

The Pouakani Report 1993

Appendices

11 (a) Introductory Note

Following the abolition of the provincial governments in 1876, the Department of Lands and Survey was established under the Land Act 1877, with the dual role of administering Crown lands and responsibility for surveys which had previously been carried out under separate provincial administrations. The permanent head of the new department was both Secretary for Crown Lands and Surveyor General. The Surveyor General required the chief surveyor of each district to examine all surveyors who were employed either in the Department of Lands and Survey or in private practice to ensure a minimum standard of knowledge and practical experience before a certificate of competency was granted.

Since the Native Land Act 1862, there had been legislative provisions requiring that all surveys for the Native Land Court be carried out by government certified surveyors. The Native Land Court issued a new set of rules in 1880 which at rule 42 stated:

All surveys undertaken for the purposes of the Court, when not done by the official survey staff, must be made by authorised surveyors of the colony, holding a diploma signed by the Surveyor-General.

During the late 1870s, survey regulations which applied to all surveyors were notified in the New Zealand Gazette and consolidated in a separate publication in 1879 by the Surveyor General, titled Regulations and Instructions of the Survey Department of New Zealand. In 1886, revised regulations under the Land Act 1885 were issued and are reproduced below. The surveys of Taupouiatea and Aotea blocks were carried out under these regulations which were revised again in 1897.

Waitangi Tribunal, Department of Justice, Wellington.

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11 (b) Some Definitions

Field book: The note book taken into the field by the surveyor in which are recorded, as work progresses, the actual observations of vertical and horizontal angles between survey marks along a line of survey, and the measured (slope) length between them. Adjustments of minor angular errors and correction of chainages to horizontal length are shown. Any other relevant topographical information and place names are also noted.

Plan: A record of the corrected and adjusted measurements of direction and length made by a surveyor. These are reduced to horizontal length in order to plot boundaries over hilly country on a flat sheet of paper and determine area. A sketch plan is based on surveyed trigonometrical stations and perhaps some fixed landmarks with boundaries only sketched in.

Maps: These are derived from surveyors' plans and sketches and do not usually show bearings and distances. Cadastral maps show areas and boundary lines of title surveys. Topographical maps show contours, bush, rivers, lakes and other physical landmarks, roads, settlements etc.

Triangulation or Trigonometric surveys: These surveys provided a network of accurately located points (trig stations) which served as a base from which a surveyor could locate and check a boundary survey. Major triangulation involved selecting plainly visible places about 20 miles (32 kilometres) apart and making a series of observations of angles between signals erected over pipe markers in the ground at each point, to all other similar selected visible points. By calculation, the distances and directions between each was established in the form of large connected triangles. Each mark or trig station became a point of fixed position which gave fixed directions or bearings to all visible points or trig stations.

Minor triangulation used the fixed positions of major trig stations, and built further triangles with trig stations averaging about six miles (9.6 kilometres apart). The same observation of angles and calculation of distances then gave fixed positions to all these additional points. In rugged country a surveyor may need to add further unofficial trig stations and produce triangles with sides down to one mile (1.6 kilometres) in length, to provide a convenient framework and isolate any errors which may occur as survey progresses. Normally, surveyors doing boundary surveys were never more than three miles from points of known position so that they could check the accuracy of their work. All other surveys could also be correctly plotted in relation to each other.]

Surveyor General: The principal government officer in charge of surveys, a role combined with that of Secretary for Crown Lands, as the permanent head of the Department of Lands and Survey.

Chief surveyor: The principal officer of the Department of Lands and Survey in each district, a role combined with that of Commissioner of Crown Lands throughout the late nineteenth and early twentieth centuries.

Authorised surveyor: A surveyor whose competence and qualifications have been recognised by the Surveyor General. At times the term licensed surveyor has been used, although the term registered surveyor is now used.

Waitangi Tribunal, Department of Justice, Wellington.

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11 (c) Extract from Survey Regulations under the Land Act 1885 (New Zealand Gazette 1886 pp 634-642)

Minor Triangulation

1. The Surveyor should be provided with a 5in. theodolite, standard steel band, thermometer, prismatic compass, aneroid, and straining apparatus. Survey districts shall each comprise an area of 12½ miles square or thereabout, which are apportioned on the maps of the standard survey of the colony.

2. In triangulating a survey district or a portion thereof, a level piece of ground should be chosen - central, or most convenient - for the measurement of a base. The line should be chipped or otherwise prepared, and should be of about 2 miles in length. Before commencing the measurement of the base, a chain's length should be laid down on the ground by standard steel band - adjusted to 62° Fah - for reference. The band should be tried on this at the commencement and ending at actual measurements. During measurements temperatures are to be observed (the co-efficient to be used may be .000006 for each degree) for correction of expansions and contractions of band, which have to be applied in calculations. The steel band when in use is to be held with a tension of 14lb., and the ends marked on flat-boards spiked into the ground. These flat-boards should have a hollow filled with lead, for receiving the end marks made by a sharp instrument. Three boards are used, the last being always carried forward. Measure the base thus: forward and back again, and take the mean. Angles of inclination should be observed, so that a vertical section of the line can be made for reduction to true level. Bases of verification are to be measured in the same way. When for any reason it is inconvenient to prepare the ground, a base line may be measured 2ft. or 3ft. above the surface, the steel band being supported on adjustable stands.

3. Should a major triangulation cover the area to be surveyed, no measured base will be necessary, for the distances of minor trigonometrical stations will be obtained by breaking down the larger triangles.

4. Trigonometrical stations should be, as near as practicable, about 2½ miles apart. To extend the true meridian from the geographical into the settlement survey, one of the geodesical or major trigonometrical stations is to be chosen as origin, the instrument being set on the bearing given in the standard maps. This done, if a theodolite, with three verniers, is being used, three sets of observations are to be taken to each minor trigonometrical station in view: the vernier A of instrument being placed at zero, 40° and 80° of the horizontal limb respectively - thus nine readings will be observed; but if a plain theodolite is being used four sets of observations are to be made, the vernier A of instrument being placed at zero, 40°, 90° and 135° respectively - thus eight readings will be observed on different parts of the limb. In each set the instrument should be turned in one direction until the back station is again bisected with the

initial reading of the vernier. This done, the next minor trigonometrical station is to be observed in like manner, so as to complete the three angles of each triangle. Points are to be selected so as to have well-conditioned triangles - no angle being less than 30° nor greater than 120° unless under very exceptional circumstances. As far as practicable, crossing triangles are to be avoided, or one bearing over another bearing; each triangle should appear on the maps distinct from others. When the series of triangles of a minor triangulation extend a greater distance than 20 miles from the base, the first favourable opportunity of measuring a base of verification should be taken. Vertical angles are to be observed between stations with similar care, the datum being taken from the standard maps.

5. The differences of the means of bearings will give the value of the angles of each triangle; these are to be summed up, and the correction noted, one third of which + or - for calculation is to be applied to each angle. The logarithms should be taken out to seven places, and all angles to seconds. This being completed, and so all the sides and angles known, all stations are to be calculated on the meridian and perpendicular of the initial station of the survey district with the same accuracy, and a table prepared. From this table the skeleton maps are constructed by standard scale and beam compass. The difference of height between two trigonometrical stations is to be obtained from the vertical angles taken at both stations.

6. In executing the survey of an isolated section or of a block, if a base has to be measured, minor triangulation is to be carried from it to the land to be surveyed; but, if the work is to be based on major triangulation already executed, triangles are to be carried thence in the most direct course to such survey, and no more work is to be executed than is necessary for checking the chain measurements.

7. With average care the degree of error in minor triangulation need not exceed 2 links to the mile, so the extreme error allowable, but only in very special cases, is 4 links to the mile; the error in the summation of angles of a triangle need not exceed 30° , and the extreme error allowed in special cases is 60° . All work having error in excess of this will require revisal.

8. Combined with trigonometrical operations, a topographical survey is to be made showing the disposition of natural features and their names, also tracks, ridges, rocks, streams, forests, passes, remarkable objects, natural and artificial, etc.; and a map of the same is to be constructed. For altitudes vertical angles are to be observed to prominent objects, such as peaks, passes, valleys, and confluence of streams. A surveyor with a good eye can make a serviceable sketch map from his trigonometrical stations, and by theodolite alone, by taking the bearings, cross-bearings, and tangents, with estimated distances of objects; but, if the country be intricate, bearings from intervening positions can be taken where necessary. Prismatic compass and aneroid may be used when the theodolite cannot be had recourse to.

9. Minor trigonometrical stations should be constructed in the following manner: Gas-pipes, 2 in. internal diameter, are cut to $2\frac{1}{2}$ ft. lengths; these are inserted into cast metal plates with sockets, secured by an iron pin. The alphabetical letter of the station is to be cut on the upper end of the pipe with a cold-chisel. The pipe thus constructed is sunk in the hole prepared for it to a depth of 2ft. 3 in., with the metal plate downwards. The hole is then refilled, and its loose soil firmly beaten down. Round

this a circular ditch, 20ft. diameter, 1ft. deep, and 18 in. wide, should be dug. On high rocky peaks where a ditch cannot be dug a circle of stones should be made. When in use, the trigonometrical tube should have a pole carrying a black-and-white flag inserted into it and properly stayed; or a light wooden pyramid may be erected over it, with calico tightly tacked or battened to the sides all round for about 3ft. from the top. It is not desirable to build trigonometrical mounds, but in low positions these may be necessary, and of which the surveyor will exercise his own judgement. If mounds be built the exterior rim had better be of stone with earth in the centre. In positions where the nature of the soil may require modifications special directions will be given.

10. The trigonometrical work only is to be mapped on one sheet, which should show trigonometrical stations (two concentric pink circles) with their alphabetical letters and local name, the base line in red, other lines in black, bearings observed from each station (in blue), calculated mean distances (black), the observed angles (in the middle of each triangle) summed up (black). A few of the streams should be shown, so as to localize the trigonometrical stations readily. There should also be a note giving the results of the different measurements of the base line. Scale 40 chains to an inch.

11. The topographical map is to show the trigonometrical stations lettered, heights in feet (in red), barometrical heights marked "Bar.," streams (in blue), hills shaded (in Indian ink); the Native or local names of places, streams, hills, etc.; roads in use (in firm burnt-sienna lines), tracks (dotted sienna), bush (green), suggested main lines of future roads (in firm red line). Shade the boundary of the district in colour. Scale, 40 chains to an inch.

Block and Section Surveys

12. The surveyor is to be provided with a 5 in. theodolite, steel band, 5-chain wire, Abney level, aneroid, prismatic compass, beam compass, protractor, mathematical drawing instruments, scales and planimeter.

13. No magnetic bearings are admissible, unless under very special circumstances, in minor detail work, and this very sparingly. Flat or undulating country should be laid off in rectangular sections, but in rugged and hilly country the lay of the ridges and valleys must modify the disposal and form of these. It is desirable to have all the boundaries on the meridian and perpendicular: but when the general features of the country run obliquely to these, especially in rough districts, the boundaries must be arranged accordingly, so as to form lines which could be easily fenced. The less diversity of bearings the better for the avoidance of errors and multiplication of office work. When necessary, road lines may cross sections diagonally, and the area should be shown in gross and net also. The boundaries of the block in forest should be cut 4ft. wide, and in open country pared 2ft. wide, and no survey block shall exceed a length or breadth the distance of 250 chains ($3\frac{1}{2}$ miles) unless under special circumstances, however much less, or of whatever form they may be. In ranging long sectional lines crossing ridges, lockspits are to be cut so as to enable fencers to keep the right line. If the boundaries of the area to be sectionized exceed $3\frac{1}{2}$ miles, it will be necessary to divide it into two or more survey blocks, which separate blocks can be reduced into one plan for exhibition to the public.

14. In traversing, the surveyor is to proceed to the nearest trigonometrical station and base his work on it, setting the zero of the theodolite to true meridian by means of the

given bearing to an adjacent trigonometrical station. He is then to unclamp the upper plate and turn it from left to right until the signal of the forward station is bisected, or nearly so taking care not to overshoot the point; then clamp, complete the bisection and record reading of vernier in field-book. Then unclamp, and keep turning upper plate in same direction, or towards the right, until the back station is again bisected. A reference to the vernier will show whether the lower plate has remained unmoved. If so, proceed to the next station, and so forth, until a close with another trigonometrical station. Observe angles of elevation and depression, and reduce to horizontal value. After being located and graded, the road lines should be thus traversed, the surveyor when on a trigonometrical station having taken careful readings to many of the traverse or subsidiary points, so as to check his position as he proceeds; then boundaries of sections, if necessary, to be measured, in the second place. Offsets to irregular boundaries, rivers, or streams must not exceed 4 chains in length, and must be taken at intervals in the traverse not greater than 3 chains, but they must be taken at closer distances if necessary to correctly decline the irregularities to be mapped.

15. In the evenings the surveyor should reduce his traverses on the meridian and perpendicular of a central trigonometrical station, so that no daily actual measurements get in advance of this mode of check to his operations. In rural and suburban surveys all actually chained lines (excepting to range pegs), all corners of blocks and of isolated sections, whether chained or not, and the intersections with the traverses of all boundary lines of sections, are to be calculated. Should two traverses - say, of a road and of a river - run nearly parallel and not more than about 10 chains distant, it will not be necessary to calculate both. Enter reductions into the form given in Regulation No. 104, to be forwarded with the map.

16. Unless where otherwise specially ordered, main-road lines should be pegged generally to a breadth of 1 chain, occupation or by-roads to 1/2 chain, main roads 3 to 4 miles apart, by roads 3/4 to 1 1/2 miles apart, and all necessary through-roads to give access to back or adjoining country 1 chain wide. In level country the opposite angles should be pegged by setting off half the included angle and calculated distance; but in hilly and mountainous districts, where the land is of little value, the roads tortuous, and the traverses short and intricate, this may be dispensed with and the roads shown curved. At the boundary of a section or block, however, pegs must be placed on both sides of the road. Main roads should not have a steeper grade than 1 in 15; district roads, 1 in 10; and where these grades cannot be readily obtained, the case should be reported for advice; and in all cases roads should be graded on the best lines to be found, and the gradient written on the plan.

17. Having designed and laid off the skeleton of the work by survey and calculation of road traverses, the exterior boundaries of the block are to be laid out in a similar manner, and at this time all adjacent and included prior claims and their boundaries are to be investigated, for which object copies of the original plans will be furnished from the chief district offices. These claims are to be surveyed as held by established or indicated marks on the ground, showing the same by firm lines if the boundaries disagree with your own measurements based on original plans. Boundaries as by descriptions in original plans will be marked by dotted lines. If owners of prior claims cannot be found, and if all the marks of the claims are obliterated, then it will be competent for the surveyor to re-establish the boundaries by his own actual survey, recording them in firm lines. A general rule is not to interfere with original

boundaries, and with respect to the survey of land already disposed of, it is, that land sold and not granted should have the exact area marked off; land granted, but which had not previously been surveyed, or of which the survey marks are lost, should have the distances according to the grant, in preference to any attempt to lay out upon the ground the exact area granted.

18. All pegs should be sawn or dressed heart of totara, kowhai (goay), bluegum, kauri, matai (black-pine), puriri, or hinau, 3 in. by 2 in. and 2ft. long, put 18 in. into the ground, the hole having first been driven by an iron jumper. The front pegs of sections must have the numbers of the sections and the letter R branded on them; in bush back pegs to be branded with the numbers as well; road traverse pegs will have the letter R and the broad-arrow, ranging pegs the broad-arrow only. In forest country, at convenient distances, trees on the traverse lines should be blazed, having the linkage marked on the face. Conspicuous trees should also be branded, and their distances and bearings from section comers noted in field-book. Sections must be pegged front and back as well as at every comer, and have ranging pegs placed 3 chains distant from the front ones, with the lines pared 2ft. wide, or cut 4ft. wide up to them; should the 3-chain distance come in an impracticable place, then the peg is to be placed wherever convenient beyond, and the distance from the frontage peg given on the map. Pegs must be inserted and lockspits made at the intersection of every road, large stream, or path likely to be seen by the public. In forest where the timber has not been burned off, iron pins 6 in. long 1 in. square should be inserted alongside every boundary peg.

19. All pegs in open country should have trenches dug in the following manner: 6ft. long, 9 in. wide, and 9 in. deep.

At adjacent section frontages, thus: —□—
|

At traverse boundaries thus: \
□—

At corners isolated (spotting) sections thus: □—
in all cases commencing 2ft. from the peg. |

20. The positions of the section pegs in the traverse lines already surveyed are to be measured on the ground and noted in the map, and should the section peg be of the traverse line the point of intersection should be given as well as the distance of the section peg from that point. the calculated distances should, where the roads are pegged on both sides, be given from adjacent pegs on same side also.

21. All crossings of creeks and tracks in public use are to be noted; also such notes are to be made as will give a sketch of the topographical features to be delineated on the working plan.

22. In mapping, meridian and perpendicular lines are to be drawn through the initial station of the survey, which initial station must be a trigonometrical station; from these, blue faint lines may be drawn so as to describe squares 5 in. apart; then set off all the skeleton boundaries and traverses by scale and parallel ruler from the distances in the calculated traverse table. Ordnance protractor may be used in detail plotting.

23. Having drawn road lines and boundaries on the map, disposition of sections is to be designed, adhering as much as possible to the cardinal points for sake of simplicity and the avoidance of error. Sections should, as nearly as practicable, have a depth equal to twice the width or frontage to a road, stream, lake, or coast.

24. Measured lines are to be drawn in pink, calculated lines in black, with figures in pink and black respectively. Observed bearings are to be written in blue, and calculated bearings in black. New pegs should be marked by a small pink circle, old pegs by a small black circle. Water is to be coloured Prussian blue, roads burnt sienna, bush green. Hills to be shaded in light Indian ink.

25. A black marginal line is to be draw round the map. road line and boundary ends of adjacent survey sections and blocks are to be shown. A scale 12 in. in length is to be drawn; also an inscription in upright letters denoting block and district, or parish, name of surveyor, date of survey, and number of field-book. The interior detail writing should be clear and distinct. A short description of each section is to be drawn up in the form given in Regulation No. 110.

26. The error attached to traverse survey necessarily varies with the nature of the ground, and as it is essential for the security of settlers in rural blocks that it should not accumulate above 20 links, it will be advisable to have recourse to triangulation subsidiary to minor, where the country is so rough as to prevent correct charting. On an average, surveyors can chain a mile within an error of 2 or 4 links; thus, a limit of error in traverse has to be assigned, and here it is so at 8 links to the mile. Should the error in closing exceed this limit the work must be revised. So also, governed by minor triangulation, traverses should close by bearing with an error not exceeding 2 or 3 minutes of arc.

27. Suitable sites for schools are to be reserved, about 10 acres in rural districts and 5 acres in suburban districts. Also at least 100 links frontage to all navigable rivers and coasts, making the traverse lines if possible the boundary of such reservation. Bushes in sparsely-timbered country are to be reserved, and in bush country all clumps of valuable timber; also stone quarries, gravel and sand pits for road-making where conveniently situated, for trunk and district lines.

28. In surveying a spotting or isolated claim, the surveyor must proceed to the nearest geodesical or trigonometrical station and connect his section work by minor triangulation, and he will prepare a plan of the section and its connections on special sheets provided for that purpose. But if the claim be near to a trigonometrical station he may connect by traverse.

29. If no geodesical or trigonometrical station be available for connection, it will be the duty of the surveyor to report the circumstances to the head of his district before executing the survey; and in cases where a broken country is covered with forest, preventing minor triangulation or approved traverse circuit, special direction will be given for the survey and sectioning of the locality under such conditions.

Town Surveys

30. The main streets in all towns shall be laid out of a breadth not less than 150 links; side streets not less than 100 links wide. In open country the sides of the main-street

lines shall be pared; in bush, cut. In addition to pegs at the corner of every section, not fewer than four stone blocks or iron trigonometrical stations shall be placed 25 links from the building lines, so that three of them shall be reciprocally visible from each other, and on these the angular measurements of the town will be based. The block or trigonometrical tubes to be flush with the surface of the ground. The point of intersection is to be defined by a tack driven into the top of the peg.

31. Open spaces shall be set apart and reserved for recreation-grounds, the number of such reserves being regulated by the superficial area of the town, being not less than one-tenth of such area, the separate size of such reserves in no case being less than 12½ square chains.

32. No reserve shall be made for cemetery purposes within any town.

33. Municipal reserves shall be made at the rate of 1 acre to every 10 acres of the total area of the town; also one or two school sites of not less than 2 acres each. There should also be laid out sufficient land, either outside or inside such towns, for sites for depositing nightsoil, dirt, and rubbish, and such sites shall be selected on such side of the said towns as shall be opposite to the quarter from which the prevailing summer wind blows; also sufficient land, either outside or inside such towns, for sites for gravel-pits and stone quarries, and for depositing gravel, stone, or other materials required for making and repairing roads within such towns; provided that gravel, stone, or other road materials can be obtained in the locality. On the plans these areas to have their specific purpose written on each, either in full or in abbreviated form.

34. The streets of all towns shall, as nearly as a due regard to the natural features of the country and drainage of the land will permit, be laid off in straight lines and at right angles to each other; and allotments are to be laid off at right angles to the streets which they front when possible.

35. The name and plan of every town or village shall be approved by the Governor prior to any sale.

Survey of Native Lands

36. The foregoing regulations apply equally to the survey of Native lands for any purpose whatsoever, and in addition thereto the following rules are to be observed:

37. Boundary surveys of areas over 3,000 acres in extent for interlocutory orders may be made by the system of converging angles observed between fixed and known points, the intervening and adjacent features being delineated by cross-bearings, or theodolite or compass chain traverses.

38. Surveys under 3,000 acres in extent must be triangulated and traversed, or traversed only if triangulation be inapplicable by reason of the denseness of the forest.

39. Where not otherwise agreed upon, the following are the rates to be paid for the survey of Native lands for the purposes of the Native Land Court:-

(1) For the survey of any area -

Under 30	acres,	£6.	£.	s.	d.
30 to 50	"	3s.6d.	p.a.,	but not less than	
6 0	0				
50 to 100	"	3s.0d.	"	8	17 0
100 to 200	"	2s.6d.	"	15	0 0
200 to 300	"	2s.0d.	"	25	0 0
300 to 500	"	1s.6d.	"	30	0 0
500 to 1,000	"	1s.3d.	"	37	10 0
1,000 to 5,000	"	10d.	"	62	10 0
5,000 to 10,000	"	7d.	"	208	6 8
10,000 to 25,000	"	5d.	"	291	13
4					

(2) Any greater area by special arrangement.

(3) Where the surveys of two or more blocks adjoin, a deduction will be made at the rate of £5 per mile for forest and £2 per mile for open, on the length of their common boundaries.

(4) When more than half the length of the boundary lines runs through vegetation less than 4ft. high, one-third the rates will be deducted.

(5) Travelling expenses will be allowed at the rate of 4s. per mile, one way, to be measured in a straight line from the nearest survey office or residence of surveyor, at the discretion of the Surveyor-General. Where more than one block is surveyed at the same time, such allowance is to be divided amongst them in proportion to the number of the blocks. Should the block under survey lie outside triangulation, the necessary connection thereto will be arranged for specially.

40. Whenever a surveyor or the Native owner shall bring before the Court any question under section 40 of "The Native Land Court Act, 1880", the party intending to apply to the Court shall give to the other party at least seven days' notice of his intention so to apply, except in cases where both parties are present. The Chief Surveyor of the district shall give the Native owners notice of the cost proposed to be charged for a survey as soon as it is completed.

41. All surveys undertaken for the purposes of the Court, when not done by the official survey staff, must be made by authorized surveyors employed by the Surveyor-General, who shall issue a specific authority in writing in each case. Assistants employed by surveyors must be approved by the Chief Surveyor.

42. When triangulation is available for ascertaining distances it will not be necessary to chain long lines if the crossings of streams, ridges, or other natural features are fixed by intersections. Where a boundary line abuts on to a stream, lake, or coast line, the length of such line, as well as the traverse length, must be supplied. Swamp or terrace boundaries are inadmissible; they must be shown by right [ie straight] lines.

43. The positions of all remarkable hills, ridges, pas, eel-weirs, Native cultivations, tracks, battle-fields, villages etc, within or near the block under survey must be fixed by intersections; and the courses of all rivers, forest margins, swamps, lakes, coast lines, or other natural or artificial features must be sketched in for delineation in their proper position on the map.

44. The Native names of all boundaries or natural features within or pertaining to the block must be ascertained, together with the names and position of adjacent lands, and shown on the maps.

45. All plans are to be drawn upon mounted paper, to the scales given in clause 71 of these regulations, but they must not be on a less scale than 20 chains to the inch, unless by special permission. It is advisable when possible, but not absolutely necessary, to keep the maps of the uniform sizes of 30 in. x 30 in. or 18 in. x 16 in., but in no case must a less space than 100 square inches be left clear of any survey detail. Maps should be neatly drawn, in accordance with specimens to be seen in any of the survey offices. The whole boundary of the land forming the subject of the claim is to be conspicuously indicated by a tint of pink carried all round within it, and, when islands lying adjacent to the mainland are intended to be included in the claim, they must be coloured of the same tint. The map should have a plain title stating the Native name of the block, the survey district, and the provincial district in which the land lies, with the name or names of one or more of the applicants, and the names of those who pointed out the boundaries. The scale to which it is drawn, the meridian of the circuit in which the block is situated, and the area must be plainly stated. In the lower left-hand corner must be quoted the number and date of letter of instructions to the surveyor, with the number and page of the field-book. The map must bear a certificate signed by the surveyor making the survey, in the form or to the effect given in Regulation No. 111.

Surveys To Be Certified Under The Public Works Acts.

46. The traverse should be connected at intervals not greater than two and a half miles to the trigonometrical stations of the district, as well as to the corners of the sections or properties through which it passes.

47. Where no triangulation exists the traverse should be chained and observed twice, and, if possible, connected at, say, three-mile intervals, to some permanent topographical feature outside the line of formation, at which place a peg should be placed and lockspitted.

48. The lengths of the sides of the area proposed to be taken for the work should be given to each property, as well as its true position in the property.

49. The distances on the meridian and perpendicular of each traverse peg must be tabulated. The surveyor, if he connect with a trigonometrical station, must use it as the initial point or zero of his traverse; failing a trigonometrical station, then a corner of a property should be used; and, failing a property-corner, some of the permanent topographical points hereinbefore referred to should be used as zero.

50. The error in closing on the triangulation should not exceed 8 links to the mile, and the total error in any traverse should not exceed 20 links, except in very rough ground.

51. The traverse should commence at the same end, and the pegs should be numbered in the same direction, as that of the original engineering traverse, if any, and each sheet should not contain more than one mile, and should be plotted upon half a sheet of antiquarian drawing-paper, to a scale of 3 chains to 1 in.

52. The names of the present owners of properties, the number of sections or subdivisions, blocks, etc., should be written on each, wherever they can be ascertained; also the area of land taken for the work from each property or separate holding.

53. The ground-marking, pegging, etc., should be done generally as directed in a previous part of these instructions.

54. Maps should be drawn in the colours hereinbefore prescribed for working plans. Boundaries of road districts should be edged in light colour, and the name printed in same colour, every district having different shades or colours. Lands to be taken to be coloured in different shades or colours for each adjoining property; road to be closed to be coloured green.

The plan is to be certified as correct by the surveyor who made the survey, and also by the Chief Surveyor holding a certificate under "The Public Works Act, 1882."

55. An accurate schedule of the land proposed to be taken from each property must be furnished with the plan in the form given in Regulation No., 100, certified as in Regulation No. 54.

Contract Survey

56. No surveyor can be considered qualified to be a contractor unless he is an authorized surveyor, and has had five years' experience in an approved system - that is, in any system whose field operations are subject to mathematical check.

Authorized Private Surveyors

57. A surveyor in private practice, whose plans have to be approved by the department before obtaining a diploma, must apply to the Chief Surveyor of the district in which he proposes to practise, who will require exhibition of certificates. These must testify -

- (1) To personal good character;
- (2) To professional proficiency;
- (3) To at least three years' service in the field in a system of surveying similar to that of New Zealand, or to six months' service with an authorized surveyor in New Zealand, in addition to foreign cadet service.

58. If certificates be satisfactory in regard to character and attainments, then surveying and mapping instruments complete will have to be shown. Candidates for authorization may also have to pass an examination in mathematics, including geometry, mensuration, trigonometry, and algebra; and in the use of surveying instruments.

59. The applicant must also produce plans of land actually surveyed in the district and drawn by himself completely and in a workmanlike manner, in accordance with these rules and regulations, -

(1) Of a base line at least one mile in length;

(2) Of at least three triangles as observed in minor triangulation, with topography, bearings, distances, summation, reductions on meridian and perpendicular etc.;

(3) Of a property of at least 100 acres, connected to a trigonometrical point, with bounding and intersecting roads traversed reduced on true meridian, drawn to proper scale, with tables, title, etc., in a form recordable in the office, as executed by the staff;

(4) Of a city or town property of one or more acres, with existing buildings, etc., to represent a plan under the Land Transfer Act.

60. The Chief Surveyor will, upon compliance with these conditions to his satisfaction, sign and forward a diploma for the approval of the Surveyor General, and if so approved the applicant will be placed on the list of authorised surveyors.

Qualifications For Entry Into And Promotion In The Survey Department

61. The candidate for apprenticeship must exhibit a satisfactory certificate from his schoolmaster, also a certificate of his having passed the junior examination under "The Civil Service Act, 1866." He must be over sixteen and under twenty-five years of age.

62. Besides the above, a satisfactory departmental inquiry as to good eyesight for observing, a healthy constitution, a knowledge of geometry, trigonometry, and algebra, a legible hand, and taste for drawing, are necessary to qualify.

63. The Government will pay a salary of £50 for the first year, £60 for second, £70 the third, and £80 the fourth, together with an allowance at the rate of 2s. a day, or 14s. per week, while in tent.

64. The teaching surveyor will receive a sum of £50 when the apprentice passes his survey examination satisfactorily at the end of the three years.

65. No surveyor will be required or allowed to receive more than one apprentice.

66. Every facility shall be given to the cadet by the surveyor under whom he may be placed to enable him to acquire a thorough knowledge of the public system. survey

67. During apprenticeship (which extends over four years - one in office, and the remainder in the field) the senior examination of the Civil Service Regulations above quoted must be passed. If this is passed, it will also be necessary, previous to receiving a diploma, or promotion, to undergo a departmental inquiry as to knowledge of practical geometry and the first six books of Euclid, plane trigonometry and algebra as far as quadratic equations, surveying and levelling, the use and adjustment of the theodolite, and map-drawing. A certificate of good conduct and competence from the teaching surveyor must also be shown. These requirements being compiled with

qualify for promotion into the grade of section or assistant surveyor. A knowledge of elementary geology, mineralogy, and botany will be considered of value in giving promotion to the grade of assistant surveyor.

68. In order to obtain employment in the geographical or standard branch, the candidate must have further a knowledge of spherical trigonometry; of the use and adjustment of sextant, alt-azimuth, and transit instruments; also of practical astronomy, particularly in reference to latitude, longitude, and true meridian.

Office Record

69. Field-books, working plans, record maps, and documents relating thereto and to title, are to be kept in a fire-proof safe.

70. Working plans, whether of meridional circuits, major triangulations, minor triangulations, or block surveys, should be drawn on antiquarian paper, cut to 30 in. square. These are to be laid flat, in folios 33 in. square, which again slide in to level shelves 34 in. square, constructed in a closed press, set up in the fire-proof safes attached to the Survey Offices. Where there is not room for laying flat, folios may be placed upright. The working plans of isolated sections are also kept in folios 18 in. by 16 in. All these plans should remain unmounted, except under special circumstances. The compiled or index plans, however, being unavoidably of large size (56 in. square), are mounted and kept in rolls; but these if destroyed are replaceable, containing as they do no original work. The tops and bottoms of these maps should have thin laths glued to them, and extra-fastened with copper tacks. This prevents the paper breaking and creasing.

71. The following are the scales to be used in surveys; -
Working Plans.

Town sections, or sections under half an

acre	2	chains or	1/10	mile to an	inch
Suburban sections		5	"	1/16	" "
Rural sections	10	"	¼	"	"
Minor triangulations		40	"	½	" "
Topographical	40	"	½	"	"
Meridional circuit		320	"	4	" "
Reconnaissance and					
major triangulation		160	"	2	" "
Index maps	80	"	1	"	"

Copied or Compiled Plans.

Town or village selection maps ..	5 or 10	chains to an
inch.		

Town or village Crown-grant					
record maps	2	"	"		
Rural selection maps (after survey)	10	"	"		
(before survey)	40	"	"		
Crown grant record maps (rural)	20	"	"		
Territorial maps	4	or 8 miles	"		
Extreme Areas contained in Plans					
Working plans of	town sections	7/10	mile	square	
	rural sections	3 1/8	miles	"	
	minor triangulations	12 1/2"	"	"	
	topographical	12 1/2"	"	"	
	reconnaissance and				
	major triangulations	112"	"	"	
	meridional circuit	112"	"	"	

The above are suitable for keeping in the fire-proof safes. Wall maps may be of any size and scale.

72. With a view to the systematic record of all transactions of the Land Transfer Branch, and of surveys executed under the Public Works or other Acts, record maps on the same scales as for original surveys - namely, 20 chains to an inch for rural lands, and 1 or 2 chains to an inch for town lands - will be prepared, on which all road lines, sub-divisions, and other details surveyed since the issue of the Crown grant under the Land Transfer Act, Public Works Acts, the Land Act, Native Land Acts, or any other proper authority, should be recorded.

73. Computation books should be of one size, so as to fit the shelves in the safe. The size should be a little above the ordinary foolscap, and the books should be numbered, paged and the contents indexed, for easy reference.

74. Working plans are open to the inspection of professional men only. Selection maps are open to the public.

Publications

75. Towns may be reduced to any convenient scale. Rural and suburban block or section surveys will be reduced to a scale of 20 chains or 40 chains to an inch, as the area of the sections is small or great. Districts compiled 80 chains to an inch.

76. The paper on which the drawing is made should be perfectly white and smooth, and free from dirt, creases, or wrinkles. tracing cloth may be used, but tracing paper, unless perfectly white and carefully drawn on, seldom does well.

77. The drawing should be executed with good Indian ink, freshly rubbed down, quite black, and free from grit or glaze.

78. The lines should be firm and clean, not too fine or too close together. They must all be perfectly black, and pale ink must on no account be used. Thick lines in the printing and borders should be well filled in.

79. Washes of any colour are inadmissible.

80. If cross-hatching or shading is required, the lines composing it must be kept as open and distinct as possible, and they should not be too fine, but firm enough to reproduce well. Generally it is better to have free hatching done by transfer from steel, and in such case the drawing should give only the outline. Intensity of shade should be shown by an increase in the thickness of the lines rather than by their being placed close together, as it must be borne in mind that throughout the process there is a tendency for the lines to thicken, so that if they are too close they are liable to block up in the printing, and the work will appear heavy and unsightly. This rule also applies to hill-shading, the darker portions of which should be drawn in thick distinct lines, but not crossed and recrossed with fine lines.

81. As the process produces a perfect facsimile of the original, it is essential that the latter should be complete in every respect, and the drawing, printing, and writing should all be done in as neat a style as possible, so that the result may be fit for immediate publication, and not require to be altered or touched up after transfer to stone, by which the work is always damaged more or less. The hair strokes of the printing must not be too fine. Border lines, which could not be conveniently shown on a large scale plan, can be drawn on the stone.

82. When plans are intended for reduction, the lines should be of the proper thickness relatively to the scale of reduction. The printing and detail must also be relatively large in proportion. This rule is often neglected, and the result is the loss of all the finer lines, words, and figures. When drawing for reduction care must be taken to leave sufficient space between the line of the hill-shading, water-lines, or cross-hatching, so that they may be well separated when reduced, and may not block up in the printing.

83. When possible, it will be better to draw the original on a larger scale than is required for the copy, as a photographic reduction is always much sharper and much clearer than a reproduction.

84. In all cases a scale should be drawn on the plan and not stated as a scale of so many chains, feet, or miles, etc., to an inch.

General

85. All plans deposited with any Chief Surveyor or with any inspecting officer for examination become the property of the Government, and their return for correction or addition shall not give to the person to whom they are returned any right or claim to their possession. It shall be competent for any Survey Inspector to require in special cases, of which due notice shall be given, that the rules numbered from 128 to 133, of even date herewith, made under "The Land Transfer Act, 1885," shall also apply to surveys made under this Act.

86. Upon the receipt of plan of a block for settlement, and as soon as possible after it has been checked, a tracing on cloth, without bearings and distances or traverse lines, and mounted on stiff paper, is to be sent to the Land Office; also a reduction to a suitable scale is to be prepared for lithographing either in the district or at the head office as the case may require.

87. When any report or survey is required by the Chairman of the Land Board, he shall forward a requisition in writing to the Chief Surveyor of the district setting forth the nature of the service he requires, and on receipt of such requisition the Chief Surveyor shall with all convenient speed furnish such report or survey as the case may be; provided that, when a requisition for a survey is made, the Chief Surveyor shall specially note the same in his monthly report to the Surveyor-General, and shall, as soon as practicable, direct that such survey shall be executed, unless disapproved of.

88. One officer in the Survey Department should be entirely responsible for the preparation of the draft plans for certificates of title and Crown grants, and the same officer should compare the fair copies, and certify to the correctness of the plans thereon; the duty of writing the fair copies being that of the District Land Registrar.

89. The Chief Surveyor shall, about the first of each month, send to the Chairman of the Board a report stating the progress of surveys of Crown lands proposed to be opened up for settlement, and transmit a copy thereof to the head office with his monthly report.

90. Whenever a topographical survey or a block for settlement has been completed, the Board is to be at once furnished with a tracing on cloth (mounted) giving such information as is necessary for land selection, without written bearings and distances, and lithographs should be prepared in due course for sale to the public.

91. Surveyors in the employment of Government, or executing any surveys which are to be approved by the Surveyor-General or an inspecting officer, are to report to the Chief Surveyor of the district monthly, in the form given in Regulation No. 105. Government officers shall also furnish, on the 30th June in each year, a report and summary of work done, cost, etc., for the past twelve months, in the form given in Regulation No. 106. Chief Surveyors will report to the Surveyor-General as soon as possible after the termination of each month, but not later than the 15th of the following month, giving a summary of work executed by the surveyors acting under their supervision, the arrears, or work on hand, and proposed course of duty for the following month (form given in Regulation No. 107). They shall also, on the 30th June in each year, furnish a statement of the work executed during the past year, and the expenditure in the district, in the form given in Regulation No. 108.

92. Along with the monthly report Chief Surveyors will send diagrams of field inspections that have been made in the actual surveys then going on.

93. In provincial districts having not more than ten parties at work, field check is to be done by the Chief Surveyor; but, if there be more than ten parties, an officer will be employed as a field inspector - in conjunction with his ordinary duties, if the number to be inspected be few - to be stationed in such district and over such parties as the Chief Surveyor himself cannot overlook.

94. The Chief Draughtsman will, in the absence of the Chief Surveyor, have general charge and authority in the office of the provincial district, open and attend to correspondence, and sign for him all papers or plans not having a statutory authority.

95. Field-books are to be kept in ink, and when filled up to be returned to the district office. It is to be understood that all field-books and maps, whether of the official or the contract surveyor, are the property of Government. Fieldbooks should be dated for each survey, their contents indexed, and their number given on the finished plan. the whole of the contents of the field-book should be plotted before it is returned to be filed for reference.

96. Report if not able to repair all trigonometrical stations that are seen to be dilapidated. Renewed stations to have same letter as the old station.

[Regulations 97-110 have not been reproduced]

111. Form of Certificate, Native Survey

I hereby certify that this survey has been made under my own inspection, that it is correct, and that all the rules and regulations with respect in the survey of Native lands have been strictly complied with.

Forwarded to the Chief Surveyor of , on the day of, 18.

Authorised Surveyor

[Regulations dated 19 May 1886]

Waitangi Tribunal, Department of Justice, Wellington.

The Pouakani Report 1993

Appendices

11 (d) Extract From Survey Regulations under the Land Act 1892 (New Zealand Gazette 1897 pp 223-235)

[The 1897 Regulations 1-37 in respect of triangulation, topographical, rural and town surveys are not markedly different from the Regulations of 1886 and have not been reproduced].

Survey of Native Lands

38. The foregoing regulations apply equally to the survey of Native lands for any purposes whatsoever, and, in addition thereto, the following rules are to be observed:-

39. All boundary-lines of original blocks must be distinctly marked on the ground by lines cut through all vegetation above 2ft. in height, but subsequent subdivision may, in the discretion of the Chief Surveyor, be marked in the same manner as sections of Crown lands.

40. Where not otherwise agreed upon between the Chief Surveyor and the surveyors, the following are the rates to be paid for the survey of Native lands for the purposes of the Native Land Court:-

Schedule Rates per Acre.

Area	Bush		Open		But not less		But not less	
	Rate	than	Rate	than	per Acre	per Acre		
Acres	£	s	£	s	d.	£	s.	d.
10	to	15	0	5	0	3	0	0
	0	3	4	2	0	0		
15	to	20	0	4	6	3	15	0
	0	3	0	2	10	0		
20	to	30	0	4	0	4	10	0
	0	2	8	3	0	0		
30	to	50	0	3	6	6	0	0
	0	2	4	4	0	0		
50	to	100	0	3	0	8	15	0
	0	2	0	5	16	8		

100	to	200	0	2	6	15	0	0
	0	1	8	10	0	0		
200	to	300	0	2	0	22	10	0
	0	1	4	16	13	4		
300	to	500	0	1	7	30	0	0
	0	1	0	20	0	0		
500	to	1,000	0	1	3	39	11	8
	0	0	10	25	0	0		
1,000	to	2,000	0	1	0	62	10	0
	0	0	8	41	13	4		
2,000	to	5,000	0	0	8	100	0	0
	0	0	5	66	13	4		
5,000	to	10,000	0	0	4	166	13	4
	0	0	3	104	13	4		

(a) Where two or more surveys adjoin a deduction from the sum total arrived at by the above rates is to be made as follows:-

Where two sides adjoin, deduct 25 per cent of total, or
" three " " 37½ "

(b) If the surveyors' camp is situated over 10 miles from the nearest store, in the discretion of the Chief Surveyor, there may be added to the above rates 5 per cent; if 20 miles, 10 per cent; if 30 miles, 15 per cent; if 40 miles, 20 per cent; and above that by special arrangement.

(c) Subdivisional surveys will be allowed at mileage rates, except in very exceptional cases, when the Chief Surveyor may allow the above acreage rates or a modification of them.

(d) Schedule Rates per Mile

Rough Bush Country	£	s.	d.		
Road surveys ... per mile	20	0	0		
Traverse-or boundary-line 0		"	14	0	
Ordinary bush-country, with scrub -					
Road surveys	"	16	0	0	
Traverse-or boundary-line 0		"	13	0	
Hilly, open country, with scrub-					

Road survey	"	10	0	0
Traverse-or boundary-line 0			"	8 0
Open country-				
Road surveys	"	8	0	0
Traverse-or boundary-line 0			"	6 0

(e) Wherever deductions are made for contiguity, an allowance of £1 per mile will be given for plotting and calculating adopted work; the same will apply when mileage rates only are allowed. For topographical and other internal work, where acreage rates are not used, a payment of 10s. per square mile will be allowed if, in the opinion of the Chief Surveyor, the work is worth it.

(f) In travelling to the work, by railway or coach, the surveyor will be allowed £2 a day, and four men at 7s. 6d. a mile will be allowed up to 40 miles, which includes surveyor and men's pay.

(g) It shall be competent for the Chief Surveyor of any district to make special arrangements with respect to any block, and to fix rates by the mile, or by a daily rate or other equitable rate, for surveys which do not come strictly under any of the above descriptions.

41. All the claims to be made for charging orders under section 65 of "The Native Land Court Act, 1894," must be made in accordance with the Rules and Regulations of the Native Land Court. No Chief Surveyor, is bound to certify to costs which exceed, in his opinion, what is a fair charge, even in cases where arrangements have been previously made as to such costs.

42. Charges acquired by the Crown for the survey of Native lands under section 37 of "The Native Land Laws Amendment Act, 1896," are to be drawn in the Form I. given in Schedule.

43. All surveys undertaken for the purpose of the Court, when not done by the official survey staff, must be made by authorized surveyors, specially authorised by the Surveyor-General, who shall issue a specific authority in writing in each case. Men employed by surveyors to take charge of survey parties must be approved by the Chief Surveyor of the district in which the land lies; and not more than two parties shall be employed by any authorised surveyor, unless they are under the charge of authorised surveyors.

44. When triangulation is available for ascertaining distances it will not be necessary to chain long lines if the crossings of streams, ridges, or other natural features are fixed by intersections; but the crossings over ridges must be cut and cleared, and direction-pegs there placed. Where a boundary-line abuts on to a stream, lake, or coast-line, the length of such line, as well as the traverse length, must be supplied. Swamp or terrace boundaries are inadmissible; they must be shown by right lines.

45. The positions of all remarkable hills, ridges, pas, eel-weirs, Native cultivations, tracks, battle-fields, villages, rahuis, boundary-stones, etc., within or near the block under survey must be fixed by intersections; and the courses of all rivers, forest margins, swamps, lakes, coast-lines, or other natural or artificial features must be sketched in for delineation in their proper position on the map. All legal roads traversing a block must be properly shown on map, and in cases where unsurveyed formed roads intersect such a block they must also be shown.

46. The Native names of all boundaries or natural features within or pertaining to the block must be ascertained, together with the names and position of adjacent lands, and be shown on the map.

47. All plans to be drawn upon mounted paper, to the scales given in clause 62 of these regulations, but they must not be on a less scale than 20 chains to the inch, unless by special permission. It is advisable when possible, but not absolutely necessary, to keep the maps of the uniform sizes of 30 in. x 30 in., or 18 in. x 16 in., but in no case must a less space than 100 square inches be left clear of any survey detail. Maps should be neatly drawn, in accordance with specimens to be seen in any of the survey offices. The whole boundary of the land forming the subject of the claim is to be conspicuously indicated by a tint of pink carried all round within it, and when islands lying adjacent to the mainland are intended to be included in the claim, they must be coloured of the same tint. The map should have a plain title stating the Native name of the block, the survey district, and the land district in which the land lies, with the name or names of one or more of the applicants, and the names of those who pointed out the boundaries. The scale of the map, the meridian of the circuit in which the block is situated, and the area must be plainly drawn. In the lower left-hand corner must be quoted the number and date of letter of instructions to the surveyor, with the number and page of the field-book. The map must bear a certificate signed by the surveyor making the survey, in the form or to the effect marked H in the schedule hereto. After examination, the map, if in order, is to be approved by the Chief Surveyor of the district by writing the word "Approved" above his signature, and it is to be sent to the Native Land Court when the case is advertised.

48. Original plans of blocks which have been approved by the Chief Surveyor must not have further survey work or detail of a permanent character added to them. Subdivisions of such original blocks as ordered by the Native Land Court, or made at the instance of the owners of the land, must be on separate maps.

[Regulations 49-91 and Schedule have not been reproduced]
[Regulations dated 21 December 1896]

Waitangi Tribunal, Department of Justice, Wellington.