

Christchurch; Mr. John Dennis Jack, Wellington; Mr. Harben Robert Young, Assoc.M.Inst.C.E., Westport; Mr. Robert McGregor Mowat, Wairoa, Hawke's Bay; and Mr. Roland Evelyn Fry, Auckland. The Board issued certificates of competency and licenses to the successful candidates.

The deaths of the following licensed surveyors were reported: Robert Campbell, Whangaroa; Ernest Combes, Blenheim; August Philip Mason, Wellington; Francis Pavitt, Devonport; George John Roberts, Hokitika; and Frank Blackwood Sewell, Federated Malay States.

The Board for 1911 consists of Mr. J. Strauchon, Surveyor-General, *ex officio*; Mr. Thomas Humphries, President of the New Zealand Institute of Surveyors, Lower Hutt; and Mr. T. N. Brodrick, Chief Surveyor, Christchurch, nominated by the Minister of Lands; Mr. H. Sladden, Wellington; and Mr. J. W. Harrison, Auckland, nominated by the Council of the Surveyors' Institute. At the first meeting of the Board, Mr. J. Strauchon was unanimously elected Chairman.

The list of licensed surveyors, now numbering 447 as at 1st January, 1911, was published in the *Gazette* on 26th January, and copies of the list were supplied to surveyors on application being made for them.

The Canterbury College advised the Board that a course in surveying is now being provided at Canterbury College under the direction of Mr. W. F. Robinson, licensed surveyor, and particulars of the subjects taught in the course—which extends over two years—were also supplied. The College applied for some recognition of this course in the form of a reduction in the time which has to be spent under a licensed surveyor by a candidate for examination. The Board resolved to grant the following concessions to Canterbury College students who have passed all the subjects of examination in the surveying course at Canterbury College, provided the lecturer is a licensed surveyor of New Zealand, and so long as the course of instruction has the approval of the Board—namely, the same concessions as are given to graduates in civil or mining engineering as provided in Regulation 6 (d) [*i.e.*, candidates must be professionally employed in the field to the satisfaction of the Board for a period of two years with a qualified surveyor or surveyors in private practice]. The Board also resolved to grant exemption in physics, geology, and mathematics (including spherical trigonometry) to any student who has passed in these subjects at Canterbury College in the surveying course.

The Board held an inquiry under section 16 of the Surveyors Institute and Board of Examiners Act, 1908, into certain alleged errors and misrepresentations of surveys executed by Mr. George Whitcombe, licensed surveyor, Kawhia, with the result that, after hearing all the available evidence, Mr. Whitcombe's license was suspended for two years from 21st September, 1910.

The papers for the September examination were set by the Tasmanian Board, while those for the March examination were set by the Victorian Board.

A Conference of Surveyors Boards was held at Hobart, Tasmania, in January, 1911, at which Mr. J. Strauchon, Surveyor-General and Chairman of the Board, and Mr. Thomas Humphries, President of the New Zealand Institute of Surveyors and a member of the Board, were the Board's representatives. An abridged report of the important business transacted thereat is published in the *New Zealand Surveyor*, Wellington, for March, 1911. At this Conference Mr. A. A. Spowers, Surveyor-General of Queensland, and Mr. E. A. Counsel, Surveyor-General of Tasmania, were selected as the representatives of Australia and New Zealand to attend the Conference of Surveyors-General in London, in May, 1911.

The Board authorized Mr. C. Hastings Bridge (a former member, and now on a visit to London) to afford the representatives any information on New Zealand methods and practice of surveying should they request him to do so.

The total number of cadets and articled pupils is now forty-four.

Wellington, 31st March, 1911.

JOHN STRAUCHON, Chairman.
C. E. ADAMS, Secretary.

APPENDIX V.

TIDAL SURVEY.

[By C. E. ADAMS, M.Sc., F.R.A.S., Chief Computer.]

HARMONIC ANALYSIS.

THE records for the year 1909 of the Wellington self-registering tide-gauge have been harmonically analysed, using the tidal abacus of Sir G. H. Darwin, K.C.B., F.R.S.* There were a number of breaks in the record, aggregating four weeks, and ranging from fifteen minutes to four days. It was necessary to interpolate the missing records, and the method adopted was to make tracings of the tidal curve both twenty-nine days before and twenty-nine days after the break, superimpose one tracing on the other after adjusting them for the exact period of 28 days 23 hours 33 minutes,† and then to draw the mean curve from the two tracings, fit it into the break, and measure it. As the record on the Wellington tide-gauge‡ differs from most others, a full-size diagram is given in Fig. No. 1. It will be noticed that the record is on unruled paper. All straight lines have been drawn after the paper was removed from the gauge. Formerly the times at which the record starts and ends were marked on the sheet, and the other times were interpolated between them, on the assumption that the gauge-clock has a uniform rate. Experience has shown that sometimes the rate of the clock is altered by vibration of the shed in which it is housed, and to improve the time-control the pencil-carriage has recently been connected electrically with the mean-time clock of the Hector Observatory, so that at every mean solar hour an independent mark is made on the record-sheet, exactly 1.14 in. from the pencil. These

* Scientific Papers: Vol. I, Oceanic Tides, p. 216.

† U.S. Coast and Geodetic Survey Report, 1907, p. 492.

‡ Trans. N.Z. Institute, Vol. xli (1908), p. 407.