

much to recommend it, but was the best that had presented itself, and as, as time went on, no better one could be found, it was finally examined and approved by the Surveyor-General, Mr. J. Strauchon, in October, 1909. Instructions for the measurement were issued on the 17th December, and on the 11th January following Mr. T. G. Sole, Office Surveyor, New Plymouth, started the preliminary ranging and preparation of the line, including the insertion of all the permanent marks, which work was carried out in a very satisfactory manner. The terminal marks are of the same description as those described last year. The intermediate permanent marks on the line are galvanized trig. tubes, bedded and set in concrete. Of these there are thirteen points so marked, distributed over the whole length of the line, seven of them being on public roads, where they will be readily available as standard points for Land Transfer and other surveys. The many stop-pegs along the line are of heart of totara, 2 ft. by 3 in. by 3 in., countersunk in all cases about 8 in. to 10 in., where they will last for many years, and will also be available as reference points.

CHARACTER OF THE COUNTRY.

The character of the country over which the base runs may be described as exceptionally rough for a work of this nature, as I think will be recognized by a study of the plan and section given in Fig. No. 2. In addition also to the natural roughness of the line, artificial obstacles in the shape of post-and-barb-wire fences and large boxthorn hedges were frequent, 120 fences of all descriptions having to be crossed in the course of the measurements.

Mr. Sole supplies the following information: The preparation survey was started on the 31st January, 1910, and completed on the 28th April following. Among the various works necessary thirty boxthorn or berberry hedges with ditches and banks had stiles built over them, and 21 chains of plank footways were required to cross streams, ponds, and swamps. The labour included, besides the building of stiles and bridges, the clearing and pegging of the line, taking down and re-erecting two minor trig. signals, concreting in the stones and tubes at the terminals, and also ten other tubes along the line. Mr. Sole also supervised the erection of the two large signals at both ends of the line, and before the practical work was put in hand he visited all the settlers along the line and obtained their consents in writing to the line being taken through their properties.

All the settlers through whose properties the line runs have to be thanked for the assistance given to its establishment by the ready permission given to traverse their properties, insert pegs and permanent tubes, cut back hedges, and for camping facilities.

STANDARD OF LENGTH.

The standard of length for the measurement of this line was the Imperial standard steel tape No. 4, deposited with its balance No. 4 in the District Survey Office, New Plymouth. This tape has been certified to by the Standards Branch of the Board of Trade, London, as being 0.001 in., or 0.000126 link, long at 62° Fahr. (see page 28 of report for the year 1909-10), or it is standard length at 61.798° Fahr. To verify the above, a comparison of this tape No. 4 with the Imperial Standard steel tape No. 1, Head Office, was made under the following conditions:—

1. The Imperial standard steel tape No. 1, with its certificated standard balance No. 2, were used in the laying-down of the comparator.
2. Four certificated thermometers, Nos. 263, 264, 265, 266, and two uncertificated, in light metal cases, were used. The latter, as far as they could be compared, were found to be in accord with the certificated thermometers, but, when working out the means, double values were given to those with certificates.
3. Twenty determinations of the comparator were made, involving 120 readings of the thermometers; ten of these determinations were made before the Imperial standard tape No. 4 was tested, and ten after the test was completed.
4. Twenty separate tests of the Imperial standard tape No. 4 were made, also involving 120 readings of the thermometers.
5. The conditions of weather and surroundings were practically perfect. The heavy-canvas comparator tent, used for the first time during the measurement of this base, amply vindicated its construction by the convenience it gave and the results obtained.

RESULTS OF THE TESTS.

The Imperial standard tape No. 4, by the Standards Branch of the Board of Trade, London, is Imperial standard 100 links at 61.798° Fahr., and the same tape by the above test standard 100 links at 61.767° Fahr.—difference, 0.031 of one degree Fahr., corresponding to a difference in length between tapes No. 1 and No. 4 of 0.000019 link. Although this comparison is exceedingly satisfactory, tests with the other district standard steel tapes will be necessary.

Comparison with Previous Triangulation Values.

Present determination	= 79605.1228 links.
Value by the original triangulation derived from the Waitara base, measured in 1878	= 79604.3 ..
	0.8228 links.