education resides in persistent emphasis on what is worth being absorbed and subsequently digested, and on the inevitable uncertainties associated with the application of mathematical theories to engineering problems.

Examining the array of useful knowledge which has filtered into my own system and crystallized into sound judgement, I find that it contains one ounce of geology for every pound of theory of structures and soil mechanics. The one ounce of geology is as essential as the yeast in the processes of fermentation, but it represents only a minute fraction of the vast domain covered by the sciences of the earth. Therefore, I believe that a two-semester course combined with field trips fully serves its purpose provided that the course represents the combined efforts of a geologist who appreciates the requirements of engineers and an engineer who has learned from personal experience that geology is indispensable in the practice of his profession. A few fortunate individuals combine the training and viewpoint of the geologist with that of the engineer. Such persons are ideally equipped to give a course in engineering geology.

After the student has absorbed the theory of structures, soil mechanics and engineering geology with his head and has passed the final examinations, his real development starts. The final outcome depends entirely on innate qualifications and environment. Many of those who have passed their examinations with flying colours are doomed to remain technicians to the end of their lives. They will never learn to walk without the crutches of step-for-step logical reasoning and no system of education could change this condition. However, the same individual may turn into a poor technician or a first-class one depending on the quality of the professional training he received, and that is important. Those few who were born under a luckier star may rise gradually from the ranks of technicians to those of competent engineers, capable of thinking with both their heads and their hips. The capacity for such rise has nothing to do with training. As a matter of fact, it is by no means uncommon that an individual achieves distinction in a field entirely different from the one in which he was trained, provided he was trained at all. In the realm of engineering this has happened more than once. However, for given innate qualifications, the person with superior training has a tremendous advantage over the one who has received a deficient education. Therefore, engineering education should always be for us a matter of primary concern. Yet no matter how adequate the training may be, the prospects of the graduate to rise above the level of a technician are nil, irrespective of his innate qualifications, unless the following additional condition is satisfied. His subsequent professional activities must give him ample opportunity to compare his design assumptions and forecasts with the real conditions as disclosed by the subsequent construction operations and the performance of the completed structures. Otherwise he lives, without knowing it, in a fictitious world.

The membership of this conference includes both engineers and technicians. We meet for the purpose of exchanging information concerning the tools and procedures which have been developed since our last meeting, in Zürich. Acquaintance with the tools and procedures is equally indispensable for the technician and the engineer. Hence no matter what the status of a member in the engineering hierarchy may be, he will be stimulated and benefited by the forthcoming interchange of thoughts and experience. With this conviction I open the Fourth International Conference of our Society.

CLOSING SESSION

At the Institution of Civil Engineers, on Wednesday, 21 August 1957, at 10 a.m., with the President, PROFESSOR KARL TERZAGHI, in the Chair

Obituary

THE PRESIDENT: Before starting our session, I request all those present to stand in memory of our colleagues who have passed on, particularly Al Cummings, who was our Vice-President for the United States, Walter Kjellman, Chairman of the Swedish National Committee, Don Taylor, who was our Secretary for many years, and Thomas Middlebrooks.

(Members of the conference stood for a few moments.)

Election of President

THE PRESIDENT: Yesterday afternoon the Executive Committee met for the second time, and I can announce with pleasure and satisfaction that the Committee has elected as President for the forthcoming period my friend and colleague Professor A. W. Skempton.

Election of Vice-Presidents

THE PRESIDENT: The election of the Vice-Presidents for the forthcoming period has led to the following results: Africa, J. E. Jennings; Asia, K. L. Rao; Europe, A. Mayer; North America, R. F. Legget; South America, A. J. L. Bolognesi; Australasia, G. D. Aitchison.

Appointment of Secretary

THE PRESIDENT: I can further report, with pleasure, that Mr. A. Banister has agreed to continue in his office as Secretary of our Society. Looking at his smooth and smiling face, one would not suspect the capacity for sustained effort and concentrated energy which is concealed by that cheerful countenance. The services which he has rendered to our Society during the last period were invaluable, and therefore his willingness to carry on fills me with great satisfaction.

Report of the Executive Committee

THE PRESIDENT: I invite Mr. Banister to read the Report of the Executive Committee.

THE SECRETARY: Report of the meetings of the Executive Committee, held on 12 and 20 August 1957

(1) The Executive Committee agreed to the following modifications of the Statutes:

- Clause 14 to be amended so that the issue of a members' list to all members every 2 years replaces the annual reports.
- Clause 10 to be amended so that the Executive Committee includes a sixth Vice-President representing Australasia.
- Clause 13 to be amended so that invitations for the next conference should be receivable up to the date of opening of the previous conference, instead of two months before the opening of the conference.

Clause 17 an additional paragraph to be added to the effect that international conferences are open to all members of the International Society, and to non-members by invitation.

- (2) The Executive Committee elected Mexico and the Union of Soviet Socialist Republics as members of the Society.
- (3) The following Sub-committees were appointed:

The classification of geotechnical literature

A. Casagrande (U.S.A.)
L. F. Cooling (U.K.)
J. Kérisel (France)
T. J. Osterman (Sweden)
H. Petermann (Germany)
L. Bjerrum (Norway)
A. Croce (Italy)
E. de Beer (Belgium)

Notations and symbols

R. E. Fadum (U.S.A.)
A. W. Bishop (U.K.)
J. Kérisel (France)
B. G. Jakobson (Sweden)
E. Schultze (Germany)
J. Brinch Hansen (Denmark)

Static and dynamic penetration test methods

B. G. Jakobson (Sweden)
H. O. Ireland (U.S.A.) (nominated at a later date)
E. C. W. A. Geuze (Netherlands)
M. Vargas (Brazil)
O. Moretto (Argentina)
A. von Moos (Switzerland)

- (4) The Executive Committee accepted the invitation of the French national society to hold the fifth conference in July 1961 in Paris.

Introduction of Professor Skempton as President

THE PRESIDENT: I wish now to say a few words about our new President, A. W. Skempton. He was born 43 years ago, just about at the time when Europe plunged into the fog of World War I, and soil mechanics started to emerge from that fog. Being of a conservative turn of mind A. W. Skempton attended the same university where he teaches now, in London. From 1936 to 1946 he was associated with the Building Research Station in Watford, which is known as a hotbed of soil mechanics. When I lectured at the Imperial College in the Spring of 1939 he attracted my attention, and I had the impression that he was one of the most promising stars on the horizon in our field, and subsequent developments showed that

my appraisal was correct. In 1946 he became permanently connected with the Imperial College in the capacity of a university reader.

During the following period he carried on a lively and stimulating correspondence with me concerning the most varied topics of common interest, and whenever I came through London I never failed to renew our professional contacts. I still recall with delight a week which I spent in 1946 with A. W. Skempton and with his colleagues of Soil Mechanics, Ltd., on my way from the United States of America to India.

The intrinsic value of his contributions to soil mechanics are known to all of us from his numerous publications, some of which appeared in the Proceedings of our Conferences, and most of them in the journal *Géotechnique*, which in a way is his baby. Three years ago, when he made a lecture tour through the U.S.A., he made a lasting impression. Quite recently he was promoted to the rank of Professor of Civil Engineering at Imperial College, which is a crowning event in a very distinguished academic career.

It gives me great pleasure to introduce to you A. W. Skempton.

A. W. SKEMPTON: First of all, may I thank Professor Terzaghi for the extremely kind remarks he has just made about me. I feel very touched by what he has said.

It is a high privilege to become the second President of the International Society, and in electing me to that office you have done me a great honour for which I should like to express my thanks and very deep appreciation. It is particularly an honour, of course, to follow Professor Terzaghi in this office, but may I at once say that anyone can follow Professor Terzaghi only in the purely chronological sense. It is absolutely impossible to follow him except in the mere sequence of time.

I think this is a good moment for me to tell you that the Executive Committee has invited Professor Terzaghi to continue his connection with our Society in a very definite way indeed, namely, as Honorary President for life.

May I also point out that, although Professor Terzaghi will carry the honorary title of President, and this may by implication suggest that the President is not honorary, I can assure you that there is no salary attached to the job!

I think I would be expressing the thoughts of us all if I said that this Society has been extraordinarily fortunate in so far as for our first President we have had a man of genius; and I think that there are probably few other societies in the engineering world at the present time for which that could be said. Looking round some of the other branches of the profession, and indeed some of the allied sciences, I cannot help feeling, at least from time to time, that much of their discussion exists in a cloud, a sort of scientific mist. I feel that although we also have some small clouds on our horizon, on the whole we do progress in a sensible, practical and interesting manner in the solution of our problems, and I think that we owe this attitude of mind almost entirely, if not wholly, to our Honorary President. I would say that not only have we been singularly fortunate in having a man whom I have no hesitation in describing as a genius as our first President, I think also that he is one of the greatest civil engineers this century will know.

Now the problem which I have to face is how to try to continue leading our Society in a way which bears even some faint resemblance to the inspiration which we have received from Professor Terzaghi: but my consolation is in the confident hope that we shall continue to have him with us during my term of office and at our next conference.

Now, as you have heard, the next conference is to be in Paris, and very delighted we all are to have received an invitation from the French delegates which enables us to hold our conference in that beautiful city. On the Executive Committee, we are, however, extremely conscious of the fact that this will be the fourth conference to be held in Europe, the first, of course, having been held in 1936 at Harvard University in the United States. I do not think there is any doubt that the conference following the one in Paris will be on the American continent, and I think it is an open secret that we have received an official invitation already for 1965 to visit Canada, which we shall very probably come to accept.

I do not think there is anything more for me to say, except once more to thank you from the bottom of my heart for the great honour you have done me, and also to thank Professor Terzaghi again for the very kind remarks he has made about me.

Expression of Thanks

PROFESSOR TERZAGHI: In closing this conference I wish to say a few words about those who have prepared the stage for it. I was told that the organization is entirely the work of an amateur team. If that is true, I must confess that I prefer the amateur performances in our field to professional accomplishments.

First of all, we must express our gratitude to the Institution of Civil Engineers for having placed their venerable building and their facilities at our disposal. It was in this building that Benjamin Baker read his memorable paper on 'the lateral earth pressure' in 1881. It was in this building that I established my first official contact with the Institution by delivering the James Forrest Lecture in 1939, and in this building I received in 1953, on the occasion of my seventieth birthday, a most appreciated gift from my British colleagues at a surprise party. Therefore, the fact that the fourth conference was held in this building is for me a special treat.

The Organizing Committee was headed by W. H. Glanville. Since W. H. Glanville succeeded in sending a British representative to the first conference of a small and then still unknown group of enthusiasts on the far-away American continent, it is not surprising that his organization was such a success. Mr. McDonald was Treasurer, but the word 'treasurer' appears to be misused in connection with a transaction which was primarily concerned about incipient deficits. The sleepless nights pondering about these deficits were thoughtfully assigned to my good old friend Mr. Wynne-Edwards.

Mr. Whitaker was almost drowned in a flood of papers craving for publication, but he succeeded in making order out of chaos; and Mrs. Glossop performed miracles in making the ladies forget the fact that a Soil Mechanics Conference is, after all, not a joyride.

Quietly in the background Mr. Banister and his faithful secretary, Mrs. Watson, kept the machinery in a well lubricated state. That looks very simple to the layman, but I doubt whether Mr. Banister and Mrs. Watson would agree.

I do not say anything about those responsible for the organization of the excursions, because it seems to me inappropriate to give thanks for gifts which we have not yet received.

The net result of the combined efforts of the members of the Organizing Committee and their Sub-committees was an unqualified success, and I close this Session with the expression of our deepest gratitude to all the members of our now grown-up Society.

The conference concluded.

BANQUET

At Grosvenor House, Park Lane, London, Wednesday, 21 August

PROFESSOR KARL TERZAGHI, President, in the Chair

The toast of 'The Queen', proposed by W. H. Glanville, Chairman of the British Organizing Committee for the conference, having been honoured.

The Rt. Hon. HUGH MOLSON, M.P., Minister of Works, proposed the toast of

'The Heads of State'

He said: It is a very great honour to propose the toast of the heads of the 45 or more States whose representatives are here tonight. It is also a great pleasure to welcome you all to London on the first occasion that this International Society has held its conference here.

I am told that you have all been extremely zealous in attending the meetings. If you were still at school, you would have got very good marks from your headmaster! I hope, however, that you, and especially your ladies, may have found time during the last few days also to visit our historic buildings, our museums and our gardens. London has always been an international centre. We have been appreciative of the arts of other countries. Many of you may have found in our museums examples of the artistic products of your own country.

Soil mechanics is one of the newest of the sciences, but I think certainly one of the oldest of the arts. Thousands of years ago our ancestors discovered many things about soil. The Bible tells us that the wise man builds his house upon a rock, and it will stand, while the foolish man builds it upon sand, and it will be washed away. That I believe to be a perfectly sound principle of soil mechanics. (*Laughter.*)

All that has been learnt in the last few years by your scientific discoveries must surely add to our admiration of those earlier engineers, who were able to build without the help of the knowledge which you have now obtained. Surely we must admire more than ever the fact that the Venetians were able to build their beautiful city upon piles, and that the Dutch were able to build their cities upon peat, a soil which, I understand, is extremely unreliable; but by bitter experience and genius they were able to do that. It is extraordinary that the Americans were able to build some of the skyscrapers which are still a feature of the landscape—or skyscape—of New York before all that you now know was known. Perhaps also, without immodesty, I may mention that the London Tubes were built before this science of yours was fully developed.

I am told that it was really only about the year 1925 that what had previously been an art became a science. I have also been told that the origin of the science is very largely due to your President, Karl Terzaghi, who has been a professor in Istanbul and in Vienna and who is now at Harvard. We all congratulate you, Karl Terzaghi, on the world-wide recognition which has now been given to the science of which you are, I am assured, one of the founders, and at the present time the Grand Old Man. (*Applause.*) We congratulate ourselves on being here tonight, on the 21st anniversary of the foundation of this International

Society, and on being able to congratulate you upon what you have done. (*Applause.*)

Let me now turn to the great importance in modern life of these discoveries which your Society and its members have made. There are many new discoveries in the world, and they bring about changes, but often, I think, it is not brand new discoveries which make the greatest changes; sometimes it is a new technique of using on a much greater scale what was known before. Towards the end of the last war a civil engineer in the House of Commons suggested that in order to increase the production of coal in this country we should go in for open-cast production. After hearing him speak on the subject, I said to him 'Surely there must be something wrong in your idea? After all, coal has been gotten in this country for centuries past, and we have gone to great trouble and expense in putting down deep mines; surely somebody would have thought of quarrying the coal if it were a practicable proposition?' The answer was that what had been uneconomic, if not impossible, in the past had now been made easy and economic by the invention of American earth-moving machinery; so that a whole new realm of knowledge and development has been opened up by the invention of earth-moving machinery. It is to your science that we look to make this new development as easy and as speedy and as safe and in every way as satisfactory as possible.

At the same time, there are what I have called the brand new inventions. Some of your most imaginative colleagues in the world of science are inventing wonderful aircraft that go through the sound barrier; others are sending rays into space; others are splitting atoms; but nearly all of them have to come back to you for the help of your particular science. The people who invent the aircraft want you to make runways for them; the people who send out rays into space want you to flatten the ground for radar; those who split the atom ask you to prepare the foundations on which to build their power stations, and want to put those stations alongside water, which must add greatly to the difficulties of the engineers who design the foundations. If things go on in this way, before long they will be achieving their ambition of sending men off into space; but I assume that those men will want to come back (*Laughter*) to their mother planet afterwards, and, believe me, what they will be asking you soil mechanics experts to do is to make a certain part of Mother Earth soft enough for them to be able to fall back into her lap without injuring themselves when they return! (*Laughter.*)

Both the departments with which I have been concerned are very much interested in soil mechanics. Before I became Minister of Works I served at the Ministry of Transport. Here in Britain, as in most other parts of the world, we are anxious to build good roads and to build them as cheaply as possible. I am assured that there is no broad generalization on how a road should be constructed. Is a flexible road better than a rigid road? If we build a rigid road, should it be of reinforced concrete and shallow or should it be of unreinforced concrete and rather deep? I am told that all this depends on the nature

of the subsoil, and the question of which is the cheaper depends on the availability of suitable raw materials. What is required depends upon the nature of the traffic, and upon the climate and what it does to break up the road when you have built it.

In this country the Minister of Transport is concerned about building roads and the Minister of Works is concerned about building buildings; and we both depend on you gentlemen and your science of soil mechanics in order to ensure that what we produce has quality and durability and is as cheap as possible.

Every country organizes its system in accordance with its own genius. Here our scientific department, the Department of Scientific and Industrial Research, is under a very senior Minister, the Lord President of the Council, and the Department of Scientific and Industrial Research controls both the Building Research Station, which I hope that many of you have visited, and also the Road Research Laboratory, which is under the guidance of your Organizing Chairman, W. H. Glanville. We both turn to these scientific departments for advice on how to do our work, and in return we try to help them as much as we can. When we are engaged upon large-scale building, we try to give them an opportunity to carry out their experiments. For example, I think that some of you have been to Alconbury, on the A1 road, where the Ministry of Transport has enabled the Road Research Laboratory to carry out some of the important experiments which they have had for a long time in mind.

I hope also that our agricultural friends will be appreciative of what you can contribute to help them. You have cheapened the making of the dams and canals with which they can irrigate their crops, and you have a great deal to tell them about how to conserve their fertile soil.

The mythology of the ancients contained a great deal of wisdom. Often when we think that our outlook on things is different it is only because we see the same eternal truths under a different light. You remember the story of Antaeus, the giant who was a son of Mother Earth. When he was wrestling and was lifted off the earth he was as weak as any other man, but when his feet were on the earth Mother Earth came to his support and renewed his strength. That, I believe, is still true of soil mechanics; and we turn to you in this modern time because, with all the sophistication and wealth and knowledge of these later days, we depend as much on the soil of our planet as ever did primitive man. It is you soil scientists who show us what we must do if we are to prosper.

I ask you to rise and drink the health of the Heads of the States of all those attending this conference. (*Applause.*)

M. E. BUISSON (France), as a delegate of the country to be host of the fifth conference, then proposed the toast of 'The International Society of Soil Mechanics and Foundation Engineering'

He said: Du fait de l'absence de notre éminent président M. Caquot et de nos vice-présidents MM. Frontard et Mayer, le redoutable honneur m'échoit de prendre la parole après les excellents orateurs qui m'ont précédé.

En secret, et à condition que cela reste absolument entre nous, je vous dirai qu'à un certain moment j'ai bien pensé devoir y échapper. (*Laughter.*) Vous avouerai-je aussi que je commençais à me complaire dans ce lâche soulagement que j'éprouve lorsque j'échappe à de nombreux soucis. Mais brusquement tout changea et je dus réaliser que je ne devais pas vous décevoir, qui tous avez provoqué ou accepté avec enthousiasme la vox populi. Déjà, je me voyais émaillant ce discours de quelques fleurs de rhétorique bien choisies, et avec la facilité que nous avons, nous autres Français, de nous adapter — c'est, je crois, ce que les mauvaises langues appellent être versatile — j'ébauchais un plan en trois points. (*Laughter.*)

Mais soudain, je fus obligé de sortir de ma rêverie, car je vis devant moi le visage souriant de notre si sympathique Secrétaire, M. Banister. Et savez-vous ce qu'il dit, après les congratulations d'usage? 'Eh bien, M. Buisson, je pense que vous avez assez de six minutes pour votre discours'. (*Laughter.*) Je tombais de haut, car j'espérais me rattraper du temps imposé aux séances de travail. Sur le coup de l'émotion, je lui ai répondu 'Croyez-vous que deux ou trois minutes ne seraient pas suffisantes?' (*Laughter.*) Mais il me répondit que six minutes étaient prévues.

Mon plan était détruit et je songeais à le refaire, quand je me trouvai en face de notre si chère président honoraire, M. le Karl Terzaghi, qui m'interpella en me demandant ce que j'allais dire. J'ai été absolument navré du lui répondre que j'allais vous remercier et vous inviter cordialement à venir à Paris en 1961. C'est curieux comme des paroles aussi simples peuvent rasséréner un homme; ne trouvez-vous pas? Et je crois qu'il est temps de m'y mettre, car tout à l'heure je risquerai la guillotine, ce qui vous l'avouerez serait une bien triste fin de séjour à Londres. (*Laughter.*)

Mais combien je regrette de n'être sans doute pas compris par la majorité d'entre vous. Toutefois, si le langage du cœur est international — et je le crois sincèrement — vous comprendrez tous sans exception que c'est du fond du cœur que le comité français vous invite par ma bouche, et qu'en son nom je vous dis merci pour l'honneur que vous nous avez fait en choisissant notre belle ville de Paris comme siège de notre prochaine réunion de 1961.

Nous aurons, et nous en avons conscience, beaucoup à faire pour égaliser en efficacité les conférences de Rotterdam, de Zurich et de Londres. Surtout nous tenons à remercier nos amis londoniens de la gentillesse qu'ils ont apporté dans leur réception, et ce compliment sincère peut et doit aussi être adressé à nos amis hollandais et suisses. Puisque la voie nous est tracée, je pense que notre tâche en sera grandement facilitée. Il est important de connaître les difficultés pour les mieux résoudre. Ce n'est pas le moindre service qui nous aura été rendu, d'avoir appris, de la bouche de M. Banister lui-même, les écueils à éviter et de l'avoir entendu nous proposer, avec toute sa gentillesse, de nous aider éventuellement de ses conseils, ce dont nous lui sommes infiniment reconnaissant. Nous aurons certainement à nous mettre en rapport avec notre distingué président M. Skempton, pour préparer la prochaine conférence en accord complet avec lui. Nous pensons que là encore vous pouvez être rassurés.

Ce que je puis vous affirmer également, c'est que nous nous efforcerons de joindre l'utile et l'agréable. Si l'on veut suivre utilement un congrès, cela est fatigant. Le repos bien organisé s'impose aussi. Cette tâche nous sera d'ailleurs facile et agréable. Vous savez tous que les ressources de Paris, et de la France entière, sont grandes dans le domaine de l'agrément. Nous avons déjà proposé que la réunion se tienne dans la première quinzaine de juillet. Dans cette période, Paris possède en effet toutes ses ressources. C'est donc avec le plus grand plaisir, et en vous remerciant encore, que je vous donne rendez-vous à Paris en juillet 1961. (*Applause.*)

PROFESSOR TERZAGHI who responded, said: It was a great pleasure to listen to M. Buisson who represents the country in which the next International Conference will be held. A conference under the auspices of French engineers will be a novel and stimulating experience, because the French contributions to engineering science are, in various respects, quite different from those of other nations.

This fact was brought home to me at a very early stage of my professional career. After I left college I concentrated on the field of reinforced concrete. At that time the leadership in that field was quite definitely in French hands, and all the

wisdom I needed to perform my professional duties I derived from French engineering literature on the subject. A few years later, however, the leadership passed from French into German hands. During the next two decades the Germans developed the field of reinforced concrete most efficiently in all horizontal directions, but nothing essentially new showed up, and this condition continued to prevail until a Frenchman, M. Freyssinet, conceived the idea of pre-stressing the concrete.

Returning to our field of endeavour, we cannot help remembering that Coulomb, Collin, Perronet and Boussinesq were French. Therefore I do not doubt that an International Conference on French territory will be stimulating in every respect.

I do not need to emphasize the worldly pleasures associated with a sojourn in France. The excursions will take us to some of the most delightful places on our globe. I know that from personal experience, because I have been in France very often, ever since my personal contacts with France were established some 27 years ago by M. Buisson himself on a sunny morning in Vienna.

I must call your attention, however, to a serious risk involved in a trip to Paris. In the days when I often went to France, my wife used to say, 'Whenever you come back from Paris you are a domestic problem for a whole month.' (*Laughter.*) The only remedy which I can recommend is to take your ladies with you, because if they too become a domestic problem equilibrium will be re-established. (*Laughter and applause.*) I hope very much that I shall be able to take part in the conference in Paris in the capacity of a fictitious President, basking in the sun and enjoying the charms of France while all the work is being done by the real President. (*Laughter.*) I invite you to drink the health of our next hosts, our colleagues in France. (*Applause.*)

L. F. COOLING, who proposed the toast of the Guests, said: It is my pleasant duty this evening, as Chairman of the British National Society, to propose the toast of our guests from overseas. I should like to say first of all how gratified we are by the splendid response which we have received to our invitation to attend this London conference and by the world-wide representation which it has evoked. There are something like 750 overseas visitors from more than 40 different countries.

Like so many speakers in our technical sessions during this last week, I shall have to plead that in the short time at my disposal I cannot hope to deal adequately with my subject. (*Laughter.*) I shall therefore not attempt to beat the red light, but shall content myself with one or two largely irrelevant matters. (*Laughter.*) Because of the very sharp contrast which it offers, the present occasion brings back to my mind a dinner which I was privileged to attend after the first International Conference at Harvard in 1936. On that occasion the guests were in a marked minority; I believe that they numbered fewer than fifty. The dinner was held at the Wayside Inn at Sudbury, Mass., made famous by Longfellow, in his group of famous *Tales of a Wayside Inn*. Even in Longfellow's day it seems that some of the former glory had passed, because the poet describes it as

Built in the old colonial day
When men lived in a grander way
With ampler hospitality.

When we visited the inn it had become mainly a museum of antiques brought together by Henry Ford, and, although the dinner was held in the banqueting hall there was a slight snag about it, and this was recorded by Casagrande in the records of the first conference, where you will find in Volume 3 the following sentence:

In spite of the fact that Henry Ford does not permit alcoholic beverages in the Wayside Inn (a fact which was not

learnt until all the arrangements had been made) there prevailed a gay spirit throughout the evening.

As I look round this room tonight I am glad to see that there are still quite a number of people with us who were present on that occasion and who can vouch for the enthusiasm shown. I should like to ask those who were present on that occasion to raise their hands. There are more than I thought! (*Applause.*)

While we were there we visited places in the neighbourhood and we came across a school which was said to be the original made famous in the nursery rhyme:

Mary had a little lamb
Whose fleece was white as snow.

Like a good tourist I purchased a small booklet giving the story of Mary's little lamb, and from it I learnt several things. I learnt that Mary was a real person, and this booklet gave a documented background of the family, the brothers and sisters, uncles and aunts, school teachers and students, and even a history of the lamb. It was apparently a ewe lamb, because it had a family, and in the end it was killed by being gored by a bull. The style of the booklet reminded me strongly of some Master's Theses which I have read; it brought in everything remotely connected with the story.

At that conference I was the only member from Great Britain, and my presence there was brought about by weeks of hard work in presenting the case that it was worth while sending even a junior member to a conference on this new-fangled subject of soil mechanics. My boss at that time was W. H. Glanville. His interest dates from that time, and soil mechanics in this country owes much to W. H. Glanville. (*Applause.*) I want to express my gratitude to him, in that he put up a case which was successful and got by the Treasury. (*Laughter.*) That is one of the most difficult obstacles for us to overcome on these occasions, and I am sure that there are many attending this banquet tonight who could tell some very interesting stories about how they managed to get here. (*Laughter.*)

This does not refer only to the menfolk and how they persuaded their sponsors—government, university or civic authority—that their attendance here was not only desirable but absolutely essential (*Laughter*); it applies also to the ladies; but I suppose that we are so used to their persuasive methods and to their skill in skirting round financial obstacles and getting their own way that we are apt to overlook their achievements.

I wish on behalf of the British National Society to extend a specially cordial welcome to the ladies present, and I hope that for all our guests their visit to this fourth International Conference has been both enjoyable and profitable. I ask the members of the 'home contingent' to raise their glasses and drink a toast to our guests from overseas. (*Applause.*)

Mr. A. VON MOOS (Chairman of the Swiss National Society), who responded, said: On behalf of all the overseas guests here, I should like to thank L. F. Cooling for his very kind toast. It is a pleasure for me to add my thanks to those expressed this morning to the British Organizing Committee, and especially to its Chairman, W. H. Glanville, for the wonderful work which they have done for us. The undertaking of such a task means constant study for a long time, not only during the day but also during sleepless nights, to decide what should be done, what might happen and what should be presented to such a conference; but when I met W. H. Glanville at the Institution of Civil Engineers early one morning I saw the smiling face of a general whose battle was going according to plan, and I knew that all was well.

The Chairman of such a Committee must be surrounded by men to help in the work, and one of these is Mr. Banister.

(Applause.) Mr. Banister is not only Secretary of our International Society but has also acted as Secretary for the Organizing Committee and some of the sub-committees.

A conference such as this has to be supported not only by the payments of members and of the Society but by the help of the Government and others. There must be a personality who knows how to enlist the interest of the directors of private firms and organizations. Studying the list of donors and guarantors given in our Programme, I have the impression that the work of Mr. Wynne-Edwards and the other members of the Finance Sub-committee has been very successful. *(Applause.)*

One of the most onerous tasks which has to be done, but the result of which will last long after the end of the conference, is that of the Papers Sub-committee, with Mr. Cooling as Chairman and Mr. Whitaker as Secretary. I think you will agree with me that they may be proud of the two volumes which were presented in due time, and I think that they have been successful in translating some of the papers from overseas from very basic English into correct English. *(Laughter.)*

In my view, one of the most important features of our conference are the visits to laboratories and sites, which have been organized here by the Visits Sub-committee, of which Mr. Glossop is Chairman and Mr. Cox the Secretary. They showed us England at work and also some of the beauties and arts of this country. For many of us the visit to Canterbury Cathedral, under the wonderful guidance of Canon Frost, was one of the highlights of this conference.

The flowers of our conference are the ladies, and we have to thank the charming Ladies Sub-committee, with Mrs. Glossop as Chairman, for all they have done. *(Applause.)* They have taken away our ladies so that we had more or less a quiet time at the sessions. *(Laughter.)*

At the end of my little speech I should like to repeat once more my thanks to the British National Society and to all who have contributed to the success of this conference. I ask the guests from all overseas countries who are at this banquet to raise their glasses and drink a toast to the organizers of the conference. *(Applause.)*

MINUTES OF THE MEETINGS OF THE EXECUTIVE COMMITTEE

At the Institution of Civil Engineers, Monday, 12 August, at 10.30 a.m.

Professor Karl Terzaghi, President, in the Chair

THE PRESIDENT: During the last conference in Switzerland it was suggested that members of the national societies should meet from time to time in order to discuss topics of common interest. That suggestion fell on very fertile ground indeed. As a matter of fact, in every national society at least one meeting was held each year, and in quite a number of them meetings were held five times a year. Furthermore, some of the national societies published the proceedings of those meetings and other societies published a great number of professional papers either in publications of their own or in the proceedings of their engineering societies. As a consequence very active contact between the members was maintained. I had the privilege of participating in several of those meetings, among which was a very interesting meeting in December 1956 held in Ottawa. I must say that all of them were distinguished by the keen interest of the members in the topics which they covered.

Furthermore, quite a number of national societies have established publications of their own which cover either their social activities, their professional activities or both. Among these publications I wish to mention first of all *Géotechnique*, which is familiar to all of you, *Geotecnica*, published by the Italian national society and the News letters published by various societies. Therefore, we can say that the activities of our societies since the last conference have been satisfactory in every respect.

The interest of the profession in the aims of our Society was further demonstrated first of all by the increase in the number of members of the International Society, and by the application and admission of several societies into the International Society, among which I have to mention Southern Rhodesia, Ireland, Colombia and China. I am sure that all of you will welcome the representatives of these new member countries most heartily.

The Secretary will now present the details of the developments which have taken place during the last four years.

Report on Membership and Financial Statement

THE SECRETARY (Mr. Banister): You, Mr. President, have already mentioned that the membership of the Society has increased by the addition of China, Colombia, Ireland and Southern Rhodesia. The membership, including those countries, is now 30. During the four-year period there have been no resignations and, based on the latest annual subscription from each country, this represents an individual membership of 2,525. We have in the last few days received applications from two other countries, Mexico and the Soviet Union. Those are formal applications which have included all the necessary documents, membership lists and statutes.

If I may pass now to the Annual Reports, I am very sorry indeed that the hopeful proposals agreed to at Zurich for the publication of Annual Reports have not materialized. It was the intention that every individual member of the Society

should receive a copy of the report outlining the principal developments in soil mechanics in all the countries which are members. The first report for 1953-54 was published early in 1955 and I know it is your view that it did not meet the needs at all. I am afraid that was due to the fact that only about half the countries sent in anything, and it was very difficult indeed to distinguish in those reports that which was important work and that which was merely routine. In succeeding years the position was even worse, and the publication of a report did not appear justified. The point that has to be borne in mind is that the report can be useful, but each country can really only have about two pages bearing in mind that the subscription per member is only 25 cents.

That brings me to the accounts. The accounts have been professionally audited at the end of each year, and it is very satisfactory to report that no countries are in arrears. The rate of subscription throughout the four years has been 15 dollars plus 25 cents per member, and the following is a brief statement of expenditure and receipts.

Receipts

	£	s.	d.	£	s.	d.
Subscriptions				1,600	12	9
Other receipts						
U.A.T.I. Expenses	178	11	4			
U.A.T.I. 4th Conference	1,232	2	11			
U.A.T.I. Swedish Conf.	142	17	2			
U.A.T.I. Egyptian Conf.	142	17	2			
Dollar Fund	106	9	10			
				<u>1,802</u>	<u>18</u>	<u>5</u>
				<u>3,403</u>	<u>11</u>	<u>2</u>

Payments

4th Conference	1,232	2	11			
U.A.T.I. Meetings	61	3	1			
U.A.T.I. Subscriptions	171	8	7			
Postage	46	11	0			
Dictionaries	7	10	3			
Audit	5	5	0			
Printing	299	4	7			
Swedish Conference	142	17	2			
Cheque book	4	4	2			
Sundries	1	6	3			
				<u>1,967</u>	<u>13</u>	<u>0</u>

Balance being Excess of Receipts over Payments	£1,435	18	2
plus balance of Dollar account at the Harvard Trust Co.	\$1404.89		

Report on Relations with U.A.T.I.

W. C. VAN MIERLO (Representative on U.A.T.I.): On the occasion of the Third International Conference of Soil Mechanics and Foundation Engineering in Zurich in 1953, I had the honour to give a brief report on the activities of the Union of International Engineering Organizations. In this report I mentioned the main objects of the Union as described in Chapter I of the Constitution, and for the sake of completeness I repeat them here. They are: (a) to co-ordinate by

common agreement the activities of the member-organizations and in particular the programmes and dates of international congresses; (b) to take all useful steps for moral and material support of member-organizations; (c) to receive proposals and to make recommendations thereon with a view to helping the formation of new international organizations in fields not effectively covered by existing organizations; (d) to promote mutual relations amongst the member and similar organizations and also between the member-organizations, the United Nations and their Specialized Agencies. In the period covered by this report (1953-57) the Union limited their activities to normal routine work as far as allowed by their financial capacity.

Up to June 1956 the offices of the Union were located at 62, Rue de Courcelles, Paris VIII, and the present address is 58, Rue du Rocher, Paris VIIIe.

The International Institution for Production Engineering Research and The International Federation of Surveyors were admitted as members. It was not possible to accede to the application for membership presented by: (1) the Permanent International Committee for Underground Town Planning, (2) the International Confederation of Technical Agriculturists, and (3) the Electro Heat International Bureau. The first and third organizations at the moment of application had an insufficient number of national committees or members in different countries in the world. So far as the second organization is concerned, in the course of discussions which took place when U.A.T.I. were founded, it was agreed as a principle that the Union should comprise only those organizations of purely technical purpose. The International Confederation of Technical Agriculturists did not meet with these conditions, because at its congresses it dealt with economic and social questions. That was the reason for the rejection of the application of this organization.

In the period covered by this report the number of member-organizations was increased to 14. They are:

- (1) Permanent International Association of Road Congresses
- (2) International Institute of Welding
- (3) International Association for Hydraulic Research
- (4) International Society of Soil Mechanics and Foundation Engineering
- (5) International Conference on Large Electric Systems (CIGRE)
- (6) International Conference of Testing and Research Laboratories on Materials and Structures (RILEM)
- (7) World Power Conference
- (8) International Commission on Irrigation and Drainage
- (9) International Gas Union
- (10) International Commission on Large Dams of the World Power Conference
- (11) International Association for Bridge and Structural Engineering
- (12) Permanent International Association of Navigation Congresses
- (13) International Institution for Production Engineering Research
- (14) International Federation of Surveyors.

The Executive Council of the Union met in Paris on 11 May 1954, 31 May 1955, 11 May 1956 and 17 May 1957. I attended all these meetings except for the meeting of 11 May 1956, at which Mr. Banister was kind enough to represent me.

The General Assembly of the U.A.T.I. held meetings in Paris on 1 June 1955 and 18 May 1957. At the meeting of the Second General Assembly on 1 June 1955 our Society was represented by A. W. Skempton and myself. The Third General Assembly on 18 May 1957 was attended only by me.

Up to March 1954 the Executive Council was composed as indicated in my previous report. After that date the com-

position was as follows: President, L. Cambournac, Vice-President of the International Association for Bridge and Structural Engineering; Vice-Presidents: Sir Vincent de Ferranti, Chairman of the World Power Conference; Shri A. N. Khosla, Chairman of the International Commission on Irrigation and Drainage; J. Millican, General Secretary of the Permanent International Association of Navigation Congresses. Members: D. Boutet of the Permanent International Association of Road Congresses; G. A. Hathaway, President of the International Commission on Large Dams of the World Power Conference; A. E. Jaeger, President of the International Institute of Welding, P. L'Hermite, Secretary-General of the International Conference of Testing and Research Laboratories on Materials and Structures, and myself as Delegate of the International Society of Soil Mechanics and Foundation Engineering. The Secretary-General was B. de Comminges.

In 1957 the following persons were at the end of their terms of office: L. Cambournac, Sir Vincent de Ferranti, Shri A. N. Khosla, J. Millican, D. Boutet and myself. In 1960 there would be A. E. Jaeger and P. L'Hermite.

The composition of the new Executive Council was discussed at the last meeting and the meeting agreed to re-elect L. Cambournac as President of the Union and until May 1957 the composition of the Executive Council was as follows: President, L. Cambournac (France), Vice-President of the International Association for Bridge and Structural Engineering. Vice-Presidents A. Rumpler (France), Permanent International Association of Road Congresses; A. E. Jaeger (Netherlands), President, International Institute of Welding, G. A. Hathaway (U.S.A.), President of the International Commission on Large Dams of the World Power Conference. Members: P. L'Hermite (France), Secretary-General of the International Conference of Testing and Research Laboratories on Materials and Structure; Mr. Suleiman (Egypt), International Commission on Irrigation and Drainage; Mr. Touwaide (Belgium), International Gas Union, and Mr. Tribot Laspiere (France), of the International Conference on Large Electric Systems.

The U.A.T.I. received from Unesco in 1954 \$12,000, in 1955 and 1956 \$12,000 and by contract \$3,000. In 1957 the amount of the subvention was maintained at \$12,000 and that by contract increased to \$4,000.

The subventions from the Union to the International Society of Soil Mechanics and Foundation Engineering were as follows: In 1954 for the printing costs of Proceedings of Congresses, \$800; for the annual report of the International Society and regular activities, \$100. In 1955 for the printing costs of Proceedings of Congresses, \$900; for the annual report of the International Society and regular activities, \$100. In 1956 for the printing costs of Proceedings of Congresses, \$750; for the annual report of the International Society and regular activities, \$300. In 1957 for the printing costs of Proceedings of Congresses, \$1,800.

The annual subscription of the member-organizations was fixed at \$80 per annum for 1954 and 1955.

Due to changes in the organization of Gaz de France who, from the start, had put accommodation and material help at the disposal of the Union, the expenses of the secretariat increased in 1956. Thus it was found necessary to increase the annual subscription to \$160 for 1956 and 1957.

With regard to the activities of U.A.T.I., the Engineering Dictionaries and Documentation Committee held a meeting on 7 December 1954 in Paris. Our Society was represented by M. R. Peltier. For this meeting a summary of the information given in reply to the questionnaires was composed and circulated to the member-organizations. As far as possible details were added by the representatives of the organizations. Mr. Duval of the International Organization for Standardization reported at the meeting of the technical

committee of I.S.O. held in Vienna in October 1954 on 'Terminology'.

A document of Unesco entitled *Unesco participation in the improvement of scientific terminology and lexicography* and the recommendations of the 'Advisory Committee for documentation in the natural Sciences' were discussed.

Mr. de Comminges reported on the central card index of the Union.

As to the publication of multi-lingual vocabularies, with the financial aid of the U.A.T.I. and Unesco different multi-lingual technical vocabularies were published by the member organizations. A leaflet giving practical information on these vocabularies was composed. According to the leaflet the following vocabularies were published by the member-organizations: Permanent International Association of Road Congresses—a technical dictionary of road terms; International Institute of Welding—a multi-lingual collection of terms for welding and allied processes; Our Society—a provisional publication of technical terms used in soil mechanics and foundation engineering; International Conference of Testing and Research Laboratories on Materials and Structures—a trilingual dictionary of engineering materials testing; International Commission on Irrigation and Drainage—a multi-lingual dictionary on irrigation and drainage; International Gas Union—a vocabulary of the gas industry, illustrated; International Commission on Large Dams of the World Power Conference—a technical dictionary of dams; Permanent International Association of Navigation Congresses—an illustrated technical dictionary; and the International Federation of Surveyors—a vocabulary of surveyors.

The U.A.T.I. was invited to send a representative to the Advisory Committee for Researches in the Arid Zone, which took place on 23–24 April at Tucson, Arizona, and on 5 May 1955 at Socorro, Mexico. Shri Kan war Sain, Vice-President of the International Commission for Irrigation and Drainage, attended these meetings. At the meeting of this Committee held in October 1956 in Canberra, the Union was represented by Mr. Sexton of the University of Melbourne. At the meeting on 3–5 April 1957 in Paris, the Union was represented by Mr. de Comminges. For this last meeting our Society was also invited.

U.A.T.I. was invited by Unesco to become a member of an International Advisory Committee for Research of the Humid Tropical Zone. This Committee met for the first time in Manaus, Amazon State, Brazil, in July 1957, with a second meeting at Abidjan. Our Organization was invited to send a representative.

The Union are also a member of the International Advisory Committee for Marine Sciences. This Committee held its first meeting at Lima on 22–24 October 1956. The second will be held on 16–17 November 1957 at Bangkok.

Until 1954 the Union had participated in the general conference of Non-governmental Organizations enjoying consultative status in Unesco as an ordinary member. In that year the Union were elected for a period of two years as a member of the Permanent Committee which looks after the interests of these organizations in the interval between their general conferences.

The Union were invited to join the International Advisory Committee on Scientific Research under the programme of the Department of Natural Sciences in Unesco. The seat is that of a permanent member along with the International Council of Scientific Unions, the Council for International Organization of Medical Sciences, and 12 individuals designated for their eminent personal and scientific qualities.

Stimulated by the Union, collaboration was established between the International Association of Bridge and Structural Engineering and the Permanent International Association of Navigation Congresses for the purpose of an investigation of

'life load on road bridges'. A symposium on this subject was held in Lisbon in June 1956.

THE PRESIDENT: During his period of service W. C. van Mierlo has represented the International Society in a splendid fashion, and I am sure you will wish me to express to him our deepest gratitude for his services. However, according to the Statutes, his term of service expired in May 1957, and we are now faced with the question of his successor. In my opinion it would be extremely difficult to replace W. C. van Mierlo, with his broad experience and diplomacy in dealing with the subject, and by far the best solution would be for him, in spite of the Statutes, to serve for a second term, if he were agreeable.

W. C. VAN MIERLO: No, Mr. President; now that the Organization has a Vice-President in Europe and the Secretary in London, I believe that it would be better for them to represent our Society in the Union.

THE PRESIDENT: As W. C. van Mierlo is not in a position to accept my suggestion, we have to consider the alternative which is that Mr. Skempton and Mr. Banister should carry out this duty. Is that proposal agreed? (*Agreed.*)

THE PRESIDENT: Prior to our conference we received two applications from newly formed national societies for admission into the International Society. These two countries are Mexico and the Soviet Union. Both societies have submitted to Mr. Banister the Statutes, and I would suggest that Mr. Banister might be kind enough to prepare copies of the Statutes and other documents which accompanied the applications, and that these copies should be handed to members of the Executive Committee in order to give them an opportunity of studying the data before the next meeting of the Executive Committee at the conclusion of the conference. At that meeting of the Committee we shall decide whether the applications for admission can be granted or not. I hope that procedure will be satisfactory.

Resolutions by National Societies

THE PRESIDENT: Prior to this conference resolutions from national societies were submitted to the Executive Committee. Among them are two resolutions from the South African Society and four resolutions from the Swedish Society. Unfortunately the representatives of these two societies are not present; therefore, we shall be compelled to discuss the resolutions in their absence. I suggest that sub-committees might be set up to deal with the resolutions listed in the agenda.

The first is a resolution by the South African Society:

Publication of papers in the Proceedings of International Conferences: it is felt that the present quota system, is based only on the numbers of members in the individual societies, is not satisfactory, and the main emphasis in the selection of papers should be placed on merit. This would still be a difficult matter for the selection panel, however, but lack of printing space should not be the main factor governing publication of papers in the Proceedings.

The second resolution deals with Annual Reports:

It is felt that the present reports, which took the form of a list of bibliographies from each country, were insufficient, and that an Annual Report should include information on work that was under way and a description of the activities of each National Society. The Annual Report should be published regularly and should contain whatever information was available on time.

I suggest that the sub-committee set up to deal with the resolutions proposed by the South African Society should comprise five or six members.

A. MAYER (France): Monsieur le Président, je voudrais signaler que si un comité doit s'occuper de la question 9, il devrait également traiter la question 8 qui est relative au même sujet.

THE PRESIDENT: Exactly. Resolutions 8 and 9 deal with the same topic, and it is obvious that the sub-committee which deals with the South African proposal would also deal with Resolution No. 8.

A. VON MOOS (Switzerland): I would suggest that the sub-committee should be split up because they are different problems. For the sub-committee dealing with publication of papers I would suggest that membership should comprise the Secretaries of past conferences, the present conference and future conferences, because they have the necessary experience to deal with the problem.

THE PRESIDENT: Are there any other comments?

L. BJERRUM (Norway): I think it is extremely difficult to make any decision concerning the procedure at the next conference, and I propose, so far as the first resolution is concerned, that we recommend to the country in which the next conference will be held that the problem be discussed with Mr. Banister and A. von Moos. I do not think that we can do very much in the Executive Committee.

A. MAYER (France): Monsieur le Président, je m'excuse de reprendre la parole, mais dans le cas où ce serait à Paris que se tiendrait la prochaine Conférence, je serais, contrairement à ce que vient de dire L. Bjerrum, très désireux que des règles précises soient posées au sujet de la publication, pour ne pas être dans la situation désagréable où s'est certainement trouvé le Comité britannique lorsqu'il a eu à demander aux différents pays de réduire le nombre de leurs rapports.

Par conséquent, j'aimerais beaucoup que ceci soit précisé ici et que nous n'ayons ensuite qu'à nous conformer aux décisions du Comité exécutif.

THE PRESIDENT: It could be done in private conversation between now and the next meeting, and the result presented at the next meeting of the Executive Committee.

The author of the South African resolution has just arrived, and I therefore suggest that he should present his resolution.

L. E. COLLINS (Union of South Africa): I apologize for my late arrival. I think that this resolution is fairly straightforward. We realize that space difficulties have been very great and that the expense of printing transactions for this Fourth Conference must have been very high; but, at the same time, the quality of the papers which have probably been turned down is something which it is difficult to consider lightly.

THE PRESIDENT: It has been suggested that the subject of these resolutions might be discussed between now and the next meeting of the Executive Committee by those who are primarily interested in the problem, particularly the gentlemen who will be in charge of the next conference, and that the results of the discussions should be presented at the next meeting of the Executive Committee.

Then we have the four resolutions presented by the Swedish Society which are as follows:

First:

The question concerning a limitation of the number of members to the international conferences on soil mechanics. Arrangements to make the conferences more effective.

Second:

A List of Members of the International Society to be printed every second year and sent to all members.

Third:

The adoption of an international classification for geotechnical literature. Settlement of fixed Divisions to be used at the conferences.

Fourth:

The adoption of international symbols in soil mechanics.

The authors of the resolutions are not present and we have not the time to discuss these subjects today, nor shall we have time to discuss them during the next meeting of the Executive Committee; therefore, I suggest that a sub-committee should be appointed to discuss the subjects between now and the next meeting.

J. BRINCH HANSEN (Denmark): I want to point out that with regard to the question of symbols, the proposals are not solely those of the Swedish Society. Although the Swedish representative is not present, L. Bjerrum and I are present representing Norway and Denmark respectively.

THE PRESIDENT: Nevertheless it is inevitable that the question will have to be taken up by a sub-committee because the Executive Committee has unfortunately not the time to deal with these topics.

I should like to know those members who would be willing to serve on a sub-committee dealing with the resolutions which I have read out. It is obvious that the representatives of those national societies which have proposed the resolutions should be members of the sub-committee.

R. F. LEGGET (Canada): I am one of those who think that there are far too many committees in this world; but despite that, I must suggest to you as our Chairman that the matter of the classification of literature is in itself so important that it should not be associated with the other equally important matters raised by our Swedish friends, and placed in the hands of one sub-committee. If I am correct, there was a sub-committee appointed at the meeting in Zurich four years ago to investigate the suggested classification of soil mechanics literature. Since that time I know that our Swedish confrères have done a good deal of work in developing their ideas further, and B. Jakobson—if I may say this in the absence of the Swedish delegate—has recently circulated a revised version of the classification system which has already caused much discussion among the circles to whom it was sent. We in Canada are extremely interested in this matter, and we did have a member on a previous sub-committee and an unofficial meeting was held in Stockholm about two weeks ago. In view of our interest I would gladly offer one member of the sub-committee from Canada, but I would suggest that there should be a sub-committee set up with specific instructions to report finally before the next conference on the matter of the classification of literature.

There is a great deal of work to be done. I know it cannot be done during this conference, but I do feel that if we give sufficient impetus to such a sub-committee that four years might perhaps lead to final results. I would, however, suggest that we separate the classification of literature from other important matters raised by our friends from Sweden.

J. BRINCH HANSEN (Denmark): In my opinion the question of symbols is also sufficiently important to be treated by a separate sub-committee.

THE PRESIDENT: Are there any other comments? I think that the suggestions made by R. F. Legget were very helpful indeed, and I propose that we take these resolutions and classify them according to their contents, because there are several resolutions which are identical as far as their contents are concerned, and then at the next meeting of the Executive Committee we can appoint one sub-committee for each one of the groups and set a deadline in the future for those sub-committees to report on their findings.

Are there any comments on that proposal? If not we shall proceed accordingly, and at the next meeting of the Executive Committee I shall present a classification of the topics in the various resolutions and then, on the basis of that classification, we shall appoint a sub-committee for each one of the categories and set a deadline for submitting reports. (*Agreed.*)

Date and Place of the Fifth International Conference

THE PRESIDENT: An invitation has been received from the French Society to hold the next conference in Paris, and then quite recently—within the space of the two months set for receiving invitations—we have received another invitation from San Francisco. So far as that is concerned, you have more than a week to think it over and a decision will be reached at the next meeting of the Executive Committee.

A. MAYER (France): Monsieur le Président, au nom du Comité français, je tiens à répéter verbalement l'invitation qui vous a été déjà transmise. Nous serions particulièrement heureux que la prochaine réunion du Comité puisse se tenir à Paris.

Je voudrais toutefois faire une réserve, qui tient à nos habitudes, peut-être, à notre législation sur les congés. Nous demandons que la date, dans ce cas, ne soit pas fixée au mois d'août, parce qu'à ce moment-là Paris est complètement vide ... et nous ne pourrions faire visiter aucune des institutions que nous estimons intéressantes, parce que le personnel serait en congé.

Je suis obligé de formuler cette réserve. Je m'en excuse. Mais j'espère qu'elle n'empêchera pas la réunion, que ce soit en juin, en septembre ou même au début de juillet.

THE PRESIDENT: I wish to thank the representative of France for his cordial invitation, and as far as the reservations are concerned, I must say they are indeed convincing. Nobody will insist on having a conference on an impossible date.

R. B. PECK (U.S.A.): I recognize that the invitation of the U.S.A. to hold the conference in San Francisco does not fall within the limits of our Statutes of two months, and if you decide to accept that invitation we may have to take steps to enable Statutes to be amended by this Executive Committee; but I should like to extend the invitation of the U.S.A. Council to hold the Fifth International Conference in San Francisco for several reasons. The first is that San Francisco is a delightful place—as is Paris—to have a conference in the summer time. Secondly, the last three conferences, counting this one, have been held in this hemisphere. Members from the western hemisphere have attended in considerable numbers, and it is our feeling that it is time perhaps for the trend to turn in the other direction. Our people might be a little closer to home and it would be proper that the next conference should be held in the western hemisphere where it would be convenient particularly for members of the U.S.A., Canada, Mexico and South America. Therefore I hope that this invitation will be considered seriously, and I shall be glad to leave various documents with the President outlining the details of the invitation.

Appointment of Officers

(a) *President*

THE PRESIDENT: During a period of 21 years it has been my privilege to preside over your Society. During that period our world has weathered the storm of World War II, and our Society has emerged from that period of catastrophe stronger than before. I should be delighted to preside over the Society for many more years, but in a few weeks I shall reach the age of 74 years, and it is time to consider the fact that nothing lasts for ever.

Therefore, during the last few years I have often pondered over the problem of who should succeed me in this office, and I have repeatedly discussed this question both orally and in correspondence with members of the Society. It was the consensus of opinion that the logical successor to my office would be A. Casagrande who initiated the first International Conference in Cambridge, Mass., in 1936, and who acted at that time as Secretary of the Society. There seemed to be some obstacle in the way, however, because A. Casagrande refused to accept nomination. It appears now, however, at the last minute, that he has changed his mind. Therefore, I place before you the fact that A. Casagrande would be willing to accept nomination, and I invite you to consider this question of my successor between now and the next meeting of the Executive Committee.

R. F. LEGGET (Canada): Will you permit a comment on your statement at this meeting?

THE PRESIDENT: Yes.

R. F. LEGGET: I know I speak for all round this table when I say that we in soil mechanics are very fortunate in two ways. First we have been privileged to learn something of the branch of engineering science in which we are interested from you yourself, to whom we all owe so much as the real founder of the subject, and, secondly, we have a remarkable system of communication, and I think that probably most of those present know that the strongest and most fervent efforts have been made in private discussion and in public to get you, Sir, to change your mind with regard to the fact that you feel you must give up the Presidency. We understand that despite all the pressure which has been exerted upon you and all the temptations placed in front of you—even on the top of glaciers—being the strong man we know you to be you have still refused to change your mind. In that case there is only one thing left for us to do, because as long as you are with us you will always be the President of this Society in our minds and in our hearts. Therefore, without your permission and forgetting all the Statutes I shall ask if we may not now, and not at the next meeting, say that if you insist, Mr. President, on having your own way in this matter we shall insist on having our own way by asking you to be the Honorary President of this Society just as long as you are with us, and we hope that will be a very long time. (*Applause.*)

That response will show you that I did speak for all round this table. I did so without having spoken to more than one or two, but it was, I know, something that was in all our hearts. It may make the job of the next President whenever he is elected difficult if he has an Honorary President above him, but we are sure that, no matter who he may be, he will share our pleasure if you accept our suggestion that you should be our Honorary President. I hope that the Secretary will say that even although the resolution was not put from the Chair and therefore was not legal, it is nevertheless effective and is put into the records.

THE PRESIDENT: I am deeply moved by the kind words which R. F. Legget has addressed to me. My association with the International Society in the course of years became a vital part of my life. I am deeply attached to it, and although the years may prevent me working with the Society as actively as I did before, nevertheless I will consider it a great privilege to accept the title of Honorary President. (*Applause.*)

(b) *Five Vice-Presidents*

THE PRESIDENT: I suggest you discuss this topic between now and the next meeting of the Executive Committee so that you are then able to make definite proposals.

The meeting is adjourned.

At the Institution of Civil Engineers, Tuesday, 20 August, at 3 p.m.

Professor Karl Terzaghi, President, in the Chair

Applications for Membership

THE PRESIDENT: The first item on our agenda are the applications for membership from Mexico and from the U.S.S.R. I understand that you have all received the relevant documents, including the statutes of the two bodies, which you require in order to come to a decision. I invite you, therefore, to vote by show of hands on the application of Mexico.

[A vote was taken by show of hands.]

THE PRESIDENT: The admission of Mexico is agreed to unanimously.

I now put to the vote the application of the U.S.S.R.

[A vote was taken by show of hands.]

THE PRESIDENT: The admission of the U.S.S.R. is agreed to.

Appointment of a Sub-committee on the Method of Selection of Papers, and Membership of Future Conferences

THE PRESIDENT: The second item is the appointment of a sub-committee on the method of selection of papers and on membership of future conferences. This is a matter which in my opinion should be left to the national society which is going to organize the next conference. Are you in favour of this procedure?

B. JAKOBSON (Sweden): I am very sorry that I was not able to be present at the meeting on Monday, 12 August, because of very stormy weather in the North Sea. I understand that this item on the agenda combines two points which were on the agenda of that meeting, one a proposal by the South African Society and one a proposal by the Swedish Society. I am not sure that it is correct to combine them in this way. The South African Society says that the selection of papers should be based on merit, with which I quite agree, although, like that Society, I do not quite know how it is going to be done. The proposal of the Swedish Society, however, deals with another matter, and I cannot imagine that a sub-committee can deal with both points.

For the Swedish proposal I do not think that it is necessary to appoint a sub-committee; I think that we can discuss it here and arrive at some conclusion. I believe you will all agree with me when I say that we want to make our conferences as effective as possible. We have seen that they have grown bigger and bigger. In our opinion in Sweden a small conference is the most effective, and will enable the agenda to be most profitably discussed. We do not think that there is any reason to attempt to make our conferences as large as possible, but we have found that there is a tendency to do so; on the contrary, we want our conferences to be more confined and really effective.

It is, of course, very difficult to prevent people coming to our conferences, but I think that at least we might lay it down that the participants must be members of our Society. If they take so little interest in soil mechanics that they are not members of the national society in their own country, I see no reason why they should take part in our conferences.

The opinion is sometimes expressed that our conference should be confined to a few topics only, and then we could devote more time to their discussion. In view of the fact that there is a long interval between our conferences, I do not think that this is a suitable method, but there is another possibility; we might have several meetings going on simultaneously. We could then give more time to the discussion of each subject, and members could attend those meetings in which they were

most interested. This method has been used successfully by other conferences, and I think it could be employed by our Soil Mechanics Conference also. There may be other arrangements which can be made to increase the effectiveness of our conferences. We suggest, therefore, that participation in our conferences should be confined to members of the Society.

With regard to the second question, it cannot be correct to give orders to the inviting country on how to organize the conference, but we could agree to make a recommendation to the Organizing Committee to arrange to hold two or several meetings simultaneously, so as to have more time for the discussion of each topic. We know that whether we attend a discussion or not we can read the report of it afterwards in what will be, in this case, the third volume of the Proceedings. I do not think that it is necessary to appoint a sub-committee on the Swedish proposal; we can take a decision here and now.

A. J. DA COSTA NUNES (Brazil): Je suggère une solution intermédiaire entre celle du Président et celle de B. Jakobson, de la Suède. Le pays chargé d'organiser la Conférence recevra des suggestions sur l'organisation de la Conférence de tous les participants et prendra ses décisions sur la base des suggestions reçues.

THE PRESIDENT: Before going further, I wish to ask the French-speaking members of the Committee whether or not they wish to have speeches in English translated into French.

A. MAYER (France): En ce qui nous concerne, non.

THE PRESIDENT: Are there any other suggestions?

R. PIETKOWSKI (Poland): I understand that B. Jakobson has suggested that the right to participate in conferences should be restricted to members of the affiliated Societies.

THE PRESIDENT: Yes. There are two topics before us which have been mentioned by B. Jakobson, and we must distinguish between them. One concerns a reduction in the number of topics open to discussion during the conference, and the other the number of people who are going to attend. So far as the first point is concerned, I have the feeling that most of the national societies represented in this room are in favour of reducing the number of topics to be dealt with by an international conference. In doing so we should only be following the very successful example of the Large Dam Conference. I will now take a vote on the advisability of reducing the number of topics to be covered by an international conference.

[A vote was taken by show of hands.]

THE PRESIDENT: There are 15 in favour and 15 against. This is contrary to all the laws of probability!

THE ACTING VICE-PRESIDENT FOR NORTH AMERICA: You originally suggested that this be left to the National Committee which is going to organize the conference. I voted against the proposal because I believe that it is better to leave it to the National Committee handling each individual conference.

THE PRESIDENT: I greatly welcome that contribution, because it reduces the number in favour to 14, and the number who would leave it to the Committee charged with organizing the next conference is increased to 16. It seems that this problem, therefore, will fall into the lap of the Committee which has to organize the next international conference.

The next question is whether the number of people admitted

to take part in the next conference should be limited, or whether it should be a 'free fight'. We will now vote on that.

[A vote was taken by show of hands.]

THE PRESIDENT: There are 22 votes for free admission and 8 for limiting the numbers. It appears that the majority of the national societies are in favour of free admission.

THE VICE-PRESIDENT FOR EUROPE: Does that mean free outside all the bounds of our own members, or free within the bounds of the membership of the International Society?

THE PRESIDENT: Free within the membership of the International Society.

O. MORETTO (Argentina): I do not think that that is clear. Does it mean that if there is a country which has not a National Committee, no member of that country can come?

THE PRESIDENT: That is the meaning.

O. MORETTO: I vote against that.

THE PRESIDENT: There is one vote against—how many?

A. J. DA COSTA NUNES (Brazil): Dans le cas où une Société nationale n'est pas encore représentée dans la Société Internationale, les membres individuels de cette Société nationale pourraient-ils assister à la Conférence?

THE PRESIDENT: There is one reason against it. The International Society is a family, and the International Conference is a family affair. The family cannot admit anybody who is not a member of the family.

A. J. DA COSTA NUNES (Brazil): Even in the best families there is an opportunity to bring in others!

THE PRESIDENT: Yes. If there is a family party and someone who does not belong to the family wants to take part in it, he can always write to the head of the family and ask for permission to come. That is a very simple way out.

O. MORETTO (Argentina): If we adopt a resolution such as we appear to have passed, the friend of the family will not be able to join the party.

THE PRESIDENT: Every member of the family is cordially invited, but anyone who is not a member of the family has to apply for permission to come.

O. MORETTO (Argentina): That will change the resolution completely, but I should find that satisfactory.

THE PRESIDENT: We will ask the Secretary to draft the decision in that sense.

Appointment of a Sub-committee on Annual Reports

THE PRESIDENT: The next item is the appointment of a sub-committee on Annual Reports, to consider the question of the publication of lists of membership and the form of Annual Reports. There is at present no sub-committee on this subject.

L. BJERRUM (Norway): I see no necessity for a sub-committee on Annual Reports. I suggest that we eliminate the Annual Reports and that the Statutes be amended accordingly.

THE PRESIDENT: That is a reasonable suggestion. I put it to the vote.

[A vote was taken by show of hands.]

THE PRESIDENT: That is carried, there being only one vote against it.

THE ACTING VICE-PRESIDENT FOR NORTH AMERICA: There is another item here, the publication of lists of membership. I think it would be very valuable if a list of international members were published.

O. MORETTO (Argentina): We should say how often.

THE PRESIDENT: Every two years?

THE SECRETARY: There are two problems here: how often, and how many copies. The original proposal was that it should be issued every two years, and I see no difficulty in that administratively. On the question of how many copies, this is entirely a question of cost, bearing in mind that we have only 25 cents per member to pay for this list. If it could be limited to a certain number of copies for each country, and not one for every member in each country, it would be easy. I feel sure that every member in every country does not want a copy.

O. MORETTO (Argentina): I suggest that the list be issued after each conference and that every member should receive one, because the purpose of the list is to keep the members up to date about the other members of the 'family', so that I suppose everyone will want to have a copy, even if he does not make much use of it.

L. BJERRUM (Norway): To reduce the amount of administrative work and the cost, I propose that every National Committee should, every second year, send a list of its members to Mr. Banister, and that he should return to the National Committees only two copies. It would then be for the National Committees to arrange for the distribution to their members, which should be quite easy.

A. MAYER (France): Je ne suis pas d'accord. S'il y a une liste, il faut l'envoyer à tout le monde. Chacun de nous payerait volontiers une petite somme pour cette liste comme pour n'importe quelle autre publication. Elle pourrait paraître comme numéro special de *Geotechnique*.

A. VON MOOS (Switzerland): If we were to accept the proposal of L. Bjerrum we should have to change our Statutes, which provide that we have to send out each year a list of members. I suggest that after each conference a copy be sent to every member.

B. JAKOBSON (Sweden): I think that four years is too long an interval, and that two years is a better period. I do not think that it will cost very much. In our opinion in Sweden, the annual membership fee is ridiculous. The subscription is so small that it will not mean anything at all if we double or treble it, but we want better service. If we get better service, we have nothing against increasing the membership fee. We propose that the list of members should be issued every two years and that all members of the Society receive a copy.

THE PRESIDENT: I have pleasure in announcing that Mr. Banister is ready to send out a complete membership list to every member every second year. Is that agreed?

[A vote was taken by show of hands.]

THE PRESIDENT: That is carried.

L. E. COLLINS (Union of South Africa): At no extra cost?

THE SECRETARY: That is possible because of the elimination of the Annual Reports.

THE PRESIDENT: That is the procedure used in bazaars!

Appointment of a Sub-committee on the Classification of Geotechnical Literature

THE PRESIDENT: A sub-committee on the classification of geotechnical literature has already been proposed, namely:

A. Casagrande (U.S.A.)
L. F. Cooling (U.K.)
J. Kérisel (France)
T. J. Osterman (Sweden)
H. Peterman (Germany)
L. Bjerrum (Norway)

A. VON MOOS (Switzerland): I suggest the addition to the sub-committee of A. Croce, of Italy.

A. CROCE (Italy): We are very interested in this subject.

THE PRESIDENT: I propose that A. Croce be added to the sub-committee. Is that agreed?

[The Committee agreed.]

R. PIETKOWSKI (Poland): I suggest that Poland be added to the list of countries represented.

G. RAO (India): We are very interested in this subject.

L. BJERRUM (Norway): In order to get effective work done, we have to keep the number of members of the sub-committee as small as possible. I am very much against having too many people on it.

G. RAO (India): That is true but I think countries that are doing a great deal of work on the subject should be represented. In India we are making this investigation, and I think it is only appropriate that India should be represented.

E. C. W. A. GEUZE (Netherlands): Have the gentlemen who have already met to discuss the subject come to any definite conclusions on the way in which they would like this classification to be carried out? I think that every one of the members present here is as much interested in the result of their work as are members in India and Poland. I agree with L. Bjerrum that this sub-committee should not be too large, because there are only a few existing methods of classification, and it would be quite natural that these methods should be adopted as a working basis for the sub-committee. I think we can all profit from the work of the sub-committee without being members of it.

THE PRESIDENT: That is also my opinion, because it is essentially a working committee and does not make any decisions. It will formulate tentative proposals, and these proposals will then be submitted to the Chairmen of all the National Committees for discussion. I too, therefore, am in favour of keeping the sub-committee as small as possible, as was the case in the list which I read out. I suggest that a certain time-limit, say two years, should be given to the sub-committee in which to report, and then after two years the topic will be open to discussion to all the Chairmen of the National Committees.

R. PIETKOWSKI (Poland): In that case I do not insist on the participation of Poland.

THE PRESIDENT: I put to the vote the names which I read out, together with A. Croce.

[A vote was taken by show of hands. The list was adopted.]

NOTE: Subsequently the name of E. E. M. J. A. de Beer (Belgium) was added.

Appointment of a Sub-committee on Notations and Symbols for Use in Soil Mechanics

THE PRESIDENT: A sub-committee on notations and symbols for use in soil mechanics has been proposed with the following members:

R. B. Peck (U.S.A.)
A. W. Bishop (U.K.)
J. Kérisel (France)
B. Jakobson (Sweden)
E. Schultze (Germany)
J. Brinch Hansen (Denmark)
A. von Moos (Switzerland)

R. B. PECK (U.S.A.): I offer the suggestion that the member from the U.S.A. should be R. E. Fadum, who has been doing similar work for the A.S.T.M., instead of R. B. Peck.

THE PRESIDENT: That indicates that you have been kidnapped and put on to the sub-committee without being asked!

A. VON MOOS (Switzerland): I ask you to take off my name.

THE PRESIDENT: Very well. With those changes, is that agreed?

[The Committee agreed.]

L. E. COLLINS (South Africa): I suggest that you should urge all the members, when once this sub-committee has decided on its proposals and notation, to make every attempt to stick to them so far as is humanly possible.

THE PRESIDENT: With the stress on 'humanly possible'!

Appointment of a Sub-committee to Study the Methods of Static and Dynamic Penetration Tests

THE PRESIDENT: We have now to turn to the Supplementary Agenda, where there is an item regarding the appointment of a committee to study the methods of static and dynamic penetration tests with a view to their standardization. It adds:

The Committee further to indicate the proper procedure for the recommended static and dynamic penetration tests so that the results of such tests are uniform.

Those of us who have had to deal in practice with penetration tests will have suffered from the fact that every country uses different procedures, so that someone who is used to operating with certain 'tools' in one country is lost when he goes to another. The suggestion is, therefore, that we should appoint a sub-committee for the purpose of standardizing the procedure, and that should be most welcome.

The topic has been discussed amongst the members and the following suggestions have been made for constituting the committee. There should be one member from Sweden, one member from the U.S.A., one member from Holland and one from Brazil. Those are the four countries which are most deeply concerned with penetration tests. I invite the representatives of these four countries to make their nominations.

B. JAKOBSON (Sweden): I think I shall have to join it myself.

E. C. W. A. GEUZE (Netherlands): I am in the same position as B. Jakobson.

THE PRESIDENT: That means that you will represent your country.

R. B. PECK (U.S.A.): Could this matter be deferred until we have discussed it? We will make a proposal later.

THE PRESIDENT: Very well. It will be the business of the U.S.A. to make the appointment.

A. J. DA COSTA NUNES (Brazil): I suggest M. Vargas.

THE VICE-PRESIDENT FOR SOUTH AMERICA: Very well. I think that the Argentine is also very interested, and I would suggest the appointment of O. Moretto. I would also suggest the appointment of T. K. E. Kallstenius, who is very interested in this, from Sweden.

THE PRESIDENT: B. Jakobson will be representing Sweden.

A. VON MOOS (Switzerland): Both Germany and Switzerland are very interested in this, and I suggest that one of them should be represented on the committee.

THE PRESIDENT: Whom do you suggest?

A. VON MOOS: As I retired from the other committee, I am willing to serve on this one.

THE PRESIDENT: Very well. Now we shall have to close the doors!

M. VARGAS (Brazil): I would suggest also E. E. M. J. A. de Beer, of Belgium.

E. C. W. A. GEUZE (Netherlands): I would welcome the presence of E. E. M. J. A. de Beer on this committee, but he has more or less relegated the task to me. The Belgians have been working on the subject for a long time in much the same way that we have, and E. E. M. J. A. de Beer and I agreed that in order not to increase the size of the committee too much he would favour my appointment.

THE PRESIDENT: The following gentlemen, then, are appointed to the sub-committee:

B. Jakobson (Sweden)
E. C. W. A. Geuze (Netherlands)
One to be nominated (U.S.A.)
M. Vargas (Brazil)
O. Moretto (Argentina)
A. von Moos (Switzerland)

I put that to the vote.

[A vote was taken by show of hands.]

THE PRESIDENT: That is carried.

Appointment of a Sub-committee on Undisturbed Sampling

THE PRESIDENT: It is also suggested that a sub-committee should be appointed to deal with the standardization of certain details concerning undisturbed sampling, and it is suggested that it should have the following tasks:

- (1) To gather information on research made on the influence of sampling methods and sampler design on the quality of samples.
- (2) To gather information on penetration ability, economy and production for different types of samplers.
- (3) To recommend certain dimensions and procedures to be preferred when adopting routine samplers.
- (4) To report the result of its activities to the next international conference.

The answer to these difficult problems is ready made. I have here the following suggestions for the membership of the sub-committee:

M. Vargas (Brazil)
One member not nominated (Canada)
J. Kérisel (France)
H. K. G. Muhs (Germany)
M. Fukuoka (Japan)
A. Andresen (Norway)
T. K. E. Kallstenius (Sweden)
One member not nominated (U.K.)
M. J. Hvorslev (U.S.A.)
J. O. Osterberg (U.S.A.)
J. Lowe (U.S.A.)
J. D. Parsons (U.S.A.)
One member not nominated (U.S.S.R.)

L. BJERRUM (Norway): I am against trying to standardize these procedures. All over the world there are different

geological conditions, so that it is almost hopeless to try to standardize sampling, and I do not see any reason to form a sub-committee to find that out. We should recommend every country to develop the sampling suited to its conditions, and we do not need an expert committee to work on this point.

THE PRESIDENT: I should like to say a few words about this. The remarks which have just been made have much merit. We have one volume which has been written on the topic of sampling, and that is the volume which has been written after many years of hard labour by M. J. Hvorslev. Whoever reads that book can decide for himself whether a procedure for sampling is good or bad. I have found from bitter experience that if you go to a country outside your own narrow domain then, no matter what you think about the proper method of sampling, you have to take what you get. I feel, therefore, that the combination between two factors, the great number of members suggested for the sub-committee and the very much greater variety of conditions under which the act of sampling has to be performed, will make it rather a hopeless task and will only lead to a waste of paper. That is my view, but the discussion is open on the subject.

[A vote was taken by show of hands.]

THE PRESIDENT: That is carried.

Date and Place of the Fifth International Conference

THE PRESIDENT: The next item on our agenda are the data and place of the Fifth International Conference. On this subject we have had a meeting of the Vice-Presidents, or their representatives, and the decision was a little confused; we could pronounce in favour neither of San Francisco, which was proposed by the U.S.A., nor of Paris, which was proposed by the French National Committee. We are compelled, therefore, to decide this question here by secret vote. We shall hand a slip of paper to each member of the Committee and ask you to write the name of the place which you prefer.

B. JAKOBSON (Sweden): I wish to ask a question. Article (13) of the Statutes provides that:

The applications of the inviting countries for the next conference shall be submitted to the Secretary at least 2 months before the opening of the conference.

Have we had the applications from these two countries two months before this conference?

THE PRESIDENT: We committed the criminal act of ignoring that point.

B. JAKOBSON: I think that we must follow the Statutes. If we do not like them, we ought to change them.

THE PRESIDENT: Then I shall have to take a vote to find out who is in favour of eliminating the choice, because if we adhere to this provision in the Statutes we shall have only one invitation and there will be no need to vote or to discuss the matter. Either, therefore, we must disregard this provision in the Statutes or we must say that the next conference will be held at so-and-so, because two months ago there was only one proposal. I ask those in favour of adhering to this provision in the Statutes, which means that San Francisco shall not be considered, to raise their hands.

[A vote was taken by show of hands.]

THE PRESIDENT: That is defeated, there being only three votes in favour.

A. VON MOOS (Switzerland): These two proposals put us in a very difficult situation.

The PRESIDENT: No doubt.

A. VON MOOS: At this meeting most of us come from European countries, and we form a majority. There are two points which should be borne in mind. We have had three conferences in Europe, and therefore I think that we should have a change of continent. Personally, I am in favour of a change of continent, and I ask my European friends to remember that Switzerland has got on very well for centuries because she has given minorities their rights, and the minority in this case consists of the non-European countries. I shall vote for San Francisco.

A. PAEZ (Colombia): May we ask the representatives of the inviting countries to explain the reasons why they think that the next conference should be held in their country?

THE PRESIDENT: I think that it would be useful to have their reactions before we proceed to the critical act of voting. I invite you to express your feelings.

E. T. HANRAHAN (Ireland): I speak as the representative of a small country, and I think it a little unfair that we should have the same voting power as the U.S.A. There are far more members in the U.S.A. than in Ireland, and it seems unfair that we should have the same voting power as a bigger country.

E. C. W. A. GEUZE (Netherlands): I think that I agree with that. Could not we vote according to the five areas from which our Vice-Presidents have been chosen, according to the majority within each area? That might get over this difficulty.

THE PRESIDENT: Do you suggest that we should give to each area a vote in proportion to the number of members within the area?

E. C. W. A. GEUZE: It should be according to the majority for either of the places mentioned, the majority in each area.

R. PIETKOWSKI (Poland): I want to point out that there are economic reasons for choosing Paris rather than San Francisco.

THE PRESIDENT: We are all conscious of the distance between the centre of gravity of Europe and San Francisco. It is not a negligible quantity.

L. BJERRUM (Norway): I speak as an ordinary member of the Society in Europe. I think we all agree that preferably the next conference should be held in the U.S.A. There is no discussion about that, and we should be ready to face the extra cost. I speak, however, I am sure, for a great number of people when I say that the conference should not be held at the point in the U.S.A. which is the furthest away from Europe. San Francisco will double the cost compared with Boston or Eastern Canada. I should like to ask the Americans if they really think that it is worth while to hold an international conference attended by only 30-40 people from Europe. It would be very similar to the normal American Convention held several times a year, as the number of participants from other countries would be small. Do the U.S.A. delegates consider that it is impossible to hold the conference in some other place than San Francisco? I should be ready to vote for the U.S.A. in general, without specifying a place, if they would promise to reconsider the place and try to hold it in the more eastern part of the U.S.A.

R. B. PECK (U.S.A.): I think first we have to say that we have only one commitment, and that is from San Francisco. It would be unwise for me to say that we could hold it in some other place. I recognize that that is very far from Europe, though it is very close to Asia, which may mean something to some of the people here. I think that all of us in the U.S.A. have been

extremely conscious of the economic situation, and that if the conference is held anywhere in the U.S.A., and particularly on the West Coast, it will be difficult for many people to come from Europe, and particularly for the younger people who do not have the means or the support of some organization. We feel, however, that the economic unbalance is not in such a high ratio—4:1, let us say—that one conference in four should not permit young people to come, and therefore we feel that we should extend the invitation from the point of view that no matter where we hold the conference it will be too far away for many people; but this will be closer to another large group of people.

THE PRESIDENT: A. Mayer, will you present the case for Paris?

A. MAYER (France): La chose me semble assez simple. Il y a plusieurs mois que la commission française a examiné la question de la prochaine réunion de la conférence. Nous avons cru qu'il y existait une règle selon laquelle deux conférences ne peuvent pas se succéder dans le même pays. En 1936 la conférence s'est tenue aux États Unis; ensuite elle a eu lieu à Rotterdam, et maintenant à Londres. Nous avons pensé que c'était peut-être notre devoir de proposer que la prochaine conférence ait lieu à Paris, surtout que, si nos informations sont exactes, aucune autre invitation n'a été adressée.

Il n'est pas nécessaire de faire de la publicité pour Paris; vous avez tous entendu parler de cette ville! Nous avons la possibilité de loger tout le monde, et nous ferons de notre mieux pour assurer le succès de la conférence.

B. JAKOBSON (Sweden): I should like it to be placed on record that it is my definite opinion that we have to follow the Statutes; otherwise we do not need Statutes.

D. KRSMANOVIĆ (Yugoslavia): From the economic point of view we must realize that for more than half our members it will be very difficult to go to San Francisco. This should give cause for reflection, because it means that not more than 200-300 members may go, and that is not the object of our Society.

THE ACTING VICE-PRESIDENT FOR NORTH AMERICA: I should like to say a few more words about San Francisco as a location for the next conference. From an economic point of view—the importance of which we recognize—air transportation across the U.S.A. is less than half the cost across the Atlantic, and can be booked on this side of the Atlantic on the one ticket, so that the extra cost of going to the West Coast is not an extremely major item.

Secondly, the reason for the U.S.A. Committee endorsing the invitation from San Francisco is primarily that there are very large engineering operations and works under construction there in the highway field and on airfield work and large earth dams, which are close enough to San Francisco to be readily visited. We hoped that many European countries would send delegates with their expenses paid because of the engineering construction which can be visited there.

Thirdly, if I may mention again a point which R. B. Peck made, San Francisco is very much closer to Australia, Japan and India than is the eastern part of the U.S.A.

THE PRESIDENT: If there are no other contributions to the discussion, we shall take a vote.

[A vote was then taken by each delegate writing the place chosen on the voting paper.]

THE PRESIDENT: The result of the vote is that Paris is chosen, there being 18 votes for Paris against 14 for San Francisco. I thank the French National Committee for their invitation. *(Applause.)*

The next question is the year in which the conference should be held. Opinions vary between four years and five years. We will take a vote on each.

[A vote was taken by show of hands.]

THE PRESIDENT: There are 22 in favour of four years and 9 in favour of five years. The next conference will therefore be held in four years' time.

A. MAYER (France): J'ai quelques questions à poser au sujet de l'organisation de la prochaine conférence. Il a été décidé qu'elle aurait lieu en 1961. J'aimerais savoir s'il nous appartient de proposer une date plus précise. Si c'était le cas, la première quinzaine de juillet vous semble-t-elle commode?

THE SECRETARY: With regard to the date, there is only one factor which I should like to mention, and that is that in choosing the date of an international conference it should be borne in mind that there are other organizations which also have conferences, and the U.A.T.I. exists for the purpose of ensuring that there is no clash in dates.

THE PRESIDENT: The subject is open for discussion. The first half of July has been suggested. What other dates are proposed?

A DELEGATE: The first half of September.

THE PRESIDENT: We will take a vote on those two suggestions.

[A vote was taken by show of hands.]

A. MAYER (France): Je propose une date entre le 1^{er} juillet et le 1^{er} octobre, à l'exclusion des mois d'août. A cette époque, par exemple, nous pourrions vous loger à l'Ecole Polytechnique, ce qui permettrait aux jeunes ingénieurs de venir à Paris d'une façon plus économique.

THE PRESIDENT: There are 16 votes for the first half of July and 8 for the first half of September. It appears that the majority of those in this room are in favour of holding the conference in July, starting on 1 July. Is that correct?

R. B. PECK (U.S.A.): The French Committee should consider this as a preference and not as a mandate, because there may be many reasons which necessitate an alteration, and it may be difficult to fix the exact date now.

THE PRESIDENT: Yes. It is a preliminary project.

A. MAYER (France): Il y a une autre question qu'on a commencé à discuter tout à l'heure à l'initiative de M. Jakobson, celle d'une réduction dans le nombre des sujets traités. Avez-vous confiance en nous pour prendre une décision sur ce point, naturellement en tenant compte des directives de la sous-commission responsable?

THE PRESIDENT: In connection with the second point raised by A. Mayer I suggest the following procedure. The French National Committee should be asked to work out a programme for the number and types of topics which are to be covered during the conference. When they have arrived at a decision they should send their suggestions to the National Committees and invite their comments.

A. MAYER: D'accord.

Election of the President

THE PRESIDENT: We now pass to the next item, the election of the President. At the last meeting of the Executive Committee I announced that A. Casagrande would be willing to

accept nomination as President, but at that time I was not aware that he upholds the theory that the President ought to be elected from the continent in which the Conference will be held. You know from experience that if a man is sold on a theory it is almost impossible to make him understand that his theory is not quite so sound as he believes, and A. Casagrande still believes that his theory is sound.

We are compelled, therefore, to nominate our President in such a manner that he will preside on the European continent, and, taking account of that fact, I nominate my friend and colleague A. W. Skempton to succeed me in the presidency. Are there any other nominations? If not, I am pleased to declare A. W. Skempton elected. (*Applause.*)

Election of Vice-Presidents

THE PRESIDENT: We have now to elect Vice-Presidents for the following zones: Europe, Asia (India has requested that an Indian be made Vice-President for this zone), Africa, North America and South America. I invite the Committee to split up into five fractions, each to nominate its Vice-President.

B. JAKOBSON (Sweden): May I make a general statement? It is wrong to resolve that a certain country shall represent a continent or to say that, as in this case, the Vice-President for Asia shall be a representative of India or of Japan or of any country. He must be a representative of the whole of Asia, and in his capacity as Vice-President for Asia he must feel that he represents the whole of Asia and not just a single country; otherwise he will not be a good Vice-President. The Vice-President should not be chosen because he represents a certain country but because he is the most suitable person for the office. I should like this statement to be placed on record.

THE PRESIDENT: All that I have done is to read what is written on the agenda! I have no opinion to express on the point. I invite you to proceed to the selection of your Vice-Presidents.

D. H. TROLLOPE (Australia): May I express the view of the Australasian group and ask to be excused from participation in this? Australasia feels that it belongs nowhere, so to speak at the moment.

A. W. SKEMPTON (Vice-President): Would it be in order to create a vice-presidency for Australasia?

THE PRESIDENT: Yes. According to Article (19) of the Statutes the Executive Committee can amend the Statutes. It would be necessary to amend Article (10) (b).

A. W. SKEMPTON: Then I formally move that Article (10) (b) be amended by adding:

[1 Vice-President for Australasia.]

THE PRESIDENT: I put that to the vote.

[A vote was taken by show of hands.]

THE PRESIDENT: That is carried.

A. MAYER (France)* suggested that it was premature to elect a Vice-President for Europe, the vacancy having arisen unexpectedly, and that the European members should have an opportunity to consult together and announce their decision the following day.

THE PRESIDENT: I think that that is a perfectly legitimate request. Europe is in an exceptional position in that its former Vice-President has now been elected President. I suggest, therefore, that the European members discuss this matter

* Taken from interpretation. Original inaudible.

amongst themselves and hand to me or to Mr. Banister tomorrow, before the closing session, their decision.

L. BJERRUM (Norway): I think that many of my colleagues from Europe would be in favour of the nomination of the European Vice-President from France, as the country which will organize the next conference. It would seem only logical for those of us from the European countries to vote for a Frenchman.

B. JAKOBSON (Sweden): I object to choosing a certain country, but I shall be glad to vote for A. Mayer.

J. BRINCH HANSEN (Denmark): I do not see why we cannot take that vote now. I shall prefer to do so.

THE PRESIDENT: It is a matter for the representatives of each continent and cannot be made the subject of a general decision. All that I can do is to ask the representatives of Europe to cast their vote, and the representatives of Africa, and so on.

R. B. PECK (U.S.A.): Without wishing to be too legalistic, I think the Statutes say that the Executive Committee elects the Vice-Presidents, not the different continents by compartments.

L. F. COOLING (U.K.): I support the nomination of A. Mayer.

THE PRESIDENT: A. Mayer is nominated as Vice-President for Europe. I put that nomination to the vote.

O. MORETTO (Argentina): Has everybody a vote?

THE PRESIDENT: Yes.

[A vote was taken by show of hands.]

THE PRESIDENT: A. Mayer is elected. *(Applause.)*

A. MAYER: Thank you very much.

M. TOYAMA (Japan): As Vice-President for Asia I propose the delegate of India, G. Rao.

[The motion was carried.]

L. E. COLLINS (Union of South Africa): As Vice-President for Africa I propose J. E. Jennings.

[The motion was carried.]

R. B. PECK (U.S.A.): I should like to propose, on behalf of the U.S.A. Council, that the Vice-President for North America be R. F. Legget.

[The motion was carried.]

A. J. DA COSTA NUNES: As Vice-President for South America I propose A. J. L. Bolognesi of Argentina.

[The motion was carried.]

D. H. TROLLOPE (Australia): As Vice-President for Australasia I propose G. D. Aitchison.

[The motion was carried.]

R. F. LEGGET (Canada): I should like to say a word about that last election, because it occurs to me that the suggestion

of a new Vice-President of this International Society was put to us rather quickly, and perhaps few of those round this table have had the privilege of visiting Australasia. I am one of those few, and I should like to testify to the great activity in soil mechanics on both Australia and New Zealand. This is not a case of electing a Vice-President from a large country where not much is being done in soil mechanics. I should not like anyone to go away from this room in doubt about the decision which we have taken in appointing a Vice-President from Australasia, and so I should like to testify from personal knowledge, as a visitor to that great continent, to the value and activity of the work which is being done there. I am sure that my view will be shared by everybody as they come to know of the work which is being done. I am very pleased to know that this sixth Vice-presidency is to be filled by G. D. Aitchison.

Other Business

THE PRESIDENT: As the last item on our agenda, is there any other business?

J. BRINCH HANSEN (Denmark): I should like to ask whether our Statutes are going to be changed, because on a number of points decisions have been taken which are in contradiction to the Statutes. Will they be changed, and do we have to vote for the changes here?

THE SECRETARY: It is suggested that we have done things which are contrary to the Statutes. That has been done only once, by putting the invitation to San Francisco to the vote although it did not comply with the two months' rule, and in effect it had no result.

J. BRINCH HANSEN: We have elected an extra Vice-President.

THE SECRETARY: That has been formally passed as an amendment to the Statute.

J. BRINCH HANSEN: What about the Annual Reports?

THE SECRETARY: It has been agreed that Annual Reports shall be omitted, and the necessary amendment will be made.

O. MORETTO (Argentina): I move that Article (13) of the Statutes be amended so that applications of inviting countries may be submitted up to the date of the opening of the conference.

THE PRESIDENT: That is a very good suggestion. It would have saved one discussion this afternoon! I put it to the vote.

[A vote was taken by show of hands.]

THE PRESIDENT: That is carried.

That brings our discussions to an end, and I close the meeting.

The proceedings then terminated.

Statutes of the International Society of Soil Mechanics and Foundation Engineering

Statuts de la Société Internationale de mécanique des sols et des travaux de fondations

As amended in London, August 1957 Révisé à Londres, août 1957

I. Name, Aim, Headquarters and Official Languages of the Society

(1) The name of the Society is: International Society of Soil Mechanics and Foundation Engineering; in French: Société Internationale de mécanique des sols et des travaux de fondations.

(2) The aim of the Society is the promotion of international co-operation among scientists and engineers in the field of soil mechanics and its practical applications.

The International Society ensures this co-operation by:

- (a) periodically holding International Conferences;
- (b) creating permanent Research Committees;
- (c) publishing a List of Members every two years;
- (d) promoting the publication of abstracts.

(3) The official languages of the Society are English and French.

II. Membership, National Organizations, Contributions

(4) The International Society is composed of National Societies. The National Societies may be affiliated to existing Engineering Societies. The National Societies shall be governed by the rules stated in Articles 6, 7, 8.

The application of a new National Society for membership must be submitted to the Executive Committee of the International Society who have the right to accept or reject it.

Should the Society belong to a country in good standing represented on the Executive Committee at the Third International Conference of Soil Mechanics and Foundation Engineering it shall be automatically admitted.

(5) Each individual or collective member of a National Society is automatically a member of the International Society.

In countries where no National Society exists the resident shall apply for admission to a National Society of his choice willing to accept his application.

(6) Annual contributions, individual and collective, shall be collected by the National Societies. The National Societies shall pay their annual contributions to the International Society. The amount and the date of payment of the latter contributions shall be fixed by the Executive Committee.

(7) To fulfil the obligations necessary for its admission to the International Society a National Society must send to the Secretary of the International Society:

- (a) its statutes, in duplicate;
- (b) the names, addresses and occupations of its members, in duplicate;
- (c) the contributions for the current year.

I. Nom, but siège et langues officielles de la Société

1° Le nom de la Société est Société Internationale de mécanique des sols et des travaux de fondations; en anglais: International Society of Soil Mechanics and Foundation Engineering.

2° Le but de la Société est de promouvoir une collaboration internationale entre les savants les ingénieurs dans le domaine de la mécanique des sols et de ses applications.

Pour assurer cette collaboration, la Société Internationale:

- (a) organise périodiquement des Congrès Internationaux;
- (b) crée des Commissions permanentes d'étude;
- (c) publie une liste de ses membres tous les deux ans;
- (d) encourage la publication de résumés.

3° Les langues officielles de la Société sont l'anglais et le français.

II. Membres, organisations nationales, cotisations

4° La Société Internationale est composée de Sociétés Nationales. Les Sociétés Nationales peuvent être affiliées à des sociétés d'ingénieurs déjà existantes. Les Sociétés Nationales sont soumises aux règles fixées aux articles 6, 7 et 8.

La demande d'admission d'une nouvelle société est soumise au Comité exécutif de la Société Internationale qui a le droit de l'accepter ou de la rejeter.

Si la société appartient à un pays remplissant les conditions requises par les statuts et déjà représenté au Comité exécutif du Troisième Congrès International de mécanique des sols et des travaux de fondations, elle est admise automatiquement.

5° Chaque membre individuel ou collectif d'une Société Nationale est automatiquement membre de la Société Internationale.

Dans les pays n'ayant pas de Société Nationale le requérant sollicitera son admission auprès d'une Société Nationale de son choix disposée à accepter sa demande.

6° Les cotisations annuelles, individuelles et collectives, sont encaissées par les Sociétés Nationales. Les Sociétés Nationales versent leurs cotisations annuelles à la Société Internationale. Le montant et la date de versement de ces cotisations sont fixés par le Comité exécutif.

7° Pour remplir les conditions nécessaires à son admission à la Société Internationale, une Société Nationale devra envoyer en double exemplaire au Secrétariat de la Société Internationale:

- (a) ses status;
- (b) les noms, adresses et indication de l'activité de ses membres, en double;
- (c) la cotisation pour l'année courante.

(8) Each year, at a date fixed by the Executive Committee, the National Society shall send to the Secretary of the International Society:

(a) the amount of its contribution as stated by Article 6.

It shall send further, in duplicate, and at the same date:

- (b) copies of its complete statutes if they have been modified during the current year;
- (c) the current list of its members, their occupations and addresses.

III. Management of the Society

(9) The management of the Society shall be vested in the Executive Committee.

(10) The Executive Committee is composed of:

- (a) the President;
- (b) 1 Vice-President for Europe (Turkey to be considered as a European member)
- 1 Vice-President for Asia
- 1 Vice-President for Africa
- 1 Vice-President for North America
- 1 Vice-President for South America
- 1 Vice-President for Australasia;
- (c) one delegate from each National Society in good standing.

The President and the 6 Vice-Presidents shall be elected by the Executive Committee. Their mandate shall expire after each International Conference. They shall be eligible for re-election.

(11) The Secretary of the International Society shall be appointed by the President.

The Secretary shall be a non-voting member of the Executive Committee.

(12) Voting shall be decided by a simple majority. The President shall have a casting vote. The Executive Committee will hold its meetings during the Conferences; between these, the business of the International Society will be transacted by correspondence.

The Executive Committee cannot take decisions unless more than 50 per cent of its members participate in the vote. Votes by correspondence shall be admitted. Voting shall be decided by a simple majority.

(13) The applications of the inviting countries for the next conference shall be submitted to the Secretary before the opening of the Conference.

The agenda of the work of the Executive Committee shall be drawn up by the President and must be sent to the National Societies at least one month before the opening of the Conference.

IV. List of Members

(14) At the given date (Article 8) each National Society shall send to the Secretary the current list of its members, their occupations and addresses.

The Secretary shall publish a List of Members on the basis of these lists and shall send copies to the National Societies every two years.

8° Chaque année à la date fixée par le Comité exécutif, la Société Nationale versera au Secrétariat de la Société Internationale:

(a) la cotisation fixée à l'article 6.

En outre elle enverra en double exemplaire et à la même date:

- (b) un exemplaire complet de ses statuts si ceux-ci ont été modifiés pendant l'année en cours;
- (c) la liste mise à jour de ses membres, leurs activités et adresses.

III. Direction de la Société

9° La direction de la Société est confiée au Comité exécutif.

10° Le Comité exécutif comprend:

- (a) le Président;
- (b) 1 Vice-Président pour l'Europe (la Turquie fait partie de l'Europe)
- 1 Vice-Président pour l'Asie
- 1 Vice-Président pour l'Afrique
- 1 Vice-Président pour l'Amérique du Nord
- 1 Vice-Président pour l'Amérique du Sud
- 1 Vice-Président pour l'Australasie;
- (c) un délégué par Société Nationale remplissant les conditions prévues par les Statuts.

Le Président et les six Vice-Présidents sont élus par le Comité exécutif. Leur mandat cesse au terme de chaque Congrès International. Ils sont rééligibles.

11° Le Secrétaire de la Société Internationale est désigné par le Président.

Le Secrétaire est membre du Comité exécutif mais ne participe pas aux votes.

12° Les décisions par vote seront prises à la majorité simple. En cas d'égalité du nombre des voix, le Président décide. Le Comité exécutif tient ses séances durant les Congrès; entre ceux-ci il règle les affaires de la Société Internationale par correspondance.

Le Comité exécutif ne peut prendre des décisions que si 50 pour cent au moins de ses membres participent au vote. Le vote par correspondance est admis.

13° Les candidatures des pays désirant être le siège du Congrès suivant sont à soumettre au Secrétaire avant l'ouverture du Congrès.

L'ordre du jour des travaux du Comité exécutif est établi par le Président et doit être soumis aux Sociétés Nationales un mois au moins avant l'ouverture du Congrès.

IV. Liste des membres

14° A la date fixée selon l'article 8, chaque Société Nationale envoie au Secrétaire la liste mise à jour de ses membres, leurs activités et adresses.

Le Secrétaire publie une liste des membres basée sur ces listes et en fait parvenir des copies aux Sociétés Nationales tous les deux ans.

V. International Conferences

(15) Generally, the International Conferences shall be held at intervals of 4-5 years; time and place shall be fixed by the Executive Committee on the basis of the invitations submitted by the National Societies.

(16) The National Society of the country in which the Conference meets shall be responsible for the organization as foreseen by Article 17. To this end the National Society shall appoint an Organizing Committee to which the President and Secretary are ex-officio members.

(17) At least 18 months before the opening of the Conference this Organizing Committee shall request all National Societies to submit to it the papers submitted by their members. These shall be allotted to the sections selected by the Organizing Committee. The Organizing Committee shall nominate a General Reporter for each of those sections.

The General Reporter may, with the approval of the National Society, co-opt one or more assistants.

The papers shall be first submitted to the National Societies. These shall be responsible for selecting them and sending interesting papers only. In case there should be too many papers a quota shall be granted to each country by the Organizing Committee.

The ultimate date up to which these papers are to be sent shall be fixed in the same way. These papers shall be assembled by sections and published in one or more volumes. These volumes shall also include the General Reports; they shall be circularized to the members of the Society at least three months before the opening of the Conference.

Conferences are open to all members of the Society, and to non-members by invitation.

During the Conference the presentation of the General Reports shall be followed by discussion. The Organizing Committee shall fix the ultimate date up to which the text of these discussions are to be sent as well as their size. The discussions shall be published in the final volume of the Proceedings.

VI. Payment of Contributions

(18) Any National Society which has not paid its contribution for more than 12 months shall cease to receive the List of Members. It shall also be deprived of the advantages of any information or service and shall not be permitted to vote.

VII. Amendments to the Present Statutes

(19) The Statutes can be amended by the Executive Committee only.

V. Congrès Internationaux

15° En règle générale les Congrès Internationaux se réuniront à intervalles de 4 à 5 ans; les dates et lieux sont fixés par le Comité exécutif sur la base des candidatures présentées par les Sociétés Nationales.

16° La Société Nationale du pays dans lequel se réunit le Congrès assume la responsabilité de l'organiser ainsi que prévu à l'article 17. A cet effet la Société Nationale désigne un Comité d'organisation dont le Président et le Secrétaire sont membres ex officio.

17° Dix-huit mois au moins avant l'ouverture du Congrès, ce Comité d'organisation invite toutes les Sociétés Nationales à lui soumettre les communications de ses membres. Celles-ci sont classées dans des sections qui seront définies par le Comité d'organisation en accord avec le Président et le Secrétaire. Ceux-ci désignent également un Rapporteur général pour chacune de ces sections.

Le Rapporteur général peut faire appel à la collaboration de un ou plusieurs assistants.

Les communications sont soumises aux Sociétés Nationales, à qui il incombe de les sélectionner et de ne présenter à la Société Internationale que des travaux dignes d'intérêt. Si le nombre des communications présentées est trop élevé, il sera limité pour chaque pays par le Comité d'organisation d'accord avec le Président et le Secrétaire.

La date limite d'envoi de ces communications sera fixée de la même façon. Ces communications seront réunies par section et publiées en un ou plusieurs volumes. Ces volumes qui comprennent également les Rapports généraux seront distribués aux membres de la Société trois mois au moins avant l'ouverture du Congrès.

Tous les membres de la Société ont le droit de prendre part au Congrès. Toutefois les personnes qui ne sont pas membres peuvent également y participer par invitation.

Pendant celui-ci la présentation des rapports généraux sera suivie d'une discussion. Le Comité d'organisation fixera la date ultime de remise des textes des contributions aux discussions ainsi que leur étendue. Elles seront publiées dans les comptes rendus.

VI. Versement des cotisations

18° Toute Société Nationale qui n'a pas payé sa cotisation depuis plus de 12 mois n'a plus droit au Liste des Membres.

Elle perd également le bénéfice de tous renseignements et services et ne peut participer à aucun vote.

VII. Amendements aux présents statuts

19° Les statuts ne peuvent être modifiés que par le Comité exécutif.

Final Report

History and Organization of the Conference

The decision to hold the Fourth International Conference of the International Society of Soil Mechanics and Foundation Engineering in London was taken at the meeting of the Executive Committee in Zurich in 1953.

An Organizing Committee was appointed by the British National Committee in December 1953 together with Sub-Committees for Papers, Finance, Visits and Ladies' functions: the first meeting of the Committee was held in May 1954. The initial task of the Committee was to decide the date of the conference, and the period 12-24 August 1957 was selected after consultation with all National Societies.

The Institution of Civil Engineers provided the secretarial assistance for the Organizing Committee, and the Finance and Exhibition Sub-Committees. The Soil Mechanics Division of the Building Research Station undertook the secretariat of the Papers Sub-Committee. A firm of travel agents were engaged for the secretarial work of the Visits Sub-Committee. In addition, local Visits Sub-Committees were appointed in Birmingham, Cambridge, Cardiff and Glasgow.

Bulletins

3,500 copies of Bulletin No. 1 were issued through the National Societies in January 1956. This Bulletin contained a preliminary registration form, 743 of which were returned.

Bulletin No. 2 was issued in January 1957 direct to members who had returned the preliminary registration forms and also through the National Societies. This bulletin contained the programme of the conference and application forms for registration, accommodation and participation in the visits and tours. All members were asked to send the full fees with the registration forms but many were unable to do so either wholly or in part due to currency restrictions; therefore, provision had to be made for separate payment prior to or at the conference, which caused much administrative difficulty.

Proceedings

The Organizing Committee entered into an agreement with Butterworths Scientific Publications to produce the three volumes of the Proceedings and their willing and helpful co-operation has enabled the publication programme to be carried through smoothly and satisfactorily.

The first and second volumes, issued on 31 May and 2 June, 1957, respectively, contained 179 papers and the General Reports. The available financial resources placed a limit on the size of the volumes, and estimates were based on the acceptance of 182 papers, each of 2,500 words with accompanying illustrations. Preliminary notifications received from National Societies showed that 353 papers were intended for submission. Each National Society was therefore given a quota and asked to select the papers to be sent for publication. The Organizing Committee is very grateful for the co-operation shown by National Societies and authors in meeting these severe restrictions.

The publication date for unrestricted sale of the Proceedings

was 22 August 1957, and thereafter all sales were dealt with by the publishers.

Conference Members

The following table gives details of registrations made by members from the various countries:

	<i>Members</i>	<i>Non-attending members</i>	<i>Ladies</i>	<i>Total</i>
Argentina	2	1	0	3
Australia	5	1	1	7
Austria	12	1	2	15
Belgian Congo	2	0	0	2
Belgium	21	2	4	27
Brazil	16	2	4	22
Bulgaria	1	0	0	1
Burma	1	0	0	1
Canada	16	9	9	34
China	2	3	0	5
Colombia	2	0	1	3
Cuba	1	0	0	1
Czechoslovakia	5	0	0	5
Denmark	13	1	5	19
Egypt	3	0	0	3
Finland	5	0	0	5
France	59	1	25	85
Germany	48	12	17	77
Greece	2	0	0	2
Guatemala	1	0	0	1
Hungary	2	0	0	2
India	4	0	0	4
Indonesia	0	1	0	1
Ireland	2	0	0	2
Israel	8	0	2	10
Italy	37	2	14	53
Japan	9	1	0	10
Kenya	1	0	0	1
Lebanon	1	0	0	1
Luxembourg	1	0	0	1
Mexico	7	1	0	8
Monaco	1	0	0	1
Netherlands	19	0	7	26
New Zealand	2	0	1	3
Norway	18	0	11	29
Poland	11	0	0	11
Portugal	5	0	3	8
Portuguese East Africa	2	0	0	2
Rhodesia	0	1	0	1
Rumania	1	1	0	2
Singapore	0	1	0	1
Spain	18	3	8	29
Sweden	24	3	11	38
Switzerland	27	11	14	52
Turkey	5	0	0	5
Union of South Africa	5	4	1	10
U.S.S.R.	18	0	0	18
U.K.	238	6	70	314
U.S.A.	66	29	37	132
Venezuela	1	0	0	1
Yugoslavia	22	0	9	31
Totals	772	97	256	1,125

Discussions

All the sessions were held in the Great Hall of the Institution of Civil Engineers, Great George Street, London.

To enable the Chairmen of sessions to allocate the time available for discussion in a satisfactory manner every member intending to contribute to the discussion was asked to complete a form stating the points to be raised, and to hand this form in before the session in which he wished to speak. Because of the large number of members in each session notifying their wish to contribute, very few minutes could be given to each speaker, and in some sessions a number who notified their intention had not the opportunity to speak.

After speaking, each contributor to the discussion was asked to complete a form giving a written account of his contribution so that the shorthand report could be checked and amplified if necessary. Written contributions to the discussions have been accepted and considered for publication along with the contributions made during the sessions.

The secretarial duties and the stewardship of the sessions were carried out by the members of the Soil Mechanics Division of the Building Research Station.

Simultaneous translation of all discussions in the two official languages were available by earphones. The discussions were also recorded by shorthand writers.

Tours, Visits, Events

The following table gives the approximate attendance at the various events:

12.8.57	Reception at the Tate Gallery	760
13.8.57	Ladies' Lunch	210
	Ladies' tour of London	210
	Reception at Hurlingham Club	750
14.8.57	Ladies' visit to Hampton Court Palace	92
	Ladies' tour of London	60
	Technical visits as follows:	550
	Imperial College	
	Soil Mechanics, Ltd.	
	George Wimpey & Co., Ltd.	
	Building Research Station	
	Road Research Laboratory	
	British Railways, Paddington	
	Metropolitan Water Board	
	Port of London	
15.8.57	Ladies' country tour	120
	Ladies' tour of London	60
	Ladies' visit to Palace of Westminster	200
16.8.57	Ladies' excursion to Arundel Castle	92
	Ladies' visit to Blenheim Palace	92
17.8.57	Conference tour to Folkestone and Canterbury	438
18.8.57	Conference tour to Windsor	214
	Conference tour of London	156
19.8.57	Ladies' excursion to Windsor	98
	Ladies' visit to Wisley Gardens	62
	Ladies' visit to Victoria and Albert Museum	60
20.8.57	Ladies' visit to Royal Naval College	98
	Ladies' visit to Kew Gardens	90
	Technical visits, as follows:	550
	Imperial College	
	Soil Mechanics, Ltd.	
	George Wimpey & Co., Ltd.	
	Building Research Station	
	Road Research Laboratory	
	British Railways, Paddington	
	Metropolitan Water Board	
	Port of London	

21.8.57	Banquet	754
22.8.57	Tours of Scotland	110
	Tour of East Anglia	54

Provision had been made for a third Scottish tour, and tours to the Midlands and South Wales, as preliminary registration forms indicated that this was necessary; when final registrations were received, however, these tours were cancelled because of lack of support.

Finance

The following charges were made for participation at the conference:

	£	s.	d.
Registration, members	17	10	0
Registration, ladies	6	0	0
Conference tour to Folkestone and Canterbury	2	0	0
Conference tour to Windsor	1	2	6
Conference tour of London		17	6
Tour of Scotland	47	10	0
Tour of East Anglia	20	0	0

All other events were free to members although a limitation had to be put on the numbers who could take part in certain events owing to difficulties in transport, catering, etc.

Every member was supplied with a set of the Proceedings free of charge, and was able to purchase an additional set at the time of the conference for £17 10s. 0d. This special reduction applied to members of the Society only for the period up to the end of the conference, the normal selling price being £26 5s. 0d.

The Organizing Committee gratefully acknowledge the assistance of British Industry in contributing over £8,300 towards the cost of the conference.

The Organizing Committee also wish to thank U.N.E.S.C.O. for subventions received to date, through Union des Associations Techniques Internationales (U.A.T.I.), amounting to £1,230.

The gross cost of the conference was approximately £38,500.

Acknowledgments

The Organizing Committee wish to express their thanks to all those who helped the Committee and its Sub-Committees: to the team of editors who assisted the Papers Sub-Committee in preparing the papers for printing and in the checking of the work as it proceeded; and also the members of the French National Society who rendered valuable help in the French translations of the papers.

Further, the Committee sincerely thank the General Reporters for their task of reporting on the papers and presenting them at the technical sessions. The thanks of the Committee are also due to the Chairmen of the technical sessions, and the co-operation of all those who took part in the Conference.

In conclusion, the Organizing Committee express their great gratitude to industry which, by its generous financial support of the conference, enabled the Committee to plan a programme which they believed to meet the wishes of members.