

The plotting is now done in the office by a draughtsman, the actual surveyor attending to read off the bearings and the distances from the field book. The surveyor sets off his work in the map on the magnetic meridian, correcting the bearings where he can refer to a trig. pole. The greatest error by this means is said not to exceed eight links to the mile, but intricate new traverses are not so strictly tested.

Where Crown grants are about to be issued this is the mode of proceeding. On its being drafted in the office the letters *Dfd* are put on the application map in pencil. A book of sections is also kept in the office, where a small red circle is marked against each number at the same time.

The mode of proceeding in taking in applications is as follows:—A person applying for land comes to the map room and points out to the draughtsman appointed for that purpose his choice on the application (*i.e.*, working plan) of the district. The application is then marked on the map, as stated before, in pencil. Then a written description is drawn out by the draughtsman on a printed form. After the Waste Land Board has approved of the application, the land is surveyed as soon as possible.

On this part of the subject I was shown on the plan of Lake Ellesmere District an example of what sometimes occurs:—The application or working plan showed a space between former surveys less than has been found actually to exist, but to the present purchaser has been given a Crown grant, not of the lesser quantity shown on the map, but the greater quantity existing in reality on the ground. Thus the evidence of a record map of the province is ignored by the department itself.

Nor are all the errors unintentional; as the price of land was high, good measure, it was thought, should be given. Thus in the towns of Christchurch and Lyttelton, a link more or less is added per chain on each section; as, for example, in block containing sections 177 to 198, the double row of sections have a length of 1111 links instead of 1100. Block containing 155 to 176 has a length of 1110 instead of 1100 links; and transversely, 502 instead of 500; and so on. The working plan of the Town of Lyttelton shows evidence of the same principle. Now I hold this to be injudicious, even for the sake of the purchaser, as in "cutting up" complications can easily arise whereby he may mark out to one purchaser too little, and to another too much, and so involve himself in law-suits.

On finishing my examination of the Christchurch Survey Office I proceeded to Timaru, accompanied by the Chief Surveyor. At the Survey Office there I first looked into the triangulation of the district south of Rangitoto. This was executed in its northern first part by Mr. Hewlings, on contract. He next proceeded with that portion between Washdyke and Pareora; then from Pareora to Waitaki. These were done before the year 1865. All the bearings were referred to magnetic meridian. The base line is in the plain between the Waihao and Waitaki, close to the beach, and whose length is 20,323½ links. The diagram of the triangulation gives the calculated sides only. The angles were taken by a 6" theodolite. The readings were checked three times, but this was noted in a separate paper, and the average booked. The zero of the theodolite was adjusted to one station to get the arc contained between it and the next. The azimuths of zero were thus various; but a separate book of bearings was kept in which the magnetic readings of stations were noted. The object of this was to check traverse by chain and theodolite. Thus each trig. station had two visits paid to it. The triangles were calculated by the sides of the opposite angles; the magnetic bearings are still in the field-books. The calculations are carried out to seconds. This triangulation comes within the term minor, and is not ruled by a standard process. The triangles are plotted by scale and compass, not by mathematical reduction.

The section surveys of these districts are founded on triangulation, but also checked at mile intervals by intersection from trig. station. These points are not fixed by calculation, but by plotting; chain and theodolite traverses are thus carried from station to station, but merely plotted, not mathematically reduced. The first process of traverse was to run along all the features, such as rivers, ridges, terraces, forest, &c., and on these the section frontages were founded.

Over nearly the whole of the plains the third has been bought and surveyed in this manner; no overlappings are said to have taken place, excepting at Buckley's Point, where errors of fifty links occur. There are occasional errors also where four or five separate surveyors have been at work at different times; here errors extending from 50 to 180 links are apparent by the plotting of the maps. These are exceptions. The cause of the superior general accuracy of the South Rangitoto surveys is attributed to the fact of their having been executed by one officer and his assistants, but, I may add, also to the largeness of the holdings. The want of proper closings which was seen in one or two places near the margin of the sheets was explained by the plottings of traverses having extended from one plan into another; so these were affected by paper shrinkage. The maps were all in good condition, the size being 6' × 28'.

I was also shown a reduced copy of all surveys—scale forty chains to one inch—used by the public these last seven years in making their selections. The sections are numbered as they are sold, and their positions, which are very dispersive, are found by a reference book. The purchased land is not coloured, and, as this one map is considerably soiled, the sold and unsold land may be difficult to distinguish. As all these maps are rolled, the tendency of the older to split into shreds was noticed.

The field-books were all in a good state and kept in ink. Mr. Hewlings said that, if the maps were all destroyed, he and his assistants could re-establish them by this means. I may here add that the system of survey and mapping introduced by the Canterbury Association at the founding of the settlement is here seen in its best phases, and carried out to the best advantage it is capable of attaining. That the triangulation, though not conforming to all the requisites considered necessary in other provinces, is reliably and creditably observed, is proved by the following tests:—

Verification base	+0		Chained.	Calculated.
"	115·116	Otaio ...	179·53	179·52½
"	147·150	Tengawai ...	115·45	115·48½
"		Opuha ...	134·48½	134·51

On returning to Christchurch, I met Mr. Thomas Cass, who long held intervening charge of the department. He informed me that the system of settlement and survey was designed by the Com-