

surveyors or minor triangulation. There is no safe attached to this office, which also is in constant danger from fire, being in a street line.

HAWKE'S BAY SURVEYS.

I visited the Wellington office on the 24th November, but found the Chief Surveyor absent on leave, so I proceeded to Napier, at which place I arrived by sea on the 30th November, calling upon the Chief Surveyor, Mr. C. H. Weber, and from whom I received information as follows:—The initial station of the Hawke's Bay surveys is at Pa Tangata, but which was determined before Mr. Weber's time. The fact is given from hearsay also that the true meridian was observed by Captain Drury in 1854 at Napier, from which place it was transferred to Pa Tangata. Proceeding from thence there was a triangulation, maps of which were exhibited, executed about the year 1859. The area covered by this extends from Napier to Porongahau along the sea coast over about 1,000,000 acres. The field-books, however, show the work to have been done originally on magnetic meridian, the angles being observed only once, kept, noted, and registered in a most primitive manner. A base of verification was measured in 1865, the error proved being $5\frac{1}{2}$ links to the mile. This work is not reduced on the meridian and perpendicular, and the triangles are put together by "building." One cause of the incompleteness of this work was owing to the opposition of the Natives at that early time, who would not allow stations to be erected or pegs driven. Mr. Weber is, however, of opinion that it may yet be put into satisfactory connection with the major triangulation, as most of the stations may yet be found.

Mr. Weber also informed me that he held the appointment of Provincial Engineer as well as that of Chief Surveyor, to which latter office he could give only one quarter of his time—in fact, the former took up almost all his attention.

The major triangulation of the Native Land Department now covers the whole of this province, whose initial station or true bearing is at Marikako. The bearings, distances, and ordinates are not given in the maps, but these are registered on foolscap.

Most of the section surveys of the province have gone on in advance of triangulation: they are on magnetic meridians, but executed with the theodolite. The present operations of a similar nature, however, are controlled by triangulation. *Good measure* besides is given in these as an extra preventive against purchasers' complaints, but I may remark that the same objections that apply in the Canterbury surveys against *good* instead of *correct measure* are valid here. On scrutiny of the working plans, I found that in the section surveys the custom in the province has been to allow the work to be done by different surveyors at different times, some of which are executed by the needle only; that there is no system of mathematical reduction on the meridian and perpendicular by traverse surveyors, nor any exact mode of making section survey subordinate to triangulation even after it has been executed, previous to the section survey required.

The land laws were stated to affect the survey operations most injuriously, these being free selection prior to survey from forty acres upward, over all Crown lands without restriction. In the meantime, the Crown lands being let to tenants, these soon "spotted" their runs, and in the course of ten or twenty years, at their convenience, purchased the whole. And as no sooner had lands been applied for than they had to be surveyed, it followed that, if the Provincial Government was not in a position to employ a surveyor at once, the applicant had the right of employing a surveyor and receiving 5 per cent. in land for the survey of the block. These surveys of course could not be checked on the ground, at least rarely. There was in fact no means.

The sizes of the maps in this office vary from $6' \times 5'$ down to $2' \times 2'$, all kept rolled and mounted on cloth, the older generally in a dilapidated state owing to no charge having been made for their examination by lawyers' clerks, merchants, and land agents. Nearly all maps and field-books are kept in the safe. The field-books are for the most part in pencil. Indices are made of contents; they are yet intelligible, and the only ones lost are those of the Town of Napier, which disappeared sixteen years ago.

The office is very confined, and unfit for the duties in hand.

In the Crown grant system of record no special maps are kept for this duty, but a list is kept of the grants prepared, giving district, number, name, number of application, and acreages. The letters G.P. and number are also marked in red letters on the district maps when the grants are prepared and sent to the Crown Lands Office. These maps are on 10, 20, and 40-chain scales.

On looking into the system of "breaking down" the major triangles in this province, I found the operation was not done systematically, the practice of section surveyors being merely to observe two angles in the subsidiary triangles on which their traverses close. This is a very dangerous proceeding, as with small instruments distant trees or rocks may be mistaken for the actual trig. station. The work in many cases may therefore be all wrong. Added to this, the subsidiary stations are not mathematically calculated on the meridian and perpendicular.

It is thus evident that none of the actual surveys in this province can be classed as correct or out of the term "unproven," though the surface of the country appears to be eminently adapted for triangulation of the several kinds as well as for traverse survey.

My opinion is, as I have already said, in regard to other provinces similarly situated, that it would be inexpedient to revise old surveys, and it will require great personal exertion, knowledge, and facility in draughting on the part of the officer in charge to introduce and continue an approved and reliable system of survey and record.

In looking over some of the plans, the inefficiency of major triangulation without minor was apparent, consisting in the long distances required to be travelled by the subordinates to obtain connections, and the inferior value of such connections when made: this to a considerable degree would be ameliorated by referring stations being observed, attached to each trig. station.

The state of the provincial work in Hawke's Bay District is given as follows:—

	Acres.	
Minor triangulation ...	320,000	Plotted only.
Spotting section surveys ...	1,000,000	Ditto.
Section surveys in hand ...	6,000	In two localities near Seventy-Mile Bush.