1898.

QUEENSLAND.

SURVEY DEPARTMENT.

RULES AND DIRECTIONS

FOR THE

GUIDANCE OF SURVEYORS.

BRISBANE:
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1898.

Survey Department,

Brisbane, 12th October, 1898.

The Rules and Directions for the Guidance of Surveyors, hereinafter set forth, are now established in accordance with Regulation 10 under "*The Land Act*, 1897."

All previous Directions are hereby rescinded, and Surveyors employed by the Department are requested to carefully study the Directions now in force, in order to become conversant with the amendments and additions that have been made.

A. McDOWALL,
Surveyor-General.

Approved:

J. F. G. FOXTON,
Secretary for Public Lands.

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ABBREVIATIONS.—A. = "*The Land Act*, 1897."
R. = "*The Land Regulations*, 1898."
App. = Appendix.

Sections are shown—76—subsections—4: thus (A. 76-4) means "*The Land Act*, 1897"—section 76, subsection 4.

RULES AND DIRECTIONS FOR THE GUIDANCE OF SURVEYORS.

I. DUTIES OF DISTRICT AND STAFF SURVEYORS.

1. District and Staff Surveyors shall be under the control and direction of the Surveyor-General. Under control of the Surveyor-General.

2. It shall be the duty of District Surveyors to supervise and control the operations of licensed surveyors employed in their districts, issuing to them instructions for survey work, when such instructions are not issued by the Head Office, advising them in the conduct of their work, and generally insuring that the surveys in the districts under their supervision are effected in accordance with the Acts and Regulations in force for the time being, and with the Rules and Directions of this Department. Where the strength of the staff permits, district office maps should be kept charted up to date. Duties of District Surveyors generally.

3. District and Staff Surveyors are expected to acquire a personal knowledge of the districts in their charge, particularly with reference to immediate and future road requirements; to inspect and report to the Surveyor-General on lands, advising the reservation of all lands that may be required for public purposes; to effect isolated, difficult and special survey work; to examine, by re-survey where necessary, and report on surveys effected by licensed surveyors; to inspect licensed surveyors' equipment; to report such instances of surveys being effected by unauthorized deputy as may come under their notice, and generally to promote the early and efficient completion of survey work; to be prompt in recognition of, and to give immediate attention to, all such public requirements as may be dealt with by this Department. In the performance of these duties they will be guided by the Departmental Rules and Directions. Duties of District and Staff Surveyors generally.

4. Particular attention is directed to the importance of frequent astronomical observations for meridian, both in effecting original surveys and in the examination of surveyors' work. No surveys by District or Staff Surveyors can be considered complete unless referred to the astronomical meridian. Importance of astronomical observations.

5. The Surveyor-General will from time to time issue to District and Staff Surveyors instructions for their guidance in matters of detail connected with their obligations, as salaried officers, to the Department, and in their relations with the state-paid labour employed in their survey parties. Surveyor-General will direct details.

II. DUTIES OF SURVEYORS.

6. Any specified district may be assigned to a licensed surveyor, who will generally be entrusted with the survey operations required therein; but such assignment shall not confer on him an exclusive claim to all the work in his district. Any other surveyor may also be employed therein, should circumstances render such a course expedient. Districts may be assigned to licensed surveyors.

7. Surveyors who propose temporarily to absent themselves from their assigned districts are required to give sufficient notice of such proposed absence, its probable duration and their interim address, to the Surveyor-General and to the District Surveyor; and on their returning, they should similarly report to that effect. Absence from district to be notified.

8. Surveyors are directed to give information about the land to persons representing themselves to be intending selectors. Occasionally it may be advisable that the surveyor should go, or send a competent person, with them to inspect the land; and, in some cases, it may be necessary to provide horses or accommodation for such persons. Reasonable claims for such services will be paid, but a detailed statement of the services rendered and the time so spent, signed by the person or persons assisted, with a note of their address, shall be forwarded with the claim. It is desired to put the surveyor's valuable knowledge of the lands at the service of intending selectors. The permissive direction hereby conveyed should, however, be judiciously exercised, so that the general cost of surveys will not be materially increased. To supply information to intending selectors.

9. In order that Land Agents may advise intending selectors of the location of survey camps, Surveyors are requested, when commencing the subdivisional survey, or mapping out, of large areas of land, to inform the District Land Agent of—— To inform Land Agent of the location of survey camp.

(*a*) The date on which it is proposed to commence operations;

(*b*) Their probable duration;

(*c*) The site of the survey camp, the post town, railway station, or other known locality nearest thereto, and directions by which from these, or any of them, the camp may be found.

21. Official memoranda relating to errors and omissions, must receive immediate attention. If a satisfactory reply is not received within a reasonable time payment may be withheld, or action taken in the matter independent of the surveyor interested. Memoranda *re* errors, &c., to receive prompt attention.

22. Where survey work has to be amended, all former marking must be obliterated or defaced.* Erroneous marking to be defaced.

23. Under certain circumstances specified and provided for in "*The Land Act*, 1897,"† surveyors may accept instructions from selectors for the survey of their farms. In any such case the survey shall be effected in accordance with the "Directions," and the plan, field-book, computations and the selector's written instruction for the survey are to be forwarded direct to the Surveyor-General, just as if the instruction had emanated from the Department. Instructions from selectors.

24. Before the permanent work on any extensive survey is commenced, a design of the proposed arrangement of roads and areas, based, if necessary, on a preliminary survey, and accompanied by a detailed report, is—if required—to be submitted for the consideration of the Surveyor-General. On completion of the permanent work, the approved design is to be returned with the plan of the survey. Designs to be submitted.

25. In the conduct of surveys, surveyors should note the general surface and geological formation of the country, the quality of the soil, the vegetation and the water supply; observe bearings to hills and other conspicuous features, and, generally, obtain as much topographical information as possible. Feature surveys.

26. Public interests being conserved, farms selected before survey should be surveyed as nearly as may be practicable in accordance with the selectors' applications. Where the area and position of boundaries, as surveyed, differ materially from the selector's description, his written consent to accept the farm as surveyed should, if procurable, be forwarded with the plan. Farms selected before survey.

27. The boundaries of portions previously mapped out should be surveyed as nearly as practicable in accordance with the sketch map, but necessary modifications, providing for additional roads or for the adjustment of boundaries so as to conform with existing surveys or natural features, may be made. Should considerable modification be proposed, it may be necessary to consult the selector, the Surveyor-General, or both, before completing the survey. Survey to accord with sketch map.

28. Where selections include more than one portion as mapped out, the external boundaries only of those portions are to be surveyed, and the portion number of the block will be the lowest portion number included in the selection. Selections including more than one portion.

29. Frontage to main roads and watercourses is to be computed at right angles to side lines. No portion shall have a greater breadth of frontage than two-thirds of the depth, except in cases where the land applied for comprises the whole of the land available for selection in the immediate neighbourhood.‡

Generally the depth of a portion should not exceed three times its mean breadth. Frontage and depth of portion.

30. When situated consistently with the general design, boundaries should be roads, rivers or creeks, or should follow ranges, spurs or other leading natural features. Failing these in suitable positions, straight lines at right angles to one another should be adopted, and, as a rule, directed to the cardinal points. But any other general direction for boundaries may be adopted where such would more suitably conform with the general trend of road systems or natural features. In rough or rugged country it is important that the boundaries should be so located as to afford the greatest facilities for fencing. All natural and artificial advantages being conserved, symmetry of design, minimum in perimeter, and rectangularity of form should be aimed at. Location and direction of boundaries.

31. As far as possible, roads should form boundaries of portions—that is, the boundaries or area may be modified so that the road, in the most desirable position, shall be a boundary. Small severances or irregular spaces between portions and roads are to be avoided. Roads to form boundaries where practicable.

32. Good serviceable fences, situated approximately on the gazetted boundaries of the leased parts of runs, should be traversed, and direct lines between suitable fence-posts computed and adopted as the boundaries of the adjoining grazing farms. The broad-arrow and portion number should be cut into such fence-posts and reference trees marked in the usual manner. Where fences so situated are old, very crooked or badly situated they may be disregarded, and straight lines, in the shortest directions compatible with fencing facilities, surveyed and marked as boundaries. Fences on boundaries of leased parts of runs.

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* The proper obliteration of survey marks is a matter of some importance, as a misunderstanding in this respect may lead to considerable trouble and expense. The method of "nicking" horseshoe marks, commonly practised by surveyors, is not sufficient, as it may mislead selectors and others. After a few years, when the sap and bark have grown over the blaze, it will present exactly the same appearance as if nothing had been done to it. The following method is to be adopted:—Extend the blaze downwards by cutting off the ledge of the original horseshoe mark, so that when the obliteration is complete it will have the appearance of a long irregular blaze which, when overgrown, will render it at once recognizable as an obliterated mark.

† Section 76, subsection 3.

‡ *See* "*The Land Act*, 1897," Section 87, and Regulation 13 thereunder.

To consult Local Authorities re public requirements.

10. Surveyors are specially directed to consult with Local Authorities on matters of public requirement—such as the location of roads, reserves and town sites—and the views and requirements of Local Authorities should receive careful attention and satisfaction. But the onus of providing for present and future public requirements in these respects will nevertheless fall upon the surveyor, who should look well into the future, especially where lands are being surveyed for alienation.

To report on any interference with survey marks.

11. The removal, obliteration or defacement of trigonometrical stations, survey-posts, pegs or marks, is a misdemeanour under section 237 of "*The Land Act*, 1897." Any such misdemeanour coming under the notice of a surveyor should be reported to the Surveyor-General and also to the nearest police officer.

III.—EQUIPMENT AND CAMP.

Necessary instruments and equipment to be supplied and maintained.

12. Each surveyor employed by the Department shall supply himself for use in survey work with the following surveying instruments, viz. :—

One transit theodolite*, the horizontal circle of which is not less than five inches in diameter ;

One prismatic compass, not less than four and a-half inches in diameter ;

One five-chain steel band for standard (*see* clause 14) ;

One or more five-chain steel bands adjusted to standard for general use.

And at all times during his employment shall, subject to inspection by district or staff surveyor, maintain the same in good order and efficiency.

He shall further supply himself with all other necessary equipment, and shall obtain and make himself conversant with the Acts and Regulations relating to the leasing and alienation of Crown lands. He will be supplied by the Department with all information requisite for prompt compliance with instructions.

Licensed surveyors personally responsible for parties.

13. Licensed surveyors shall engage and be personally responsible for the cost of the labour employed in their respective survey parties.

Standard five-chain bands issued by the Department.

14. A steel band, five chains long, correctly adjusted to standard length, will be supplied, free of cost, to all surveyors working for the Survey Department. The band so supplied is to be considered as the property of the Department, to be used solely as a standard of linear measurement with which to compare the working steel bands. The particulars of the tension and the temperature at which the band is standard are supplied with it.†

To be returned periodically.

15. At the expiration of periods of about two years the standard bands so supplied should be compared with the standards lodged in the district offices or returned to the Department for comparison with the official standard. They may be returned at any time for this purpose, if their value as standards of measurement should become impaired by breakage or from any other cause.

IV.—CONDUCT OF SURVEYS.

(*a*) *Selections and Reserves.*

Personal survey directed.

16. All surveys shall be carried out personally by the surveyor to whom they are entrusted. The Surveyor-General may, however, specially sanction the employment of any competent assistant surveyor, but the surveyor entrusted with the work shall be held solely responsible.

Surveys to be completed within three months.

17. As a general rule, surveys should be completed within three months after the date of the instruction. If a surveyor's work accumulates, so that he cannot comply with this rule, he should inform the Surveyor-General of the cause of such accumulation, the order in which it is proposed to effect the work, and the probable date of its completion. It is necessary to strictly comply with this rule, otherwise delayed instructions may be withdrawn without notice and issued to another surveyor.

Surveys to be in accordance with directions.

18. All surveys or other duties, are to be carried out in accordance with the Rules and Directions of the Department, and such amendments thereof as may from time to time be authorized. Of such amendments surveyors will be duly advised.

Surveyor to correct errors at his own cost.

19. Should a surveyor's work be found to be in error or not in accordance with the rules as then established, he may be called upon to rectify such error or default at his own cost, or he may be charged with the cost of rectification as made by another surveyor.

Limit of error.

20. Under the present improved methods of measurement it is expected that the limit of error in closure of new survey work effected on ordinary undulating country will not exceed one link in fifty chains; but the limit excusable in any case, will be decided by the Surveyor-General, on consideration of the examining surveyor's report.

* Surveyors should, as opportunity offers, test the needles of their theodolites by comparison with referring marks established at the District offices.

† Surveyors employed by the Department, who have not already been supplied, should apply for such a standard of linear measurement.

Consent of lessee.

33. If such fences or lines encroach on the lease, written consent to their adoption as boundaries should be obtained from the lessee or his responsible agent.

Previously surveyed boundaries of Grazing farms—not to be re-surveyed.

34. Where grazing farms adjoin previously surveyed rivers, creeks or marked lines, such shall not, without good reason, be re-surveyed. Connections should be made with original corners, and the azimuth of old lines observed—the surveyor's own work being proved by astronomical observation. A mis-closure with old work, unless very serious, will not justify a re-survey.

Theodolite to be used—exceptions.

35. Traverse surveys of features, of improvements, or of wide roads, may be effected with the compass (or circumferentor) and steel band. Surveys of runs may, under special instructions only, be effected with compass and perambulator. But with these exceptions, or as may be otherwise specially directed, all survey lines are to be run out instrumentally, and angles measured, with a carefully adjusted theodolite.

Datum to be taken from adjacent portions.

36. The accurate determination of datum lines is important under all circumstances. Unless otherwise instructed the meridian of an adjacent surveyed boundary line is to be determined by running out with the theodolite the whole, or so much of it as may be necessary, and the meridian so determined is to be adopted as a datum for the new survey work. The datum line is to be entered in the field-book and shown on the plan.

Datum need not necessarily be measured.

37. The adjacent boundary adopted as datum need not necessarily be measured, unless it forms a boundary of the new survey work, and has not been surveyed by the same surveyor (*see* clause 38). If the true meridian of a long and badly defined adjacent boundary line is known, instead of running it out with the theodolite from end to end, a satisfactory datum for the new work may be established from a preliminary astronomical observation.

Old lines to be identified and need not be re-surveyed in certain cases.

38. Where any of the boundaries of a portion under survey co-incide with previously surveyed lines, sufficient evidence that the boundaries adopted are identical with the original lines must be given in the field book. If the surveyor making the new survey made the previous one also, or in any case where a complete re-survey appears unnecessary, only so much work should be done as is absolutely requisite to re-establish the original boundaries (*see* clause 247).

Datum for isolated surveys.

39. To obtain a datum for isolated surveys the true meridian should be determined by astronomical observation, and from this should be laid off the arbitrary meridian adopted for surveys in the locality. The angular difference of this arbitrary meridian from true north will be stated in the instructions. If no such arbitrary meridian has been adopted, surveyors are directed to also determine the magnetic meridian from needle readings, and to adopt as the meridian of the new survey an angular difference from true north equal to the whole degrees of the magnetic declination so determined, any fraction of a degree being disregarded (*see* clauses 162 and 163).

Measurement of lines.

40. All measurements on survey work are to be made with the five-chain steel band, following the contour of the surface of the land, the temperature of the band being noted at each measurement and the angles of inclination from the horizontal being observed with theodolite or clinometer. Such inclined measurements are to be reduced to horizontal lengths, and further corrected for the expansion or contraction of the band from standard length. The use is approved of correctly graduated chain handles or scales (the latter affixed to the band at each chain's length) by means of which corrections for variation of temperature may be made on each measurement without calculation. The theodolite should be used to read angles of inclination exceeding eight degrees from the horizontal, as the clinometer cannot be relied on for the accurate measurement of greater angles (*see* clause 184).

Comparison of working tapes with standard.

41. The standard steel band supplied by the Department is standard only at a certain given tension and temperature, particulars of which are supplied with it. In laying down a field standard, with which to compare and adjust the working steel bands, the given tension is to be applied to the standard band by means of a spring balance and, as the lengths are marked down, the temperature of the band should be read from thermometers placed in contact with it. For each degree Fahrenheit under or over the temperature at which the band is standard, a plus or minus correction of 0·005* of an inch per 66 feet must be made on the field standard so marked down.

Boundary and road lines—clearing and marking.

42. Boundary and road lines are to be cleared to a width of two feet by the removal of scrub, undergrowth and trees less than six inches in diameter. In scrub and in forest country the trees standing nearest to the line are to be marked with a horseshoe mark (*see* Appendix xx. d) cut into the heart-wood on opposite sides of the tree in

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* This correction is arrived at by assuming that a steel band 66 feet long expands or contracts 0·00000625 of its length for a change in temperature of 1° Fahrenheit. This co-efficient multiplied by the number of inches contained in 66 feet (0·00000625 x 792) produces 0·00495 as the expansion or contraction in inches for one chain, for which fraction 0·005 of an inch is a convenient working abbreviation.

The co-efficient of expansion (0·00000625) assumed is a mean between 0·0000055 and 0·0000070, which are those given as extremes for steel tapes in Johnson's "Theory and Practice of Surveying," page 476, and which very nearly agrees with General Roy's co-efficient for steel rod.

such positions that the marks face along the survey line. Trees left standing, and through which the line passes, are to be double marked (*see* Appendix xx. b) on opposite sides in such positions that the marks face along the survey line.*

43. In sparsely timbered or open downs country, where there is only an occasional tree near the line, such tree shall be marked with a horseshoe-mark on three sides, the centre mark facing the line, and the position of that mark in reference to the surveyed line shall be determined by a rectangular measured offset, which is to be recorded in the field book and shown on the plan. In such country especial care must also be taken to use only good, sound corner posts and ten-chain pegs of the full dimensions specified in the Regulations (*see* "The Land Regulations, 1898"—10). Marking in sparsely timbered or open country.

44. At distances not exceeding ten chains apart, and always so situated as to be visible one from the other, split hardwood pegs, eighteen inches long and two inches square, are to be aligned with the theodolite and driven one foot into the ground. Pegging.

NOTE.—The practice of obtaining pegs by chopping them from the sides of standing timber is prohibited.

45. On each side of the split pegs, and distant about one foot, lockspits five links in length and one link in depth are, except as hereinafter provided, to be dug in the direction of the surveyed line. On very stony lands, rows of stones placed in the direction of the surveyed line may be substituted for dug-out lockspits. In dense scrubs, lockspits at pegs are not required. Lockspits at pegs.

46. Where marked lines exceed one hundred and twenty chains in length, reference trees should be selected adjacent to them, at or about one mile apart, and the bearing and distance determined from these trees to a mile or other chainage peg. The usual horse-shoe marks should be cut, and the bark removed in the form of a shield, the mileage or chainage being inscribed under the broad-arrow on the shield. The position of, and the bearings and distances from, such trees (taken from bench-mark at base) are to be recorded in the field-book and shown on the plan. Reference trees to mile pegs on long lines.

47. All corners shall be marked with hardwood posts three feet six inches in length, squared to not less than four inches in width, with a butt six inches long and the full round size of the timber left on the bottom of the post (*see* Appendix xxi.). Posts are to be sunk two feet into the ground and well rammed. Corner posts.

48. Outside a fifteen-inch radius from the post, lockspits are to be dug ten links long and nine inches deep in the direction of boundary lines. Lockspits at corners.

49. Where bed rock is met with in post-holes, the posts should be solidly packed up with stones and, if necessary, rows of stones placed in the direction of boundary lines in lieu of dug-out lockspits. Rocks at corners are to be marked with a broad-arrow (point at angle) and with pickmarks in the direction of boundary lines. Rocks at corners.

50. Where soils are of so sandy or friable a nature that lockspits quickly fill up, and consequently do not remain as permanent indicators of the direction of survey lines, split hardwood pegs, twelve inches long and one and one-half inches square, driven level with the surface of the ground shall be substituted for dug-out lockspits. Such pegs are to be aligned with the theodolite and driven at exact distances—for instance, at twenty links from corner-posts. In order that these pointer-pegs may not coincide with fence post holes, and so be disturbed, their distances from the corner-posts may be varied, as the fencing practices differ; but, so that they may be of service in the determination of the angle points, the distances from the corner-posts at which they are placed shall be recorded in the field book, and shown by a note on the plan. Pointer pegs in lieu of lockspits.

51. The nearest suitable tree to a corner-post should be selected and the bark removed in the form of a shield, about five feet from the ground and exactly facing the post. On this barked space the broad-arrow and portion number in Arabic numerals shall be cut at least half an inch deep. Horseshoe marks shall be cut into the heartwood on the other sides of the tree, about four feet from the ground—on large trees three such marks, on small trees a fewer number. The bearing (to the nearest five minutes of arc) and the horizontal distance (to the nearest tenth of a link) shall be observed and measured to the post from a bench-mark cut into the heartwood at the base of the tree and exactly facing the post. Reference trees should preferably be selected within the boundaries of portions, but should none such be available the most suitable tree shall be utilized. Corner trees—method of marking.

52. Where a post is situated at the intersection of the boundaries of more than one portion, a reference tree, except as hereinafter provided, shall be marked for each portion. Separate tree for each portion.

53. Should no suitable tree whatever stand within a radius of two chains of the corner, the broad-arrow and the portion number or numbers shall be cut into the post. No tree—post to be marked.

54. If a large tree stand exactly at a corner it shall be marked as directed with broad-arrow, portion number or numbers and horseshoe marks, and with lockspits dug from it in the direction of the boundary lines. Tree at corner.

* As it is found that various trees of the order "Coniferæ"—Dundathu or Kauri Pine (*Agathis* or *Dammara Robusta*), Moreton Bay or Hoop Pine (*Araucaria Cunninghamii*), and the Bunya Pine (*Araucaria Bidwillii*)—are destroyed by incisions being made in the bark, these trees should not, except where it is unavoidable, be blazed or used for reference purposes

Distant trees to be marked if no others available.

55. In sparsely timbered districts, surveyors should neglect no reasonable opportunity of marking reference trees at corners, and when the only suitable tree is situated at a greater distance than two chains from the corner, measured connections thereto may be made and charged for at traverse rates.

Corner trees in grazing farms.

56. To avoid destruction when rabbit fence lines are being cleared, reference trees at the corners of grazing farms should, where possible, be selected at a distance greater than twenty links from the post.

Inaccessible places.

57. When the boundary of a portion crosses a tract of country that is inaccessible, the boundary should be surveyed and marked on either side of and up to the inaccessible place, posts and reference trees being established at the terminal points, which shall, when practicable, be connected by a traverse survey detouring the obstacle.

—may be avoided.

58. To avoid inaccessible tracts, the direction of boundaries may be varied and carried by marked lines along the top or the base of cliffs or precipices.

Traverse lines.

59. Traverse lines, following natural features or fences, should be as long as practicable, within an offset limit of three chains on country lands and one chain on town or suburban lands. Where short bends cause these limits to be exceeded, subsidiary traverse lines should be run. Offsets should be taken at intervals of about two chains, but at shorter distances if necessary.

Uniformity in surveying water frontages.

60. As it is desirable to establish uniformity of practice in the measurement of frontage watercourses, it is directed that the boundaries of portions fronting a watercourse shall be the tops of the banks where they are bold and well defined. Where the banks recede gradually the boundaries shall be at such distance from the centre of the watercourse as to continue the channel at the same average width as that between the well-defined banks, provided there is no great increase in the actual width of the water, in which case the edge of the water shall be taken as the boundary. The minimum width to be reserved for the channels of frontage watercourses (that is between the portions on opposite banks) shall be fifty links. Offsets are to be taken to the boundaries as above defined and extended to the water's edge at the ordinary level; but such additional length of offset shall not be reckoned in the computation of the area of the portion fronting the watercourse. The full average width of the watercourse shall be noted in the field-book and plotted on the plan.

Equalizing lines along shallow watercourses.

61. Where frontage creeks are shallow or dry, and so offer no barrier to the crossing of stock, equalizing or give-and-take lines may be surveyed crossing and recrossing the creek. Such water as may exist should be equally divided between portions on either side; and the equalizing lines should, where possible, be located on country that is not flooded.

Fresh-water swamps not to be boundaries.

62. The edges of fresh-water swamps are not to be adopted as frontage boundaries. Portions abutting on to such are to be surveyed irrespective of them, excluding or including such swamps or parts of them, and are to be defined in conformity with the local design. Boundaries which cross swamps with deep water too wide to be actually measured over may be dealt with as inaccessible (*see* clause 57).

Boundaries along lakes, &c.

63. The boundary lines of portions fronting lakes or lagoons required for public purposes, shall be defined by marked lines at a distance of not less than one hundred and fifty links from the water's edge, so as to allow the free passage of stock along the margin.

Esplanade along sea-coast, &c.

64. An esplanade, not less than one hundred and fifty links in width, and providing a practicable road, must be reserved above high-water mark, along the sea-coasts, navigable rivers and creeks. The boundaries of portions fronting on to such esplanades are in all cases to be surveyed and marked.

General rule as to high-water mark.

65. Sandy beaches, mangroves, bare mud-flats and salt swamps are generally to be considered as being below high-water mark, but land that can be easily reclaimed, small patches of mangrove, or mud-flats, nearly or quite isolated from the general contour of high-water mark, may be dealt with as being above it, and may be crossed by esplanades, or be included within the boundaries of portions. Surveyors, while observing this direction as far as it may fairly apply, must exercise discretion in dealing with the varying conditions to be found along such frontages.

Reserves in grazing areas.

66. To meet the requirements of travelling stock, full and sufficient reservations should be made for camping and for water. Suitable sites for dams, tanks or bores, along main roads and stock-routes should be reserved, or their reservation recommended. Local Authorities should in all cases be consulted, and their suggestions and requirements, in the matter of reserves for all public purposes, should receive the surveyor's careful attention.

Department to be advised of lands suitable for reserves

67. Surveyors should unfailingly advise the Department of all lands that should be reserved for town sites, natural or artificial water supply, building-stone, road-metal, gravel, camping, State schools, recreation, trigonometrical stations, State forests for the preservation of cedar, pine or other timber, crossings in water-courses, lakes, waterfalls, spots of unusual beauty, or for any other present or future public purpose.

68. Should instructions received for surveys include land which in the public interest should not be alienated, surveyors should immediately report thereon to the Surveyor-General, and take such other action as may be necessary to secure its reservation. Action towards reservation to be taken.

69. On each side of existing railways, or proposed railways the routes of which have been permanently surveyed, a reserve, at least three chains wide, measured from the centre line of the railway, shall be provided. Two chains of this reserve on each side of the centre line is required for railway purposes, and one chain on each side next to the fence line of portions fronting on to the reserve, may be considered as a provision for public road purposes. If a road wider than one chain is required on either side, the reserve must be made so much wider, or its width may be increased in places to provide for road-crossing or other facilities. Reservations along railway lines.

70. When surveying portions fronting such a reserve, it is advisable that the surveyor should be provided with the bearings and lengths of the straights, and the radii of the curves of the centre line of the railway. The reserve width should be marked off on each side from the tangent points, at right angles to the straights; the length of the curves should be computed and divided into equal parts, the chords or tangents of which shall form the boundary lines. No chord or tangent should be less than two chains in length. Frontages to railway reserves.

71. Excepting such as may be required for public purposes, areas of Crown lands less than forty acres in extent, or narrow strips less than ten chains in width, should not be left as vacant lands between country portions. As the circumstances of the case may require, the boundaries of portions to be surveyed may be adjusted to increase or to include such small areas or narrow strips. Small areas and narrow strips not to be left vacant.

72. The survey of one or two isolated portions should be connected with previously surveyed areas if such exist within two miles. The survey of large groups of portions should be connected with previously surveyed areas if existent within five miles. If there be no such previously surveyed portions connections should be made with a marked tree on a feature survey, or to any other point the position of which has been previously determined. Connection should be made by theodolite survey, preferably following a road or a natural feature.* Connecting isolated portions.

73. Should a road be traversed for this purpose, one side of it may, if advisable, be also surveyed and marked in addition to the traverse, which, provided there be no reason to the contrary, should in such a case be effected with the prismatic compass—the theodolite survey of the marked side forming the connection required. Connection by surveyed road.

74. Connecting traverses along watercourses suitable for subsequent adoption as boundaries should be carefully effected, offsets being measured from the traverse line to the watercourse, and to other natural features. Such survey should be marked with hardwood pegs, eighteen inches long and two inches square, driven firmly into the ground at the angle points, the tree nearest each peg being blazed with three horseshoe marks, the centre one of which should face the peg. Where there are no roads or natural features, connecting surveys should be as direct as possible. Connecting traverses along frontage watercourses.

75. All surveyed portions are to be numbered in sequence, each parish, run, resumption, &c., having a separate series. Where heretofore adopted the addition of the letter "V" to portion numbers is to be continued, but it need not be so added when commencing a series. The method of grouping the broad-arrow, the number and the letter "V" is shown in Appendices xx-a and xxix. Numbering of portions.

76. In surveying farms care should be taken not to exceed the maximum net area fixed by "*The Land Act*, 1897," and Regulations thereunder. Areas of portions.

The area of grazing selections must not exceed	...	...	20,000 acres
" " scrub selections must not exceed	...	...	10,000 "
" " agricultural farms must not exceed	...	...	1,280 "
" " unconditional selections must not exceed	...		1,280 "
" " country portions for auction must not exceed			320 "
" " agricultural homesteads must not exceed			160, 320, or 640 acres according to the purchasing price.

The limit of area allowable will be stated in instruction for survey.

77. A report on the prescribed form (Appendix iii.†) should accompany all plans of unselected lands surveyed for alienation. This should contain a detailed description of each portion, its rock formation, soil, proportion of agricultural to pastoral land, Report and valuation to be forwarded.

* It is frequently found in practice that surveyors omit to make connections which could easily be done when on the ground, but involve considerable expense and delay afterwards. Surveyors are, therefore, expected to see that their work is properly connected with former road and portion surveys, with definite and known points (such as mile-posts) on railway and telegraph lines, and with the marked trees (when such are found in the vicinity) of previous feature surveys. Also, when a surveyor is effecting surveys along a watercourse or road on the opposite bank or side of which there are previously surveyed portions, connections to such previous work should, if possible, be made—either by actual survey or by bearings from the work in progress to a clearly defined point on the old work. When it can be conveniently done, the meridians of the old and new work should also be compared. Such connections will be paid for, either as connections or according to circumstances and the amount of work involved, the surveyor to supply particulars.

† The Report shown in Appendix xii. is required by the Lands Department. Vouchers for such services should be rendered to the Under Secretary for Lands.

natural herbage, grazing capacity, description and value of timber, water supply, liability to flood, existence of noxious weeds, nature of improvements, and the rent per acre recommended. When groups of portions are dealt with a summarized description of the total area should be supplied with information as to the best road and mileage to the nearest port, town, or railway station.

(b) Town and Suburban Lands.

Selection of town sites.

78. The selection of sites for towns is a most important matter, meriting more attention in this colony than it has had in the past—some of our towns having been located without proper regard to the laws of hygiene or economic considerations. When a town site is chosen by the surveyor, may be in a casual manner, the location of a future city has perhaps been really decided, and, as the health of the town or city will be a matter of supreme importance, it is essential that the site chosen should present such natural features and advantages as will conduce to the well being of the future inhabitants. In this relation there is a well-known connection between subsoil and disease, between geological structure and the death-rate, and it may be stated as an axiom of sanitary science, that there is less disease on pervious than on impervious soils ; less, again, on high-lying pervious soils than on those that lie low.

Elevated sites should, therefore, be chosen as not being liable to be flooded by the overflow of watercourses, nor kept damp by soakage waters, and, moreover, the natural inclinations from elevated sites towards lower levels provide for surface drainage. The soil should be pervious, or thinly overlying an absorbent stratum into which moisture quickly drains away. Pervious soils also present favourable economic conditions, in that they are easily excavated for underground subways, water, gas and sewage conduits.

It is expected that surveyors, perceiving their responsibilities in this respect, will, in the selection of town sites, exercise wisely their judgment as between clay flats and permeable strata ; between flooded lands and more elevated situations safe from flood and the dangers lurking in perennial moisture.

The matter of the water-supply for future town or city should also receive due attention, any existing natural provision being reserved or its reservation recommended. In this, as in all other cases when making reservations or provision for future public requirements, Local Authorities should be consulted and their requirements and views should receive careful consideration.

Designs to be submitted.

79. Before the permanent work on any survey of town or suburban lands is commenced, a design of the proposed arrangement of sections and streets, based, if necessary, on a preliminary survey, and accompanied by a detailed report, is, if required, to be submitted for the consideration of the Surveyor-General.

New townships to be surveyed on the arbitrary meridian.

80. Where new townships are to be located the permanent survey of town sections shall be preceded by the astronomical determination of the true meridian by eastern and western solar or stellar observations. The arbitrary meridian (*see* clauses 162 and 163) is to be adopted as the datum of such survey.

Sections to be rectangular.

81. Towns should be laid out in rectangular sections on lands that are fairly level, but to some extent in accordance with the surface conformation on uneven ground.

Dimensions of sections and allotments—back lane.

82. Generally, sections should contain five acres each, divided longitudinally by a lane twenty-two feet wide, the section measuring ten chains long and five chains thirty-three and a-third links wide, including the lane, each half section being, divided into five half-acre, or ten quarter-acre, allotments.

Streets to be located on lower levels.

83. Streets, where practicable, should be located on the lower levels, that the surface water may drain from the allotments into the street channels, which, in towns without underground sewers, are the means usually provided for carrying off storm waters. In certain cases it would be an advantage that streets follow the contour of, and include the minor, watercourses ; the lower levels along which storm and soakage-waters flow would thus be under the control of municipal authorities. Such streets, however, should be of sufficient width to provide for ordinary traffic without immediate formation.

Width of streets.

84. The main street may be two chains or one and one-half chains wide ; other streets one and one-half chains or one chain wide.

Esplanade.

85. When town sections are being surveyed adjacent to rivers or creeks an esplanade of a suitable width should be reserved along the frontage.

Wharf sites.

86. Provision should also be made for wharf sites on the banks of navigable water-ways

Allotments not to adjoin boundary of town reserve.

87. Allotments are not to be marked within one chain of the proclaimed boundary of a town reserve.

Reserves for various public purposes.

88. Areas should be reserved for school (five to ten acres), post and telegraph (one acre), and police (one and a half acres). Reserves of suitable areas may be provided for road metal, gravel, recreation, parks or gardens. A site for a cemetery may be recommended, but should not be located within the limits of a town. These reserves need not be marked on the ground unless required.

89. Previously erected improvements should be included in sections, when so doing does not greatly interfere with the symmetry of the design. Improvements.

90. The following are the areas of town and suburban allotments prescribed by "*The Land Act*, 1897":— Areas of town and suburban lands.

Town lands in allotments of from one rood to one acre.
Suburban lands, within one mile from town lands, in lots of from one acre to five acres.
Suburban lands, over one mile from town lands, in lots of from one acre to ten acres.*

91. Suburban lands are to be laid out in sections and allotments, which may be varied in shape according to circumstances, but must be limited in area, as prescribed in clause 90. Laying out suburban lands.

92. The building lines of streets are to be cleared to a width of three feet by the removal of scrub, undergrowth and of trees less than six inches in diameter. The trees standing nearest to the line and those left standing on the line are to be marked as directed in clause 42 (*see* Appendix xx. b, c, d). Boundary lines.

93. Corners of sections are to be marked by corner posts as prescribed in clause 47. The posts shall be marked with the number of the section cut into the wood—in Roman numerals three inches in height for town sections, and in Arabic numerals three inches in height for suburban sections (*see* Appendices xxiv. and xxv.) Outside a fifteen-inch radius from the post, lockspits three feet long and six inches deep are to be dug in the direction of boundary lines (*see* Appendix xxii.). If a tree stand exactly at a corner it should be cut off eighteen inches from the ground, and a post shaped out of its stump at the exact angle point. This post should then be marked with section number and lockspits as directed. Corners of sections.

94. Corners of allotments are to be marked as follows:—Hardwood pegs, two inches square and eighteen inches in length, are to be driven fourteen inches into the ground. Those on the street frontages are to be marked with the numbers of the allotments, cut into the wood in Arabic numerals two inches in height. The numbers shall face the allotments they represent. Outside a radius of twelve inches from the pegs, lockspits are to be dug in the direction of each boundary line. Section corner posts are to be marked with the allotment numbers in Arabic numerals facing the allotments, and with the section numbers in Roman numerals facing the streets (*see* Appendices xxi., xxii., xxiii.). Corners of allotments.

95. If rocks, that cannot be removed, are found to be situated at corners of either sections or allotments they should be marked, as directed in clause 49, with broad-arrow (point at angle) and pick marks in the direction of each boundary, and, if practicable, the section or allotment number should be cut into the rock. Rocks at corners.

96. As permanent datum points in connection with the survey of town sections, iron rods, one inch in diameter and twelve inches in length, are to be driven perpendicularly into the ground to a depth of eighteen inches (*i.e.*, top of rod to be six inches below the surface) at the intersection of the centre lines of the principal streets. Sites for these rods should be selected where streets are unlikely to require other than surface formation. Not less than three rods should be inserted; in no case should the distances between them exceed 20 chains, and the sites should be visible from one another. Iron rods.

97. The survey is to be connected by angular and linear measurement with these rods, and their positions are to be noted in the field-book and shown on the plan. Survey to be connected with iron rods.

98. When additional sections are being surveyed in a town the rods inserted in connection with a previous survey should be found, and the meridian indicated by them should be adopted as the datum for the new survey work. Use of iron rods in subsequent surveys.

99. A report and valuation on the prescribed form (Appendix iv.) shall be forwarded with all plans of town and suburban lands surveyed for alienation. In the case of new town sites this should describe the soil and rock formation—whether porous or impermeable, whether the land is subject to flood and to what extent, how naturally drained, any natural water supply that may be available, and how the site is situated generally in respect of communication with the surrounding district and other places. A particular description is also required of allotments, the nature of any improvements, and the price per acre recommended. Report and valuation to be forwarded.

(*c*) *Roads through Unoccupied Lands.*

100. Rapidity, safety and economy of carriage are the objects of roads; they should, therefore, be so located as to enable loading and passengers to be transported from one place to another with the least possible labour and in the shortest time. To attain these ends roads should be straight and level. These requirements must often conflict. In such cases, straightness should always be sacrificed to obtain the lowest practicable ruling grade. A good road winds around hills instead of passing over them. As a general rule the horizontal length of a road may be advantageously increased twenty times the perpendicular height, which is thus to be saved. Roads.—General remarks.

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* "*The Land Act*, 1897," section 166.

Inclinations, always injurious, are particularly so where a steep slope occurs on a long line of road which is otherwise comparatively level. It is in that case especially important to avoid or to lessen this slope, since the load carried over the whole road may have to be reduced to what can be carried up this ascent. If a hill cannot be avoided it should be contoured with the easiest grade obtainable, but which need not be less than the ruling grade already established at other points on the road. Authorities on road making are agreed that the longitudinal slopes of a road should be kept, if possible, between one in thirty and one in one hundred and twenty-five, never steeper than the former, nor nearer to the level than the latter ("Roads and Railroads," Gillespie). Roads should therefore, wherever practicable, be so located that these grades can be obtained by a reasonable expenditure on formation. In rough and rugged country, this ideal maximum of longitudinal slope must often be exceeded, but however much this may be necessary, the importance of increasing horizontal length to obtain the lowest practicable ruling grade should not be lost sight of. Immediate public necessity for a road that is practicable often conflicts with the future public interest. It may really be false economy to contour a spur that should be cut down; to make a long detour to a crossing to save the cost of a bridge on the direct route; or to go round a swamp that should be crossed direct on a causeway. Yet immediate necessity has its claims, and economy is a comparative term in relation to funds available and the cost of such improvement. When such conflicting cases arise, surveyors should put all the facts before Local Authorities (*see* clause 106), appealing to the Surveyor-General when the decision of the Local Authority appears to be unwise.

Access for each portion.

101. Practicable road access should be provided to each portion, whether held by the same or by divers owners.

Reservations for roads inadvisable.

102. The reservation of areas for road purposes in grazing farms and grazing homesteads is inadvisable, except in special cases, when the reservation is made along a specified route. In agricultural farms it is only allowable under exceptional circumstances. As a general rule all necessary roads are to be surveyed, and the practice of reserving areas for road purposes is to be discontinued.

Selection of roads—country to be carefully inspected.

103. The greatest care and judgment must be exercised in the selection and laying out of roads. The country must be carefully examined, and the time spent in necessary reconnaissance may be charged for as inspection. For the purpose of avoiding unnecessary angles, and to insure the precise location of road lines, preliminary compass or theodolite traverse surveys may be made when justified by circumstances. Before commencing the permanent survey of road lines such traverse surveys should be plotted on a large scale, with all information gained in the preliminary survey also accurately plotted, and road lines should be laid out on the plot as long as compatible with the inclusion of the best route as the centre line of the road.

Preliminary traverses—instrument to be used.

104. Preliminary traverse surveys of roads should, when expedient, be effected with the compass or circumferentor. The theodolite may be used for preliminary road traverse surveys in dense tropical jungle, in other dense scrubs, and in country with heavy timber and dense undergrowth; but otherwise the theodolite should be used only when the conditions require the accurate location of road lines (*see* clause 35).

Failure in selecting suitable roads an evidence of incompetence.

105. The importance of the duties of the road surveyor cannot be too clearly realized, and it is expected that the directions in reference to the survey of roads will be faithfully and intelligently observed. Failure in this respect will be regarded as evidence of the surveyor's inability to perform survey work satisfactorily and as just cause for refusing him further employment.

Local Authorities to be consulted.

106. Due notice should be given in writing by the surveyor to the Local Authority of the date on which he intends to commence any road survey or preliminary traverse work for the preparation of a design for the survey of any area of Crown lands, so that such Local Authority, should they deem it advisable, may instruct an officer to accompany the surveyor in his inspection of the lands and put their views before him. The requirements of Local Authorities must always be respected and satisfied as far as may be possible; except that should such requirements appear unreasonable or unwise the matter should be referred to the Surveyor-General, the survey work being left in abeyance pending his decision.

Objective points to be kept in view.

107. The objective points as towns, railway stations, fords, bridges, gaps, etc., to which roads are directed should always be kept in view, and the route selected should be that which combines an easy ruling grade, with economy in construction and straightness in direction.

Existing tracks to be maintained.

108. Existing tracks should be maintained unless examination of the country discloses a more suitable route.

Tracks not to be blocked by felled timber.

109. Should survey parties block existing tracks by felling trees across them, the surveyor will be held responsible for the cost of removing the same, and for any damage or injury that may arise out of such improper action.

Road improvements to be kept in road.

110. All road improvements are to be kept well within the limits of the road as defined by survey, and, if desirable, trees that have been blazed to indicate the direction of the road should be kept within its surveyed limits.

111. In the survey of portions of land contiguous to previously surveyed areas the roads through the new work should be laid out in continuation of those through the old. Continuation of existing roads.

112. But so that lines of road communication may be uninterruptedly completed—should no suitable road system have been provided by the old surveys—roads surveyed in connection with the new work may be continued through any previously surveyed portion which is not freehold nor enclosed leasehold. Roads through previously surveyed portions.

113. Where it is necessary that roads be continued through freeholds, or through enclosed leaseholds, the survey may, in the absence of instructions, only be undertaken when the surveyor is in receipt of the written consent of the Local Authority and of the owner. Where the requisite consent cannot be obtained a detailed report with sketch plan should be forwarded to the Surveyor-General. Roads to be carried through freehold or enclosed lands under special circumstances only.

114. Where country is so steep and rugged, or otherwise so unsuitable for traffic that roads through it must be located along watercourses, these roads are to be the first consideration, and must be provided without regard to how they may affect portions, by division or by cutting off frontage to watercourse. Or a road may be provided along give-and-take lines equalizing the frontage and forming boundaries—where such give-and-take lines can be located along a route suitable for road purposes. Cross roads following tributary watercourses must be provided at intervals, giving access to back country, to water, and to crossings in the watercourse. Roads along watercourses.

115. When a number of short, sharp bends in surveyed roads would necessarily occur, or where it may appear to be necessary to provide for future cuttings, crossings or other improvements, such roads should be widened to avoid unnecessary angles and to provide for future requirements. Roads to be widened in certain cases.

116. At crossings of watercourses where it may be desirable to increase the width of a road, it is better to make the road lines approaching the crossing diverge to attain the required width than to mark rectangular reserves on the banks of the watercourse. Widening at watercourses.

117. Where it is necessary to survey roads in the neighbourhood of the defined routes of proposed railways, unnecessary crossings of such routes should be avoided. But where it is imperative to cross the line of the railway, the sites of railway bridges sufficiently high for road traffic to pass thereunder, sites suitable for over-bridges, or, failing these, sites providing level crossings, should be selected. Surveyors should apply to the District Engineer, or to the Railway Department, for information as to such suitable sites for road crossings. Roads across railway lines.

118. Reserves for water, camping, provisional schools, timber or any other necessary public purpose, should be liberally provided in suitable situations on all main and other roads (*see* clause 10). Reserves to be provided on roads.

119. Advantage should always be taken of the outcropping of rocks, and the exposure of gravel beds in suitable situations and distances apart, to provide reserves for road-metal, etc. Among rocks most suitable for road making are the basalts, traps and the syenitic granites, ample reservations of which, when met with, should be made, as it is more economical in road construction to transport good material some distance than to use the inferior rocks found nearer at hand (*see* clause 10). Reserves for gravel or road-metal

120. Ample provision, especially in the Western pastoral districts, is to be made for travelling stock. Main stock routes are generally to be one mile wide; but if a stock route of such width would injuriously affect the value of any farm, the width may be reduced to half a mile. Main roads, other than stock routes, should be not less than ten chains wide. Stock-driving roads not less than ten chains wide, giving access from the back country to stock routes, should be provided at reasonable distances apart. Roads separating grazing farms, or roads of access to any particular grazing farm, are to be three chains wide. The provisions of this clause shall not apply to small grazing areas in the settled districts. Stock roads and routes—in grazing areas. Main stock routes. Main roads. Stock-driving roads. Minor roads.

121. On stock routes, main roads and stock-driving roads, reserves of sufficient area for camping are to be provided at distances of about six miles apart. Such reserves should include water supply wherever water may be available. Camping reserves.

122. In agricultural areas roads are classified as follows:— Roads in agricultural areas.

a. Main roads are direct roads from ports to the interior of the colony and those connecting centres of population with each other, or with extensive agricultural areas, whether settled or reserved for future occupation. The width of main roads should not be less than three chains, and may be extended to ten or to twenty chains according to the importance of the road and the probable requirements of future traffic. Main roads used by travelling stock should be not less than ten chains in width. Main roads.

b. Secondary roads are those affording communication within limited areas, and which are not likely to be required as highways to distant lands. Secondary roads should be not less than two chains in width. Secondary roads.

c. Roads of access are those providing access to single farms or small groups of farms only, and should be one and one-half chains or one chain wide, according to probable requirements and the nature of the country. Roads of access.

Special road provision for timber hauling.

123. Timber roads in present use, or that will in the future be again serviceable as means of access to State forests, timber reserves and timbered country, should be surveyed, and may be marked of greater width than would be required for ordinary traffic, thereby affording ample room for the special traffic in connection with the carriage of heavy loads of timber. The provision contained in this clause should not be extended to old timber tracks of no present or future utility.

Bearings and lengths of road lines.

124. Where practicable, surveyed road lines should be laid out with bearings in whole degrees, and with lengths on the side first measured in whole chains, or in chains and tens of links.

Marking required on roads through grazing areas.

125. Roads in grazing areas are to be marked as follows :—

Main stock routes—on both sides.

Roads forming boundaries (unless otherwise directed)—on one side only.

Roads exceeding three chains in width, passing through farms—on both sides.

Roads three chains in width and under, passing through farms (unless otherwise directed)—on one side only.

Measurement of secants.

126. Where roads are surveyed on one side only, secant lines are to be carefully measured across the road from angle points, and the opposite corners marked with posts, lockspits and corner trees, as provided for in clauses 47 to 56—the reference trees being marked with the broad-arrow and letter R. The measurement of secants across roads wider than ten chains, is optional, but such measurement may not be charged for.

Survey required on roads through agricultural areas.

127. All roads forming boundaries of portions surveyed at the same time are to be surveyed and marked on both sides.

All roads exceeding three chains in width, reserved out of portions, are to be surveyed and marked on both sides.

All roads three chains wide and under, reserved out of portions, unless otherwise directed, are to be surveyed and marked on one side only.

Opposite corners.

128. Where roads are to be surveyed on one side only, whether such roads form boundaries or are reserved out of portions, the opposite sides are to be indicated by posts, lockspits, and reference trees at angle posts, such reference trees being marked with the broad-arrow and the letter R.

Secants.

129. In the survey of roads not wider than ten chains, secants from angle points are to be carefully run out with the theodolite, measured, and the bearing and length thereof entered in the field-book and shown on the plan. The measurement of secants across roads wider than ten chains is optional, but such measurement may not be charged for.

Opposite sides of roads three chains wide and under.

130. Where roads, three chains in width and under, reserved out of portions, are directed to be measured and marked on both sides, the opposite sides are to be measured and marked, and the notes of such measurement shall be entered in the field-book and shown on the plan, but, unless necessary for some local reason, it is not imperative to align such opposite sides between the secant posts with the theodolite. But where such roads pass through dense scrub both sides should be run out with the theodolite.

Re-traverse of previously surveyed road lines sometimes necessary,

131. Where the opposite sides of roads, previously surveyed on one side, are to be marked, and the angle points on such opposite sides have not been marked by the previous surveyor, it may be necessary to traverse the first side, or parts of it, to obtain a datum from which to lay off the secant lines, and so determine the angle points on the side to be surveyed. Such necessary traverse survey work may be charged for at the traverse rate.

Intersections to be noted and connections made.

132. The intersection by surveyed road lines with all marked boundaries, or other surveyed road lines, shall be noted in the field-book, and, wherever practicable, the bearings of such other boundaries or lines shall be observed and measured connection made to a corner or other defined point thereon.

Marking on surveyed road lines.

133. Surveyed lines forming the sides of roads are to be marked, pegged, posted and lockspitted as directed for the boundaries of portions (clauses 42 to 47). Reference trees are to be selected at corners; the bearings and distances from such trees to posts are to be determined and recorded as directed (clause 51), and the trees are to be marked with the broad-arrow and letter R and, where the road intersects or forms a boundary, with the portion number also.

(d) Roads through Leasehold and Freehold Lands.

Local Authority to be notified.

134. Road surveys through leasehold and freehold lands are generally initiated at the instance of Local Authorities, to whom surveyors should give due written notice of the date on which it is proposed to commence the survey, so that the Local Authority may, if desired, send an officer to inspect the proposed route with the surveyor.

Instructions to be obtained from the Surveyor-General.

135. It is preferred that surveyors do not accept instructions for such road surveys from Local Authorities. In order that instructions may emanate from the Survey Department, surveyors, when tendered instructions for road surveys by Local Authorities, should request that a requisition for the survey be forwarded to the Under Secretary for Lands.

136. Where road surveys are to be effected under the provisions of "*The Public Works Lands Resumption Act of* 1878," notice, as provided for in the 64th section thereof, of intention to enter upon the land for the purpose of survey, must be served upon the owner of the land, or upon his responsible agent, not less than three days prior to entry. Forms of such notice are supplied by the Department (*see* Appendix v.). Notice of entry.

137. Road surveys through leasehold lands are, as regards the general conduct of the work, and the marking thereof, to be effected in accordance with the General Directions issued by the Department, and through freehold lands to also conform to the requirements of the Registrar of Titles. Survey to be in accordance with directions.

138. Where roads are to be surveyed through leasehold and freehold lands, surveyors should make a careful inspection of the country along the proposed route. In selecting the road, the first consideration should be public requirements and the conditions favourable for traffic; the second, the least possible interference with, or injury to, private property. Route to be carefully inspected.

139. The meridian to be adopted for road surveys through leasehold lands shall be the meridian of the survey of one of the portions through which the road passes. One of the principal boundaries of the portion should be run out as far as necessary, with the theodolite, and its meridian adopted (*see* clauses 132 and 143). Meridian of survey.

140. Roads through leasehold lands, unless otherwise directed, are to be marked on one side only, the angle-points on opposite sides being marked by posts, etc., as directed in clauses 126 and 128. Roads to be marked on one side only.

141. Roads surveyed through freehold lands are to be marked, posted, pegged and lockspitted on both sides. —on both sides.

142. Watercourse boundaries of portions are to be traversed when the road ends at or crosses them. Watercourse boundaries to be traversed.

143. The survey of roads through leasehold and freehold lands shall be connected with all boundaries intersected, as directed in clause 132, the connection being made to the nearest portion corner. Connection to be made to the nearest corner on intersected boundaries.

144. The limit of error in closure that will in the case of freehold lands be accepted is that allowed by the Registrar of Titles—viz., eight links in a mile, or its tangential equivalent, three minutes of arc. When severances do not close within these limits a re-survey of the old boundaries will be necessary. Limit of error.

145. Plans of roads surveyed through leasehold lands are to be drawn on the plan forms supplied by this Department. Plans of roads surveyed through freehold lands are to be drawn on the plan forms issued by the Registrar of Titles. Original bearings and lengths of lines should be shown thereon in red figures. A separate plan should be supplied for each freehold, and the plan should show all the land held in the title. Plans.

146. A written description of the boundaries of each subdivision of freehold lands, and a declaration in the usual form, are to accompany each plan. Surveyors should only certify to those subdivisions which they have actually surveyed. Description, declaration, and certificate.

147. Certain information and values are required to be furnished by surveyors when marking roads through leasehold or freehold lands, and the form supplied for this purpose (Appendix vi.) is to be carefully filled in and forwarded with the plans of the survey. A separate report is required for each portion through which a road may pass. Report to be forwarded.

(e) Re-surveys, Re-establishment of Old Boundaries and Real Property Work.

148. Re-surveys of portions frequently show errors in the original work exceeding the limit of acceptance prescribed by the Registrar of Titles (*see* clause 144), and so necessitating the correction of the deeds of grant. It is therefore imperative that satisfactory evidence shall be afforded that such re-surveys are coincident with the boundaries as originally marked on the ground, or, failing any evidence obtainable to this effect, that they do not encroach on adjoining lands or roads. In this respect the surveyor must adhere to the principle of the unchangeableness of lines and corners established by the original official survey. These lines must be regarded as the true lines which they represent, even if the subsequent survey indicates that they do not coincide with the original description contained in the deed of grant. Original survey lines to be adhered to.

149. Portions being re-surveyed should be re-marked, posted, pegged and lock-spitted, old reference trees being dressed up or new ones provided. Re-marking.

150. Although this Department is generally concerned with only the original survey of portions, all surveys should be effected with equal observance of the "General Directions." "Directions" to be observed.

151. In effecting re-surveys of freehold lands, surveyors are required to strictly observe the Regulations made by the Registrar of Titles under "*The Real Property Act of* 1877." Regulations under "*The Real Property Act of* 1877" to be observed.

Action when corner-posts and lockspits are found.

152. Where corner-posts and lockspits are found, the position of such posts or pegs must be verified as original marks by reference to corner-trees, or the stumps of the same. The bearing and distance from the marks thereon, and the description of such trees or stumps, must be recorded in the field-book, and shown on the plan.

Action when trees are found.

153. Where corner-posts and lockspits have disappeared and the reference trees remain, field notes and plan must show that the corners have been re-instated in position on the bearings, and at the distances from the reference trees recorded on the plan of the original survey; or, if otherwise, satisfactory reason must be given—such for instance as, that it was evident that the bearing had been originally recorded—reversed—*i.e.*, recorded as from the post to the tree, or in some other particular incorrectly recorded on original plan.

Action when blazed trees only are found.

154. Where neither corner-post, lockspit nor reference tree can be found, and blazed trees on lines of original survey alone remain, field notes and plan must show that the re-constructed corners are at intersection of old lines as indicated by blazed trees.

Action when no marks are found.

155. Where no marks of original survey can be found, plan must show that the boundaries have been re-instated by measured reference to adjoining portions, and to those situated on opposite sides of roads.

Action when lengths as re-surveyed are in excess.

156. Where re-survey shows lengths of boundaries in excess of original lengths, field-notes and plan must show satisfactory evidence that the excess is not due to encroachment on adjoining lands or roads. In the absence of sufficient original marks, this is to be ascertained by the actual measurement of the boundaries of all adjoining lands, showing whether such boundaries contain their granted lengths in full.

Disputed boundary.

157. Should a common boundary be in dispute between owners of adjacent lands, all particulars of occupation must be shown on plan.

Original lengths to be shown in red, re-measurements in black.

158. The actual measurements made, and the bearings observed in the field, are to be shown on the plan in black figures, the original lengths and bearings being shown in red.

Endorsement on plans.

159. The following certificate should be endorsed on the plan:—

> The surveyed lines as re-instated are identical with the original boundaries as indicated on the ground by original posts, pegs, lockspits, reference trees, blazed lines, fences, adjacent or opposite boundaries—all, or any of them, as the case may be.

Special report.

160. Where it is necessary to explain matters in connection with re-surveys, a special report should be forwarded with the plan.

(*f*) *Astronomical and Geodetic Observations.*

General statement.

161. The rapid occupation of Queensland by the pastoralist, and the pressure of continually increasing agricultural settlement in the early days of its history, taxed the best efforts of the Survey Department of those days to provide maps defining such occupation. The great extent of territory to be dealt with, and financial considerations, really determined the conditions under which the survey work necessary for the preparation of such maps and the marking out of boundaries should be effected. The conditions so determined being those requiring expeditious and economical work, a triangulation of the colony and the adoption of true north as the meridian of survey operations were quite impracticable. Recourse was consequently had to the facilities afforded by the magnetic needle as a means of defining the direction of survey lines, and the magnetic meridian became the datum of angular measurement. The whole of our territory has been more or less defined under these conditions, and is held under tenure with boundaries referred to the magnetic meridian, and it is inexpedient, if not impossible, to revert to an entirely new system—such, for instance, as the adoption of the true north as the meridian of survey.

Arbitrary meridians to be adopted.

162. At the same time it must be apparent to every surveyor that the perpetuation of so variable a datum of angular measurement is inadvisable, and it has therefore been decided to abandon it where practicable, and to adopt arbitrary meridians as the datum of survey work in the several districts, such arbitrary meridian to be the whole degrees of the mean magnetic declination in a district: for instance, the true magnetic declination in a district being eight degrees twenty-five minutes east—the arbitrary meridian adopted will be eight degrees east (*see* clause 39).

Meridians to be determined by astronomical observation.

163. The direction of such arbitrary meridian can only be determined by means of careful astronomical observation made before the actual survey work is commenced and where survey operations are extensive—dealing with large areas or groups of portions—it is required that survey work be preceded by, and be initiated from, astronomical data. This direction is not intended to apply to small areas or single portions adjacent to previous surveys, the meridians of which should in these cases be adopted. But isolated portions, even if small in area, should, if practicable, be laid out on the arbitrary meridian adopted for that district (*see* clause 39).

Corrections for convergence to be applied.

164. The arbitrary meridian having been determined, and work commenced on it, it should be adhered to; but as all lines on the earth's surface run out by prolongation with a theodolite are great circles, lines so run out will only continue to be correctly referred to the arbitrary meridian when run exactly north and south upon it. Lines having

any departure east or west cease to maintain their arbitrary true meridional difference on account of the convergence of the meridians between the initial and any subsequent stations. The maintenance of a given true meridional difference is only possible by either constant astronomical reference or the application—to the line being surveyed—of the correction for convergence. The first method is the one best adapted to the conditions of survey work on groups of small areas in the settled districts. Both methods combined, the first being a check upon the latter, would best meet the requirements of work on large areas in the western country, where the long boundaries of such areas should be run as chords of arcs, three or any other convenient number of miles in length, checked by astronomical observations which would also eliminate instrumental errors (*see* Appendix xix.).

Work to be referred to true meridian.

165. The angular difference from true north of the meridians of all surveys shall be determined by astronomical observation, the particulars of which are to be recorded on plans, and entered in the forms supplied for this purpose by the Department. A space has also been provided on the forms for needle readings.

Number of observations.

166. The number of observations to be taken on any survey or group of surveys must be at the discretion of the surveyor, but the following general rules show the requirements of the Department. Surveyors may find it convenient to take more or less, but payment cannot be allowed for more than here specified, and satisfactory reason must be given when these requirements are not fulfilled.

Observation for Datum.

167. When the datum of a survey is based upon the true meridian determined astronomically (as in the case of very extended surveys, completely isolated portions, or new townships) the necessary observations require the greatest possible care and accuracy, and shall consist of four or more complete solar or stellar observations, in pairs, east and west of the meridian, observed from the same station, and calculated separately. Such an observation shall be termed an "Observation for Datum."

Observation for Variation.

168. When the datum is obtained from other adjoining or connected surveys, and not by an observation, it is still necessary, under clause 165, to refer the work to the true meridian. But in such a case it will be sufficient to take at one station not more than two complete solar or stellar observations east or west, and calculated separately. Such an observation shall be termed an "Observation for Variation."

Check observations.—generally sufficient.

169. On extensive surveys it may be found necessary to take further observations for the purpose of checking the work and correcting for convergence. One complete observation will be sufficient for such "check observations," and generally on small surveys such an observation will meet the requirements of the Department. One "complete solar observation," with calculations, is shown in Appendices ix. and xxxi.

—to be taken at intervals of ten miles.

—need not be calculated.

170. In addition to observations for datum and variation, as directed, "check observations" will only be required at points on boundaries about ten miles apart. On uneven and rugged lands the additional observations may, as circumstances require, be taken at points not so far apart. These observations need not be calculated, but records of them are to be forwarded with field notes.

Latitude.

171. Observations for the determination of latitude are to be made when necessary, and shall consist of two or more stars in pairs north and south of the zenith.

Observations for magnetic declination.

172. With a view of compiling a chart of Queensland, showing the isogonic lines connecting the places at which the deviation of the magnetic needle from the true north is the same, it is required that the observations showing the differences from true north of the arbitrary meridians used on the various surveys be supplemented by readings of the magnetic needle, the results being entered in field-notes, and a separate record forwarded to the Surveyor-General.

—to be taken in January and July.

173. These readings should be taken as nearly as possible at about half-past ten a.m., or about eight o'clock in the evening, on at least three days in each of the months of January and July in each year, and be compared with the true meridian. This can generally be done during the progress of ordinary field work, the meridian of which has been referred to the true north, but observations should not be made where local attraction causes magnetic deflection.

Method of taking observations for magnetic declination.

174. Although the method, designed by Joseph Brooks, Esq., F.R.A.S., and detailed in vol. VI. of the "Surveyor" (N.S.W.) from which the following description is abstracted does not eliminate all errors, it is still useful and practical, and is recommended to surveyors for adoption :—

"Call the north end of the needle N. end, the zero mark opposite to it A ; call the south end of the needle S. end, and the zero mark opposite to it B. Attach the trough to the theodolite ; and

"(1.) Cause N. end to coincide with zero A (using a magnifying glass to get perfect coincidence); then intersect the selected mark, which may be in any direction, read both verniers and enter in column marked $\frac{\text{Box direct}}{\text{N. end.}}$ (*see* Appendix xi.)

"(2.) Release lower plate and turn it backwards and forwards through a few degrees, and then cause S. end to coincide with zero B; enter readings in column $\frac{\text{Box direct}}{\text{S. end.}}$

"(3.) Detach trough from theodolite, remove glass cover, lift out needle, turn it end for end and replace in trough; slide in the glass cover, and attach trough to the theodolite. It will now be found necessary to turn the lower plate (and with it the upper) through about 180 degrees before the needle will swing. Make S. end coincide with zero A, and it will be seen that the EYE end of the telescope is about pointing to the selected mark. Plunge the telescope (so eliminating errors of collimation, etc.), intersect the mark, enter readings in column marked $\frac{\text{Box reversed}}{\text{S. end.}}$

"(4.) Make N. end coincide with zero B, intersect mark, and enter readings in column marked $\frac{\text{Box reversed}}{\text{N. end.}}$. These four operations comprise one set, and may be repeated in the same or the reverse order. The mean of all the readings is the magnetic bearing of the referring mark, the true bearing of which should be astronomically determined."

Connections to trigonometrical stations.

175. Theodolite bearings should be observed to visible trigonometrical stations from two or more points on a survey, preferably from corners. If a trigonometrical station is visible from only one point on a survey, and its distance from such point does not exceed one mile, a traversed connection should be made to it, and the angle which the traverse-line makes with a side of the triangulation should be observed and recorded.

V. FIELD-BOOKS.

Field-books supplied by Department.

176. Field-books, in three sizes, are supplied at cost price to surveyors by the Department. These only are to be officially used, and the size used should be in proportion to the extent of the survey of which it is the record.

To be carefully kept.

177. Field-books should be so lucidly kept as to enable a draftsman, without other information than it affords, to draw a true plan of the survey.

Specimen field-book.

178. A new specimen field-book is supplied herewith (Appendix xxix.), and surveyors are requested to adopt its style and methods, as uniformity in this respect facilitates the work of the computing branch of the Department.

Description of country and timber to be given.

179. Country, whether undulating, broken or rugged; timber, whether open, thick, heavy or with undergrowths; scrubs, their character and situation, should be specially noted in field-books, as the rate of additional payment that may be allowed on such account will be based on the information supplied (*see* clauses 218 and 248.)

The first page.

180. The first page of the field-book should exhibit the following information:—

(*a.*) The signature of the surveyor.

(*b.*) Reference to the steel band used on the survey, which may be in the following form:—

The steel band used on this survey agrees in length with standard steel band No. , as determined by comparison made on the day of 18 .

(*c.*) Or if the steel band did not so agree, to what extent it differed. The method of its use, and the correction applied, should be fully explained.

(*d.*) The instrument used to define the direction of surveyed lines should be stated, as theodolite, compass or circumferentor, as the case may be.

(*e.*) The title of the survey, the date of the instruction therefor, and the date of the commencement of the survey work.

Datum line to be described.

181. The details of the survey work should be prefaced by a description of the datum on which the survey is based, how obtained—*i.e.*, whether astronomically, or by the determination of the meridian of an adjacent or an adjoining portion. If the latter, describe what original marks were found, how they were identified, and to what extent it was necessary to re-instate or re-place them.

Each line to be entered separately.

182. Each surveyed line shall be entered in the field-book separately, in the sequence in which it is measured, with the number of the station at its commencement and at its completion, and with numbered references to all the pages of the book on which any station re-appears through the intersection of lines or the closure of boundaries (*see* also clauses 132, 143, and 185).

Use of diagrams.

183. Diagrams are not to be substituted for the separate entry of measured lines, but should only be used in elucidation of details.

Measurements to be shown in detail.

184. Instrumental bearing of lines shall be recorded in degrees and minutes, reading from zero round through east to three hundred and sixty degrees. The actual measured or contour lengths of lines, the angles of elevation and depression, the corrections therefor, the temperature, the corrections for changes thereof, the horizontal lengths of lines, the measurements of offsets to natural features, the bearings and distances from reference trees, and measurements made to improvements, are all to be clearly shown.

185. The angular closure, and the measured position of the point of intersection of boundaries with each other, or with traverse lines, are to be recorded in the field notes of the intersecting line and of that intersected. Closure and intersections to be recorded.

186. The stations from which astronomical observations are actually taken, or to which they are referred, should be specially noted in the field-book. Observing stations to be noted.

187. Field notes of portions fronting watercourses should clearly show the distance to the traverse line, to the post, and, in accordance with the direction conveyed in clause 60, to the watercourse, with the actual and the average width thereof. Field-notes of watercourses.

188. The features crossed by or visible from surveyed lines, such as creeks, gullies, flats, hills, ridges, plains, scrubs, etc., should also be noted in the field-book. Features to be shown

189. All available information should be recorded in field-books as to the geological formation of the country, the quality of the soil, its suitability for agriculture; the natural herbage and grazing capability; the description, quantity and value of its timber; the natural water supply, facilities for artificial storage; liability of the lands to flood; the existence of, and area under, noxious weeds, etc. Detailed description of land to be given.

190. The date of the completion of the survey and the following certificate must be entered at the end of the field-notes, and subscribed by the surveyor:— Field-notes to be certified to.

This is to certify that the field-notes herein contained are the actual results of my observations and measurements in the field.

A. B., Surveyor.

191. Field-books of each survey shall be sent to the Surveyor-General with the plans, etc., to which they refer. To be forwarded with plan.

VI. Computations.

192. The angular and linear measurements made on each survey are to be checked by the calculation of the difference of latitude and departure of each line, computed to tenths of links for country, and to hundredths of links for town lands. Measurements to be checked by closure.

193. Areas of portions, except such as are rectangular, are to be carefully computed by double longitudes. Areas by double longitudes.

194. Fractional quantities may be omitted from areas, as specified hereunder:— Limit of fractional quantities.

In portions not exceeding 2 acres, less than $\frac{1}{10}$ perch.

More than 2 acres, but not exceeding 10 acres, if bounded by right lines, less than $\frac{1}{10}$ perch; if bounded partially by a watercourse, less than $\frac{1}{5}$ perch.

More than 10 acres, but not exceeding 40 acres, if bounded by right lines, less than $\frac{1}{5}$ perch; if bounded partially by a watercourse, less than 10 perches.

More than 40 acres, but not exceeding 640 acres, if bounded by right lines, less than 1 perch; if bounded partially by a watercourse less than 1 rood.

More than 640 acres, but not exceeding 10,000 acres, if bounded by right lines, less than 1 rood; if bounded partially by a watercourse, less than 1 acre.

Exceeding 10,000 acres, less than 1 acre.

195. Where roads intersect portions, the closure of one side of the road with the boundaries must be computed. Closure of severance to be checked.

196. The direct bearing and distance between portions connected with each other, by traverse survey only, are to be calculated. Connections.

197. All such calculations, computed or copied on the forms supplied by the Department, shall be forwarded with plans and other records of the survey (*see* Appendix xxx.). Computations to be forwarded.

VII.—Plans.

198. All plans are to be drawn either by the surveyor himself, or under his supervision, on the plan forms supplied by the Department. Drafting.

199. Surveyors' plans are copied at the head office by photo-lithography, one copy being forwarded to the surveyor. To be copied.

200. That reproductions on a reduced scale may be clearly legible, plans must be drawn with ink that is quite black and thoroughly mixed, the lines firmly ruled—hair lines to be avoided—features clearly drawn, figures and lettering in bold open writing. To be drawn with black ink.

201. The style and the standard of drafting, essential to the successful reproduction of plans as described, are shown in the specimen plans attached hereto (Appendices xxiv., xxv., xxvi., xxvii., and xxviia.). Plans that do not fairly fulfil these conditions may be redrawn at the expense of the surveyor, or rejected. Specimen plans.

202. Plans shall be accurately plotted* with the north point upwards, and may be drawn on the following scales:— Scale of plans.

Town allotments.—Two chains to an inch, or where small details are to be shown one chain to an inch.

* The accurate plotting of many-sided figures is greatly facilitated by the marking off of, say, every seventh angle point by co-ordinates produced by the algebraic addition of the differences of latitude, and of departure, of the preceding seven sides.

Suburban allotments.—Up to 5 acres, 4 chains to an inch; over 5 acres, 8 chains to an inch.

Country portions.—Up to 640 acres, 10 chains to an inch; over 640 acres and up to 2,560 acres, 20 chains to an inch; over 2,560 acres, 40 or 80 chains to an inch.

In special cases these scales may be varied according to circumstances.

Road surveys.—4, 10, or 20 chains to an inch.

Feature surveys.—As circumstances may require.

Small details may be shown by diagrams drawn on larger scales.

Scale to be shown.

203. Plans shall show the scale to which they are drawn, and also that of any diagram thereon.

Variation of adopted meridian to be shown.

*204. Where there are no adjacent surveys, and the datum of survey work is determined astronomically, the variation from true north of the meridian adopted shall be shown on the plan.

Datum and its variation to be shown.

205. Where the meridian of a boundary line of an adjacent survey is adopted as the datum for new survey work, such boundary line shall be shown on the plan, and the word "datum" shall be written along it. Such meridian should be compared astronomically with the true meridian, and its variation therefrom shown on the plan.

Variation not determined, show adjacent one.

206. Where, for any good reason, the variation of the meridian of the new survey work is not so determined, the variation of the meridian of the adjacent survey adopted as datum, if known, shall be shown upon the plan, with a note as to how the variation was determined.

Delineation of boundary lines.

207. Boundary lines are to be firmly ruled in black lines, with bearings and lengths written along them. The unsurveyed parts of boundaries should be shown on plans by broken lines, and the means that were employed to determine bearings and lengths thereof should be indicated.

Intersections to be shown.

208. The intersection of boundary lines with one another or by a road, and the distances from points of intersections to the nearest corners are to be shown, together with the angular closure as observed on the ground.

Water frontages —details.

209. Plans of portions fronting watercourses are to show distances to posts, to traverse lines, to the watercourse, and the actual or the average width of the watercourse is to be written along it.

Delineation of roads.

210. Road lines are to be firmly ruled in black, with bearings and lengths written along them; unsurveyed sides are to be ruled in broken black lines. Existing tracks may be shown in dotted black lines. The width of roads should be written neatly along them.

—of secants and traverse lines.

211. Road secants and all traverse lines are to be firmly ruled in blue colour. The bearings and lengths of road secants and traverse lines are to be written on the plans in the tablets provided for the purpose.

Stations and station numbers.

212. All the corners of country portions and of suburban sections and the angle points in traverse surveys are to be shown on the plan by small black circles circumscribing the points of intersection of boundaries or of other surveyed lines. Such circles need not be used to indicate the corners of suburban allotments, town sections, nor town allotments. On plans of re-surveys and of roads through alienated lands the circles indicating the position of original corners used in the survey should be described in red colour, and these station numbers may also be shown in red, but in all other cases the station numbers are to be shown in black figures. Astronomical stations are to be shown by red triangle.

Bearings and lengths of lines.

213. The bearings of lines to be shown on the plan are those instrumentally observed and recorded in the field-book, expressed in degrees and minutes, reading from zero round through east to three hundred and sixty degrees. The lengths of lines so shown shall be the horizontal lengths of lines obtained by the calculated reduction of the actual or contour measurements made in the field, and are to be expressed in links and decimal fractions thereof (*see* clause 184).

Broken lines to be used in certain cases.

214. Bearings to distant points, as trigonometrical stations, hills, beacons, etc., computed connections with adjacent survey work, the unsurveyed parts of boundaries in inaccessible country, are to be shown by firmly ruled broken black lines, with all computed bearings and distances written along such lines in black figures.

Coasts and watercourses.

215. Lines of coasts, banks of rivers, creeks, etc., are to be shown on plans in firm black lines when their margins have been exactly determined; and by broken black lines when located approximately. Opposite sides of watercourses and an arrow pointing down stream, should be sketched on plans.

Names of rivers, etc.

216. The locally known or aboriginal names of rivers, creeks, lakes, lagoons, hills, camping places, crossings, bridges, etc., should be written on the plan—the correct orthography to be ascertained and adhered to.

217. The following spelling of timber names is to be adopted:—Belar, bendee, boree, brigalow, coolibah, gidya, mulga, quandong, and tea-tree Timber names.

218. Hills, undulations, creeks, gullies, edges of scrubs, timber, swamps, land liable to inundation, and other features as determined by actual measurement, and all such adjacently situated as may be sketched on with reasonable precision, are to be carefully etched in black on plans, in such a manner as not to interfere with the lettering, but with sufficient clearness to warrant payment of any additional allowance that may be charged (*see* clauses 179 and 248). Physical features.

219. The position of buildings, fences; cultivated areas, wells, bores or other improvements is to be shown on plans. If necessary, diagrams showing details of improvements or other minute information may be added. Position of improvements.

220. The portion number, the area, and a general description of the country should be written on the face of the plan, except on town and suburban plans (*see* clauses 224 and 225.) Portion number, areas, etc.

221. The word "lot," which is specially applied to lots for sale, is not to appear on surveyors' plans. "Allotment" is to be applied to town and suburban allotments, and "portion" to country portions. Word "lot" not to be used.

222. Areas are to be written on the plan within the boundaries of each portion of land shown thereon, in the following manner, viz.:— Areas.

165	3	10	
5	3	10	Surveyed Road.
160	0	0	

223. The farm numbers, names of selectors, dates of instruction for survey, and of transmission of plan, references to corners, meridian observations, road secants and traverse lines, are all to be neatly written in black ink in the tablets provided on the plan forms for these purposes. Other details in tabular form.

224. Should the information gathered in respect of the conformation of the country, its soil, vegetation, improvements, etc., exceed that which can be clearly written on the face of the plan, it should be neatly inscribed on the plan in tabular form. To avoid crowding.

225. Town and suburban plans are to be drawn in a clear open style, with the features, etc., shown, as detailed in clause 218, but no descriptive writing is to appear across the face of the plan, the character of the country being stated in a note placed in a convenient position. The section numbers are to be shown in Roman numerals for town sections, and Arabic numerals for suburban sections (*see* clause 93). The positions of iron pins are to be indicated by small black circles, but the connections thereto, and all traverse lines, are to be shown in firmly-ruled blue lines. Suggested names of towns and streets are to be shown in pencil or stated in the forwarding letter. Town and suburban plans—details of drafting.

226. The title of the plan is to be written in the space provided for the purpose, and the printed certificate thereon is to be signed by the surveyor. Title and certificate.

227. As surveys are completed, the plans thereof, and all other documents relating thereto, are to be forwarded as soon as may be practicable (*see* clause 233). Delay in this respect causes inconvenience. Plans to be forwarded.

VIII. Correspondence.

228. Surveyors are requested to advise the Surveyor-General and the District Surveyor of any change in their postal or telegraphic addresses, and of the location of their camps. Surveyor's address.

229. It is required that surveyors immediately acknowledge the receipt of official instructions. Printed forms for this purpose may be obtained on application to the Department (*see* Appendix i.). Telegrams, memoranda or other communications received by them from the head office are also to be attended to promptly. Prompt attention to be given to official communications.

230. Official letters, in reply, should be written on paper of foolscap size, and on one side only, with a marginal note descriptive of the subject therein referred to. The official number, initial letters, and date of previous correspondence should also be noted in the margin. Replies to official letters.

231. Each letter is to be restricted to one subject, and in forwarding plans of roads, reserves or cases of a similar nature surveyed under separate instructions, each case is to be complete in itself, accompanied by a separate letter of advice. Separate letter for each case.

232. As soon as practicable after the end of each month, surveyors shall forward to the Surveyor-General a progress journal in the prescribed form (Appendix viii.). Where surveyors are employed in districts in charge of District Surveyors, the journals are to be forwarded through the district offices. Information regarding the progress of the surveyor's work, the weather generally prevailing, any notable changes thereof, the condition of the country as to grass, water and travelling, should always be included in monthly progress journals, but should also be transmitted at such more frequent intervals as circumstances may require—by O.H.M.S., "wire" if from distant places, or, as the occasion justifies it, from any place. Occasionally report Progress journals.

should also be made as to the progress of settlement, the class of selections most in demand, and the prosperity of the district generally, especially where agriculture is one of the staple industries, together with a statement of the nature of the crops cultivated.

Documents to be forwarded on the completion of work.

233. Plans of survey work effected for the Department are to be sent to the Surveyor-General, together with all other records connected therewith, viz.:—

(*a*) Forwarding letter (App. ii.);
(*b*) Field-book (App. xxix.);
(*c*) Calculations of closure and of area (App. xxx.);
(*d*) Records of astronomical and magnetic observations (Apps. ix., xi., and xxxi.);
(*e*) Report and valuation (App. iii., iv.);
(*f*) Instructions for survey, designs, tracings, lithographs and other auxiliary information supplied to aid the surveyor in his duties.
(*g*) Vouchers in triplicate (App. vii.). (Excepting that vouchers may be forwarded for collection through an authorized agent or bank, but one copy must always accompany the plan of the work.)

Forwarding letter.

234. A forwarding letter should be despatched for each separate survey, the records of which should be complete, and include all the data thereto belonging. The forwarding letter should be sent under separate cover, so that inquiry may be made for mislaid or delayed plan packets.

Details *re* despatch of letters, etc.

235. Plans should not be folded but rolled and despatched in the mill-board cases supplied by the Department for the purpose. Packets containing plans and records should be neatly made up, securely fastened, legibly addressed and sufficiently prepaid.

IX.—Payment.

Payment by linear measurement.

236. Except when otherwise directed, payment for survey work shall be by linear measurement according to the subjoined schedule. The rates prescribed for each district have been adjusted to include compensation for economic and climatic disabilities:—

The Schedule.

THE SCHEDULE.

For Survey Work effected in the Land Agents' Districts of—	Marked Line Rate, per mile.	Traverse Rate, per mile.	Compass Rate, per mile.
	s. d.	s. d.	s. d.
1. Inglewood, Goondiwindi, Dalby, St. George, Surat, Roma, Springsure, Tambo; that part of the Blackall, Charleville, and Cunnamulla districts situated on the east of the 145th meridian; and that part of the Toowoomba and Warwick districts situated on the west of the Main Range	40 0	33 4	20 0
2. Taroom, Gayndah, Nanango, Gympie (that part of the district north of the latitude of the town of Gympie), Maryborough, Bundaberg, Gladstone, Banana, Rockhampton, Clermont, Aramac, Isisford; that part of the Blackall, Charleville, and Cunnamulla districts situated on the west of the 145th meridian; that part of the Winton, Windorah, Hughenden, and Thargomindah districts situated on the east of the 143rd meridian; and that part of the pastoral districts of Burke, Mitchell, and Gregory North and South not contained in a land agent's district, and situated south of the 20th parallel of latitude, and between the 143rd and 145th meridians ...	41 8	35 0	20 0
3. Stanthorpe, that part of the Winton, Windorah, Hughenden, and Thargomindah districts situated on the west of the 143rd meridian; and that part of the pastoral districts of Burke, Cook, Mitchell, and Gregory North and South situated on the south of the 19th parallel of latitude, and on the east of the 141st meridian, not contained in a land agent's district and not included in Group No. 2	43 4	36 8	20 0
4. Mackay and St. Lawrence	45 0	38 4	20 0
5. Brisbane, Ipswich; that part of the Toowoomba district situated on and east of the Main Range; that part of the Warwick district situated on the Main Range, and the parishes of Gladfield, Gilbert, Emu Vale, and parts of Killarney and Cunningham; Gympie (that part of the district south of the town of Gympie), Bowen, Ravenswood, and Charters Towers	50 0	41 8	20 0
6. Townsville, Georgetown, Herberton, Ingham West, and that part of the pastoral districts of Burke, Cook, and Gregory North and South not contained in a land agent's district, and not included in Groups Nos. 2, 3, and 7	51 8	45 0	25 0
7. Ingham East, Mourilyan, Cairns, Port Douglas, Cooktown, Torres, Normanton, and Burketown	80 0	66 8	By special arrangement.
8. Herberton, Ingham East, Mourilyan, Cairns, Port Douglas, Cooktown, Torres, Normanton, and Burketown, in dense tropical jungle	£10 0 0	£10 0 0	

Definition of rates.

237. The "marked-line rate" is the rate payable for surveying and marking lines; the "traverse rate" is the rate payable for making theodolite traverses; and the "compass rate" is the rate payable for making compass or circumferentor traverses in accordance with the directions relating to each class of work, and for the district in which the survey lies, as set forth in clause 236.

Application of "marked-line" rate.

238. The "marked-line rate" shall be applicable to—
Boundary lines of areas exceeding one acre;
Road lines;
Other lines, directed to be measured and marked;
Secants across roads;
Traverse lines of water-frontages, where such frontages form boundaries;
Traverse lines of water-frontages, surveyed as connections, when such frontages are suitable for subsequent adoption as boundaries, such traverse lines being marked at angles as directed in clause 74.

Application of "traverse rate."

239. The "traverse rate" shall be applicable to preliminary traverse surveys of roads, features and connections, effected with the theodolite, other than those provided for in clause 238.

Application of "compass rate."

240. The "compass rate" shall be applicable to preliminary traverse surveys of roads, features, fences or other improvements effected with the prismatic compass or circumferentor.

Road lines. —half-rates.

241. Payment for the survey of opposite sides of roads not wider than three chains, as directed in clause 130, shall be at half the marked-line rate. But where it is found necessary to run out such opposite sides with the theodolite, and for all road lines directed to be measured and marked, whether on one or both sides, the payment will, under clause 238, be at the marked-line rate for each line surveyed.

Double rates —marked lines.

242. Payment will be allowed at twice the marked-line rate for the first mile surveyed and marked (*see* clause 245).

—marked and traverse lines.

243. If the length surveyed in this class of work be less than one mile, it may be paid for at the double rate, and double traverse rates may be charged on so much of the lines traversed as will make the total length charged at double rates equal to one mile (*see* clause 245.)

—traverse lines only.

244. If the whole of the survey work comprised in an instruction should be preliminary traverse work only, involving no marked-line work—such, for instance, as preliminary traverse work for the preparation of a design—payment may be claimed at twice the traverse rate for the first mile (*see* clause 245). As a general rule double rates will not be allowed on the first mile of compass traverse.

—to be charged on one mile only.

245. Double rates may be claimed on only one mile of any survey, or group of surveys, effected at the same time by the continuous work of the same surveyor and, except as provided for in clause 243, on only one class of survey work.

—covers cost of determining datum.

246. Generally, the double rate paid on the first mile of any survey should be accepted as compensation for the work of determining a datum by running out an adjacent boundary line or part of it with the theodolite. Where such has to be measured, or where more than the ordinary amount of work has to be done, in its determination, the circumstances should be explained and extra payment therefor at traverse rates will be allowed, if the explanation is satisfactory.

Adjoining portions.

247. Where a portion under survey adjoins previously surveyed land, and it is found necessary to completely re-survey the old lines, either for the purpose of picking up a datum or for the re-establishment of the old boundaries, payment will be at schedule rates. But where a complete re-survey is not required, only so much work should be done as may be necessary to re-establish the boundaries. The circumstances of the case should be explained and a charge made according to the amount of work involved. Surveyors should be guided by the principle not to incur needless expense by doing unnecessary work (*see* clause 38).

Additional allowances.

248. Where it is clearly shown (clauses 179 and 218) that the lines surveyed are in scrub, thickly timbered or rugged country, or any of these combined, additional payment may be made at per cent., on the marked line, traverse and compass rates (clause 236), and the half-rates (clause 241), according to the subjoined scale. No additional allowance will be made on the ordinary level or undulating open forest:—

(*a*) For level or undulating forest, thickly timbered; or for ordinary forest country slightly broken by ridges,—additional payment at 15 per cent. — 15 per cent.

(*b*) For very thickly or heavily timbered forest country, or where the ordinary open forest is rough and broken, or is combined with a dense growth of saplings, or with dense wattle, fox bush, turkey bush, currant bush, rosemary bush, or with any of the dense miscellaneous undergrowths,—additional payment at 25 per cent. — 25 per cent.

(*c*) For ordinary brigalow, gidya, belar, mulga, or bendee scrubs,—additional payment at 35 per cent. — 35 per cent.

(*d*) For very dense and heavy brigalow, gidya, mulga, and bendee scrubs, in which the trees are large and numerous,—additional payment at 50 per cent. — 50 per cent.

(*e*) For extremely rugged country with ordinary open forest,—additional payment at 50 per cent. — 50 per cent.

(*f*) For extremely rugged country, with thickly timbered forest, or with dense undergrowths,—additional payment at 75 per cent. — 75 per cent.

(*g*) For dense vine scrub,—additional payment at 100 per cent. — 100 per cent.

(*h*) For dense vine scrub combined with extremely rugged country—additional payment by special arrangement. — Special arrangement.

Additional allowances not payable on double rates, etc.

249. Additional payment, on linear measurement, for scrub, timbered and rugged country, may be claimed on single rates only,—in no case may it be claimed on the extra rate payable on the first mile, nor on the £10 per mile rate.

Corners—
3s. 6d. each.
5s. each.

250. All corners, marked in accordance with clauses 47 to 56, will be paid for at three shillings and sixpence each. Except that the sum of five shillings each will be allowed for corners in the open tree-less country in the Land Agents' districts of Hughenden and Winton, and in such other localities as the Surveyor-General may from time to time direct, and for all corners of portions of 160 acres and under.

1s. each.

For marking reference trees to mile pegs in accordance with clause 46—one shilling each.

1s. each.

For marking more than one additional tree in accordance with clause 52, or for marking reference trees to existing posts not requiring renewal—one shilling each.

1s. 6d. each.

For inserting iron rods in town surveys—see clause 96—one shilling and sixpence each.

Re-establishing old corners.

For replacing old corner post and lockspit,—two shillings and sixpence; marking and locating a corner tree to the same—one shilling.

Observations—

251. Payment for observations will be limited to the requirements of the Department (*see* clauses 166 to 174).

		c	s.	d.
Solar.	(*a*) Single check observation without calculation (clauses 169, 170)	0	5	0
	(*b*) Single check observation calculated (clauses 169, 170)	0	7	6
	(*c*) Observation for variation (clause 168)	0	12	6
	(*d*) Observation for datum (clause 167)	1	0	0
Stellar.	(*e*) Observation for variation (clause 168)	0	12	6
	(*f*) Observation for datum (clause 167)	1	0	0
	(*g*) Observations for latitude (clause 171)	0	10	0
Magnetic.	(*h*) Observation for magnetic declination (*see* clauses 172 to 174)	0	5	0

Payment at per diem.

252. Payment may be made at per diem, in proportion to the number of men employed in the survey party:—

For the survey of roads that are to be located, surveyed and marked in difficult country;
For the survey of marked lines aggregating eighty chains and under;
For the survey of town allotments;
For the inspection of lands;
For the exploration for new roads; and
For other survey work or duties which, by reason of their nature, cannot be profitably undertaken at linear rates.

A full party—£3 3s.

253. A full party, for whose services the maximum fee of £3 3s. per diem may be paid, shall comprise the surveyor and four good men—one of whom may be acting as campkeeper and cook.

Inspection work—£2 2s.

254. Inspection work, not usually necessitating the employment of a full party (clause 253), will generally be paid for at £2 2s. per diem.

Daily record to be kept.

255. Surveyors employed at per diem are expected to enter up daily, in the space provided on the voucher form, the number of men employed, how employed, the number of chains measured, and the nature and extent of the work performed on each day.

Travelling—2s. per mile.

256. Payment for travelling by road with camp and party, to effect surveys under instructions from the Department, will be allowed to surveyors at rates not exceeding 2s. per mile—provided that no payment may be claimed for travelling ten miles and under.

Work to be arranged to avoid travelling.

257. Surveyors employed in districts specifically assigned to them are expected, as far as may be practicable, to so arrange their work as to obviate the necessity of charging for travelling.

Railway passes.

258. Where a railway can be utilized for moving a surveyor's camp and party for departmental purposes, a railway pass or passes may be issued, but, unless for some special reason, passes should not be so issued for distances under twenty miles.

Payment for time occupied in railway travelling.

259. Where the work of moving camp by rail fairly occupies one or more days, payment at the rate of £1 10s. per diem will, in consideration of actual expenses on account of wages and the maintenance of camp and party, be allowed in addition to the railway pass.

Particulars to be given.

260. In all cases where travelling is charged for, full particulars of the route travelled must be stated.

Rate for re-marking or obliteration.

261. Re-marking or obliterating old surveyed lines will be paid for—

In forest country, at six shillings per mile.
In dense scrub, at twelve shillings per mile.
In Ingham District and districts north therefrom, according to circumstances, and at the discretion of the Surveyor-General.

262. Lines that have been chained only will be paid for in proportion to the difficulty of the work and the obstacles overcome. Surveyors should in such cases supply full details, and state what they consider fair remuneration for the work done. Payment for chainage only.

263. The provisions for payment of fees for survey work herein contained are subject to the reservation by the Surveyor-General of the right to pay at lower rates for extensive and favourably-situated surveys, or at higher rates for difficult work which cannot profitably be undertaken at schedule rates. Rates may be varied.

264. Where such variation is made the rate of payment will, as a rule, be stated in the instructions. If the surveyor considers such rate unsatisfactory he should, if practicable, communicate with the Department before commencing the work. Rate of payment stated in instructions.

X.—VOUCHERS.

265. Vouchers are to be prepared in triplicate on the forms supplied by the Department, in accordance with the specimen appended hereto (Appendix vii.), two copies being stamped and one always forwarded with the plans (*see* clause 233). To be prepared in triplicate.

266. A surveyor may appoint a bank or other agent to present vouchers for payment and to collect the moneys payable thereon. Such appointment must be made in writing, and due notice of change of agency must be given to the Department through the retiring agent. The agent shall be the sole medium through which all vouchers are to be transmitted and payments made to the surveyor, so that the vouchers shall traverse the same channel as respective payments on account thereof. Agent may be appointed.

267. Vouchers that are assigned by the drawers to some other person (*i.e.*, the interest being absolutely transferred to such person) are liable, under section 32 of "*The Stamp Act*, 1894," to a duty of 2s. 6d. for every voucher so assigned. But when a bank or agent is authorized to collect the amount of the voucher for and on behalf of the drawers such agent is regarded as merely holding orders to receive, and vouchers so presented bearing stamps to the value of one penny fulfil the requirements of the Act. Stamp duties on vouchers.

268. By detailing their charges, line for line, from field-books, either in the vouchers or in a schedule thereto attached, surveyors will aid the work of the examining draftsman, render misunderstanding improbable, and generally facilitate passing the accounts on for payment. One copy of such details for the office record will be sufficient. Details to be supplied.

269. Before a voucher is passed for payment, errors will be corrected, omissions supplied and overcharges reduced. Persistent overcharging is deprecated, and will impair a surveyor's claim for further employment. Examination of voucher.

270. The reason for any difference between an amount claimed and that paid on a surveyor's voucher will be stated therein. Should any amount be omitted in error, the surveyor may forward an explanation, upon which, if satisfactory, the item struck out will be re-instated. Reasons for alterations will be given.

By Authority: Edmund Gregory, Government Printer, William street, Brisbane.

Appendix No. i.

No. 98.1.

Survey Camp Rosedale
4th January 1898.

To the Surveyor General,

Brisbane.

Sir,

I have the honour to acknowledge having received the instructions for survey as per margin, dated

Pors. 54 & 76 v
Parish of
Tottenham
97.9151/2 L.6.
23.12.97

I have the honour to be,

Sir,

Your obedient Servant,

Thos. Brown.

Licensed Surveyor.

Appendix No. ii.

Reference No. 98.5

Bundaberg
1st. March 1898.

Sir,

I have the honour to transmit herewith (a) 1 Plans, (b) 1 Field Books, and Accounts, in triplicate, of Survey noted in the margin; and I hereby, on honour, declare that I have personally surveyed and marked out on the ground all the boundaries of the abovementioned portions, and that the Plans and Field Books are correct, and the whole Service performed with care and in strict accordance with the regulations and practice of the Department. I further declare that, according to my estimate of the character of the country, I am entitled to the allowance of the extra percentage noted against each portion in the margin.

Portions 54 v and 61 v.
Parish of Tottenham.

25% on the Southern part of 61 v.
15% on remainder

I have the honour to be,
Sir,
Your obedient Servant,

Thos Brown
Licensed Surveyor.

To The Surveyor-General, Brisbane.

REMARKS OR REPORT ON ABOVE SURVEYS.

54 v. This portion has not been surveyed in strict accordance with the application, which included the road now forming the western boundary and part of the Camping Reserve. Selector's consent to reduced area herewith.

61 v. With the exception of the road on the East boundary, this portion has been surveyed in accordance with instructions.

The road along the north of 60 v to 63 v is rather heavy in wet weather and will require forming at some future date. A road of access to the Quarry Reserve has, therefore, been left between 61 v and 62 v.

(a) Here state Number of Plans. (b) Here state Number of Field Books.

Memo. for Surveyor.—Unless Plans are sent to Surveyor-General in a complete state, accompanied by this Form, Field Books, Instructions, and Vouchers (except where the latter are transmitted through the Bank) payment for Surveys will be delayed. Each plan should also be noted with the date and by whom the Instruction was issued.

SURVEYOR'S VALUATION—COUNTRY LANDS.

NO. OF PORTION.	AREA.	PARISH.	DISTRICT.	DESCRIPTION OF LAND AND NATURE OF IMPROVEMENTS, ETC
3v.	160 ac.	Littabella	Bundaberg	This portion consists of well grassed alluvial soil very well suited for agriculture. It is moderately timbered with gum and apple and watered by a small gully. The water is not permanent, but may be easily conserved. There are 33 chs. of 5 wire fence along the road. Rent recommended 1/- per acre.
4v	160 "	"	"	Soil, timber and grass as in 3v. There is a belt of dense scrub along the creek, which contains permanent water. The flat, about 5 chains wide, along the frontage is liable to inundation. Rent 1/- per acre.
5v	160 "	"	"	
6v.	160 "	"	"	About 70 acres Agricultural land similar to the above - 90 acres well-grassed spurs suitable for Grazing - thickly timbered with ironbark bloodwood and gum. No water, but a good supply has been obtained in the locality by sinking 45 feet. Improvements old hut and cattleyards. Rent 9d per acre.
7v.	100 "	"	"	20 ac. Agr.l and 80 ac Gr. land. - timber, water &c as in 6v. Improvements about 18 chs. of 5 wire fence. — Rent 6d. per acre.
8v	100 "	"	"	30 ac. Agr.l & 70 ac Gr. land. Similar to 7v, but the portion is broken by gullies. Improvements 40 chs. of 5 wire fence. Rent 3d. per acre.

3v to 8v generally. These portions are included in the large area of Carboniferous formation in this district. The northern part, fronting the creek, consists of alluvial flats, while the Southern part is broken by spurs from the high range lying still further south and known locally as "Wattagalla Range". This range is about 15 miles due west from the town of Kolan, but the only practicable road heads round the N.E. extremity of Wattagalla Ra. and crosses Yandaran Creek about 2 miles above its junction with the Kolan R. — making the total distance about 21 miles.

Thos. Brown L.S.

Licensed Surveyor.

SURVEYOR'S VALUATION—TOWN AND SUBURBAN LANDS.

NO. OF ALLOTMENT.	NO. OF PORTION.	AREA. A.	R.	P.	SECTION.	TOWN.	PRICE PER ACRE. £	DESCRIPTION OF LAND AND NATURE OF IMPROVEMENTS, ETC.
1 to 10		(each)	2	0	I		20	no improvements
1 " 15		"	1	0	II	Suggested	25	" "
16			1	0	"	name	"	Blacksmith's Shop and weatherboard Cottage
17/18		"	1	0	"	"Takilla"	"	no improvements.
19			1	0	"		"	Stables outhouses and 5½ chains two railed fence connected with the Hotel on allot. 20.
20			1	0	"		"	Takilla Hotel — eight-roomed weather board house. shingle roof — detached kitchen — 1 chain two railed fence — remainder of fence falls into road — see plan f.l.

These sections are situated on the North-Eastern slope of a sandstone ridge, affording good natural drainage. The site is about fifty feet above the ordinary level of Sandstone Creek — distant about 20 chains — where an unfailing supply of good water may be obtained. The Hotel on Section II is situated on the Main Road to Rosedale Railway Station — about 10 miles distant

Thos. Brown.

Licensed Surveyor.

Appendix No. iv.

Appendix No. v.

SURVEYOR GENERAL'S OFFICE,

BRISBANE, QUEENSLAND.

Notice of entry under "The Public Works Lands Resumption Act of 1878."

To Mr. Jacob Smith.

Occupier of Portion 231 Parish of Kolan

In pursuance of section 64 of "*The Public Works Lands Resumption Act of* 1878." notice is hereby given that Entry will be made upon portion 231, Parish of Kolan, for the purpose of surveying a road after the expiration of three days from date hereof.

Date 10th January 1898

Thos. Brown

Licensed Surveyor.

Information to be Supplied by Surveyors when Marking Roads through Freehold or Leasehold Lands.

Portion No. 231.

Parish of Kolan

What length of road passes through enclosed land?	18 chains and 85 links.
What kind of fence is the land enclosed by, and what is its value per chain?	Wire bound, wallaby-proof, paling fence, value 15/- per chain.
How much of the land included in the road is cleared or cultivated?	nil.
What is the kind and value of the cultivation?	nil.
State if there are any other improvements, and their nature; also if the land is injuriously affected by severance, and to what extent and value?	House and Kitchen, £150. Well £30 Stables £40. about 6 acres of cultivation (maize) fenced £25. Garden (fenced) with fruit trees, etc £20. I consider the land is injuriously affected by severance, to the extent of at least £40.
State the name of the Occupier	Jacob Smith
Have all the improvements been shown on the plan of survey?	Yes.

Thos. Brown
L.S.

Appendix No. vii.

STAMP OF BANK OR AGENT.

Survey Office Stamp.

Voucher No. _____

Surveyor's No. 98.7

Cat. No. _____

Survey of _____

	£	s.	d.	REASONS FOR DIFFERENCE.
Amount Claimed	132.	10.	2.	
Amount Paid				
DIFFERENCE				

THE DEPARTMENT OF THE SURVEYOR-GENERAL,

Dr. TO MR. LICENSED SURVEYOR Thomas Brown.

FOR THE UNDERMENTIONED SERVICES—(Particulars as within).

		CHAINS.	LINKS.	£	s.	d.
LINEAR MEASUREMENT:—						
At 41/8 per Mile		2292	19	59	13	10
At 35/- "		503	0'0	11	0	1
At 20/- "		570	00	7	2	6
ADDITIONAL ALLOWANCE:— 15 per cent. on	£ 36.0.6			5	8	1
25 per cent. on	£ 2.12.0				13	0
35 per cent. on	£ 1.9.6				10	4
100 " "	£ 2.16.10			2	6	10
CORNERS:— 29 at 3s. 6d. each				5	1	6
61 at 5/-				15	5	0
OBSERVATIONS:— At St. 3- Portion 64v Tottenham - 1 Solar observation					7	6
" " 42 " 54v " 2 Stellar "					12	6
" " 9- S.E. cor. Sub: Sec. 7- Cowra 1 Solar "					7	6
" " 12- por: 64v Tottenham, 10bs for Magnetic Declination					5	
SUNDRIES (including Day-work and Travelling):						
Survey of Sections VI and VIII Cowra - 3½ days @ £3.3.0 per diem				11	0	6
Inspection Design &c Mulga Downs Resumption 5 days @ £2.2.0 per diem				10	10	0
Travelling from Gladstone to Cowra 23 miles @ 2/- per mile				2	6	0
TOTAL				£ 132	10.	2
ADVANCE						
				£		

I HEREBY, on honour, declare that the Services charged for in this Account have been faithfully and truly performed in strict accordance with the Regulations and practice of the Department, and I authorise The Bank of Bundaberg to receive payment on my behalf.

(Signature) Thos Brown

Licensed Surveyor.

I CERTIFY that the Services charged in this Account were satisfactorily performed, and that under existing Regulations the above-named Licensed Surveyor is entitled to the payment of _____ the above Account.

Surveyor-General.

Stamp. (See Note.)

RECEIVED on the _____ 18 , from the Surveyor-General, the Sum of _____ Pounds, _____ Shillings, and _____ Pence Sterling, being the _____ the above Account.

Licensed Surveyor or Agent.

WITNESS TO PAYMENT: _____

NOTE.—Vouchers must be furnished in triplicate, two copies of which must be provided with Duty Stamp, and when Travelling Expenses are claimed, a full description of the Route followed, and the necessity for such, must be given.

INSTRUCTIONS.			PARTICULARS OF SURVEY.					
REFERENCE NUMBER.	ISSUED.	RETURNED	COMMENCED.	FINISHED.	PORTION NUMBER, PARISH, ETC.	AREA. A.	CHAINS.	
97 8672/8680 L.C. and 97 9151/2 L.C.	29.11.97 * 23.12.97 *	10.3.98 10.3.98	26.1.98 (urgent work) 24.2.98	5.2.98 1.3.98.	54v Parish of Tottenham.	60		
					55v " "	100		
					56v " "	159	3	25
					57v " "	118	0	29
					58v " "	160	0	0
					59v " "	72	2	27
					60v, 61v, 62v, 63v, 64v " (160a. each)	800	0	0
					Quarry Reserve	87	0	23
					Traverse of Rosedale St. and Norman St.			
					Secants			
					Connections			
					Preliminary Traverse of Track			
					Additional for First Mile.			
					Totals.	1,557	3	22
98/6427 P.L.	22.6.98 *	2.8.98	23.7.98	26.7.98	Town of Coora, Sub in Sec. 6 Allots. 1 to 4	17	0	7
					" " 7 " 1 " 5	23	0	36
					Secants			
					Datum			
					Additional for First Mile.			
					Totals.	40	1	3
98/6427 P.L.	* 22.6.98	2.8.98	18.7.98	21.7.98	Town of Coora – Sections VI and VII	10	0	0
97.6954 S.	23.12.97 *	29.1.98	18.1.98	24.1.98	Road through Portions 231, 22v and 35v Parish of Kolan.			
					Secants			
					Connections { N. boundary 22v . 2209 ; E " 35v . 991 ; E " 231 . 2819 ; W " " 1410 } 7429			
					Datum			
					Preliminary Traverse			
					Additional for First Mile			
					Totals.			
98.527 P.L.	17.1.98	16.3.98	10.3.98	12.3.98	Road through Pors. 163, 164, 176 Littabella			
					Secants			
					Connections and Datum			
					Additional for First Mile.			
					Totals			
98.7261 L.S.B.	23.7.98	8.8.98	1.8.98	7.8.98	Portions 1 to 5 Mulgadowrus Resumptions	50,000	0	0
					Inspection, Report and Design			
					Preliminary Compass Traverse for Roads			
TOTALS						51,608	0	25

AT 44/8 PER MI
CHAINS.

PROGRESS JOURNAL.

MR. LICENSED SURVEYOR Thomas Brown.

FOR THE MONTH ENDING 31st January 1898

POSTAL ADDRESS Bundaberg.

8.
1,62

2
58
94
17

TO THE SURVEYOR-GENERAL,
BRISBANE.

N.B.—Surveyors are requested to promptly advise the Department of the completion of work and when plans will be forwarded; also of any change in postal or telegraphic address. (*See* Clauses 227, 228, and 232).

PROGRESS JOURNAL for the Month ending 31st January

WORK PERFORMED.

DATE OF INSTRUCTION AND REGISTER NO.	SELECTION NO.	PORTION NO.	PARISH OR LOCALITY.	AREA.
17.11.97 97/6842 L.S.B.		3v 68v	Littabella	840 ac.
9.12.97 97/8629 P.L.			Town of Takilla Sections I and II.	10 "
23.12.97 97/6954 S.			Road through portions 231, 22v and 55v Parish of Kolan.	
29.11.97.	1352	64v	Parish of Tottenham.	160 "
97.8672/80 L.C.	1140	63v	" "	160 "
	1682	62v	" "	160 "

PLANS FORWARDED TO HEAD OR DISTRICT OFFICE DURING THE MONTH.

DATE.	SELECTION NO.	PORTION. NO.	PARISH OR LOCALITY.	AREA.
15.1.98		3v 68v	Parish of Littabella	840 ac.
"			Town of Takilla Sections I and II.	10 "
29.1.98			Road through Portions 231, 22v and 55v Parish of Kolan.	

DATE OF INSTRUCTION AND REGISTER NO.	SELECTION NO.	PORTION NO.
(a) 23.12.97 97.9151 L.C.	1209	54v
	1210	55v
	1372	56v
(a) 29.11.97.	1240	57v
97.8672/80 L.C.	1563	58v
	1372	59v
	1238	60v
(a) 97.9151 L.C. 23.12.97.	1354	61v.
(b.) 27.12.97 97/9384 L.C.	1683	75v
(d) 13.1.98 98.386 P.L.	1694	5v
(c) 17.1.98 98.527 P.L.		163 164 176

NOTE.—The order in which it is proposed to carry out the work in hand during the next month, is indicated alphabeti

DATE: 3rd February 1898

'arp 1898 Mr. Licensed Surveyor Thomas Brown.

WORK IN HAND.

PORTION NO.	PARISH OR LOCALITY.	AREA.
4v	Parish of Tottenham.	100 ac.
5v	" "	100 "
6v	" "	160 "
7v	" "	120 "
Fv.	" "	160 "
9v	" "	80 "
0v	" "	160 "
v.	" "	160 "
v	" "	160 "
	" Barmundoo.	2560 "
	Parish of Littabella. Road through.	

CANCELLED, WITHDRAWN, TRANSFERRED, OR RETURNED.

DATE OF INSTRUCTION AND REGISTER NO.	SELECTION NO.	PORTION NO.	PARISH OR LOCALITY.	AREA.
17.7.97 97.4628 L.C.	1135	6v	Parish of Langmorn. (withdrawn by wire from Surveyor General. 10.1.98)	160 ac.

SUMMARIZED WEATHER REPORT AND OTHER REMARKS.

The weather during the month has been favourable for survey work and, if it keeps fine, I expect to complete the surveys in the Parish of Tottenham in about ten days time.

In this district, generally, there is a scarcity of grass and water and a fall of rain is eagerly looked for by the farming community.

Settlement on the agricultural lands continues fairly active and there is an increasing demand for sugar lands and some enquiry for grazing homesteads.

ically. When private work interferes with work for the Department, the matter should be reported and particulars supplied. (*See* Clause 17).

Thos. Brown. Licensed Surveyor.

District

FORM OF COMPUTATION OF TRUE MERIDIAN AND LOCAL TIME BY OBSERVATION OF SUN,

TOGETHER WITH A TABLE FOR CONVERGENCE OF MERIDIANS.

Observed by

Mr Licensed Surveyor Thomas Brown

At Station No. 3 — the North East corner of

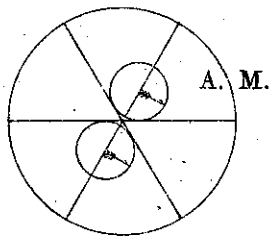
(Exact position of observing station must be denoted.)

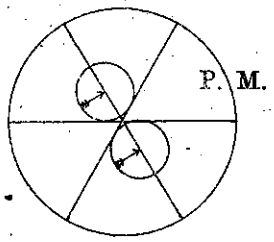
Portion 64 & 1 Parish of Tottenham

County of Flinders Date 10th February 1898.

NOTE:

These diagrams show the apparent position of Sun at times of observing A. M. and P. M. with an ordinary inverting eyepiece, also the apparent motion of Sun.





FORMULÆ.

For Azimuth

$$\text{Sin. } \tfrac{1}{2}Z = \sqrt{\frac{\text{Sin. } (s-z)\ \text{Sin. } (s-c)}{\text{Sin. } z.\ \text{Sin. } c.}}$$

For Local Time

$$\text{Sin. } \tfrac{1}{2}P = \sqrt{\frac{\text{Sin. } (s-p)\ \text{Sin. } (s-c)}{\text{Sin. } p.\ \text{Sin. } c.}}$$

When $s = \frac{p+c+z}{2}$

p = South Polar Distance.

c = Co-latitude.

z = Zenith Distance.

Z = Azimuth Angle.

P = Hour Angle.

BRISBANE.

PRINTED AT THE SURVEYOR GENERAL'S OFFICE.

1898.

Cat. No.....

Charted on T. M. M. No. .....

Place and No. of station 3 – North East corner of Portion 644

Parish of Tottenham County of Flinders

Date 10th Feb. 1898 Observer Thos. Brown Instrument 5" transit theodolite

Description of Referring object (R. O.) picket (on traverse for datum)

Bearing of R. O. referred to datum line of survey 180° 4' 40"

Latitude* 24°38'17"S Co-latitude (c) 65°21'43" Approximate longitude* 151°55'E.

To find corresponding Greenwich Date		A. M.			P. M.		
	Month.	day	h. m. s.		h. m. s.		
Time at place on	February	10			5 . 31 . 0		
Subtract one day		— 1					
if A. M. add 12 hours,			+12		+24		
„ P. M. „ 24 „							
Astronomical date		9			29 . 31 . 0		
Subtract longitude in arc / 15					10 . 7 . 40		
Corresponding Greenwich date	Feby.	9			19 . 23 . 20		

(Where "Standard Time" is used, inst ad of $\frac{\text{longitude in arc}}{15}$, subtract 10 hours, i. e. $\frac{150°\text{E.}}{15}$)

To correct the declination

Hourly diff. 48"·83

Sun's declination at noon at Greenwich for same day of month as Greenwich date *vide* Nautical Almanac Page II of each month. 5 14 33 59·0

Hours past Greenwich noon 19·39

No. of hours past noon multiplied by hourly difference 15·47 = Product = 946"·8

Corrected declination 14 18 12

If declination North add to, if South subtract from 90°

South Polar Distance (p) 75 41 48

z =	74	31	46	Log. Sin. =	9	9	8	3	9	7	2	3
c =	65	21	43	Log. Sin. =	9	9	5	8	5	4	4	5
p =	75	41	48		19	9	4	2	5	1	6	8
2	215	35	17	= Sum.	20							
s =	107	47	39	$\frac{1}{\text{Sin.z Sin.c}}$ =	0	0	5	7	4	8	3	2
s–z =	33	15	53	Log. Sin. =	9	7	3	9	1	8	3	0
s–c =	42	25	56	Log. Sin. =	9	8	2	9	1	2	2	0
				2	19	6	2	5	7	8	8	2
½Z =	40	32	22	Log. Sin. =	9	8	1	2	8	9	4	1

2

Z = 81 4 44 Azimuth angle. (For A. M. observations this must be subtracted from, and for P. M. observations, added to, 180° to obtain true bearing of Sun's centre.)

180 00 00

261 4 44 True bearing of sun's centre

74 19 20 Angle included between reading on sun and R. O.

186 45 24 True bearing of R. O.

180 4 40 Bearing of R. O. referred to datum line of survey

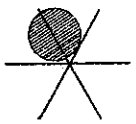
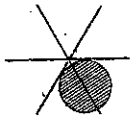
6 40 44 Variation of adopted meridian.

* State how the Latitude and Longitude of the place were obtained.

Latitude obtained by the observation of two pairs of stars at culmination North and South. (Observations herewith)

Longitude obtained by scale measurement from Trig.l Station on Mt. Monduran.

Thos. Brown
Licd. Surveyor

Apparent positions in which sun is observed (to be shown)	Horizontal Circle Reading on R. O.	Time by watch	Horizontal Circle Reading on Sun	Altitude (I)	Zenith Distance (II)
	° ′ ″	h. m. sec.	° ′ ″	° ′ ″	° ′ ″
Circle Left 	A 180 0 0	5 29 30	A 254 14 20	1 15 39 30	
	B 0 0 20		B 74 14 40	2 15 39 50	
		Reverse plate and telescope			
Circle Right 		5 32 30	A 74 24 30		1 74 36 50
			B 254 24 50		2 74 36 30
	Return A 0 0 10				
	B 180 0 30				
Sum	720 1 0	11 2 0	1017 18 20	31 19 20	149 13 20
Mean	180 0 15	5 31 0	254 19 35	15 39 40	74 36 40
Mean circle reading on R. O.			180 0 15	90 0 0	
Angle between Sun's centre and R. O.			74 19 20	74 20 20	Zen : Dist : col. I.
				74 36 40	,, ,, ,, II.
			Sum	148 57 0	
			Mean.	74 28 30	Apparent Zen: Dist:
				+ 3 24	Refraction. } For Alt.
				− 8	Parallax. }
			z =	74 31 46	True Zen: Dist:

Magnetic Declination.

of Line 2 to 3 (traverse) at Station 2

Bearing by Needle ° ′ ″ W 359 . 37 . 8

True Bearing 6 . 45 . 24

Declination 7 . 8 . 16

Convergence of Meridians.

The formula for convergence is :–

Log. Tan. Lat. + Log. Dep. (in miles) + Constant Log. 9.95832 = Log Convergence in minutes and decimals.

Mean Lat. between the two stations to be used.

Table of Convergence of Meridian for one statue mile, East or West.

Lat.	Angular diff. in Seconds	Lat.	Angular diff. in Seconds
10°	9·18	21°	19·98
11	10·12	22	21·02
12	11·06	23	22·09
13	12·02	24	23·17
14	12·98	25	24·27
15	13·94	26	25·39
16	14·92	27	26·52
17	15·89	28	27·68
18	16·91	29	28·85
19	17·92	30	30·05
20	18·94		

		For error.	For bearing.
		° ′ ″	° ′ ″
Variation at initial station No. 3		6 40 44	...
Convergence for 1·7 miles West		+ 40	...
Computed Variation at Station 42		6 41 24	6 41 24
Bearing of Line at Station 42 by Observation (True)	201 40 12	...	201 40 12
by Field Book.	195 0 0	...	...
Difference=Observed Variation at St. 42		6 40 12	...
Instrumental Error		+ 1 12	...
Bearing of line at station 42 by meridian of Survey			194 58 48

NOTE.—The form on page 2 will also serve for the calculation of stellar observations for azimuth, recollecting that the apparent declination of a star, taken from The Nautical Almanac, *can be obtained by mental interpolation—the daily change being so small in the case of a star.*

LOCAL TIME

From the calculations on the preceding page the local time, or in other words the error of the watch used in the observation, can with a little extra trouble be deduced.

The first requisite is to correct the equation of time in a very similar way to that in which the corrected declination was found, and for that purpose the same Greenwich date can of course be utilized,

To Correct the equation of time.

	m.	secs.		
Equation of time at noon at G'wich for same day of month as G'wich date *	= 14	25.69	H. difference in seconds of time=	.025
			No. of hrs. past G'wich noon=	19.39
H. difference X No. of hours past noon		.48	Product in seconds of time=	.48
Corrected equation of time		14.26.17		

To Compute the Hour Angle (P)

p =	75° 41′ 48″	Log. Sin. =	9.986324	
c =	65 21 43	Log. Sin. =	9.958544	
z =	74 31 46		19.944868	
2	215 35 17	=Sum.	20.	
s =	107 47 39	$\frac{1}{\text{Sin.p Sin.c}}$ =	0.055131	
s−p =	32 5 51	Log. Sin. =	9.725390	
s−c =	42 25 56	Log. Sin. =	9.821220	
		2	19.601743	
½P =	39 38 34	Log. Sin. =	9.804871	
	2			
P =	79 17 8	in arc.		

Hour angle in arc / 15 = Hour angle in time = 5 h. 17 m. 8 secs.

NOTE.

*Equation of time will be found on page 1 of each month in the Nautical Almanac and should be applied in accordance with the precept at the head of the column.

An inspection of the column will show whether this should be added or subtracted.

To compute error of watch on local time

	h.	m.	secs.				
Apparent noon	12	00	00	P. M.			
Subtract Hour angle if sun east of meridian				Hour angle when the sun is west of the meridian is the same as apparent time	= 5	17	8
Apparent time=							
Equation of time=				Equation of time=		14	26
True mean solar time=				True mean solar time		5	31.34 ✓
Time by watch=				Time by watch		5	31 0
Error of watch=				Error of watch			− 0.34

Watch therefore 0 m. 34 secs. slow on local time

FORM
for Calculating the Position of a Star at any time.

AT ELONGATION.

Formulæ for calculating the position of a star at its elongation.

Sin. Azimuth = *Cos. Declin.* × *Sec. Lat.* (1)

Cos. Hour Angle = *Cotan. Declin.* × *Tan. Lat.* (2)

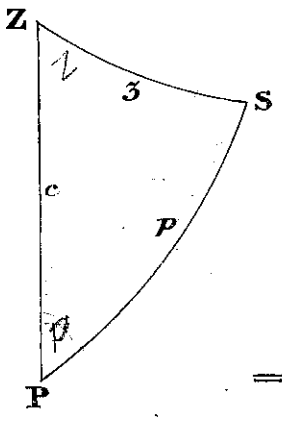
Sin. Altitude = *Cosec. Declin.* × *Sin. Lat.* (3)

NOT AT ELONGATION

To find a star suitable for observation.

Calculate the Local Sidereal Time, for the hour of the day upon which it is desired to take the observation. A star whose R.A. is about three or four hours earlier or later than this time should, if available, be chosen. If the star culminates within 30° of the Equator the local time can be advantageously obtained by the same formulæ as employed in solar observations.

Formulæ for enabling an observer to calculate the Azimuth and Altitude of any star at any given moment, when some distance away from the Meridian, so as to observe it in day light for True Meridian.



Given { PZ = *Co-latitude* = c ; PS = *Polar Distance* = p ; P = *Hour angle of Star* S }

Required { (1) *Azimuth* = Z ; (2) *Altitude* }

Tan. ½ (Z + S) = *Cos.* ½ (p ~ c). *Sec.* ½ (p + c). *Cotan.* P/2

Tan. ½ (Z ~ S) = *Sin.* ½ (p ~ c). *Cosec.* ½ (p + c). *Cotan.* P/2 (1)

From which the Azimuth, Z, may be found

Cos. Altitude = *Sin. p* × *Sin.* P × *Cosec.* Z. (2)

I wish to obtain the True Meridian by a single altitude of "α Crucis" when some distance from the meridian and before nightfall. In order to bring it into the field of the telescope, I require to know the Azimuth and Altitude of the star at the time selected for observation, viz. 4. 0 p. m. on September 15th. 1898, at a place in latitude 27° 28′ S. and longitude 10h. 12m. E. The error of my watch is known to within a minute.

To find Local Sidereal Time at 4. 0 p. m. - September 15th 1898

	h.	m.	s.
Sidereal Time at Greenwich – mean noon ..... September 15th ..... =	11	37	52·78
Correction for difference in Longitude 10h 12m E ($\frac{10\cdot2}{24}$ × 3m 56s·56) ..... =	—	1	40·54
Sidereal Time – Local Mean Noon ..... =	11	36	12·24
Sidereal Equivalent for 4h of Mean Solar Time ..... =	4	0	39·43
Local Sidereal Time at 4. 0 p. m. on September 15th 1898 ..... =	15	36	51·67

D = 48° 58′ 57″·0

To find Hour Angle &c.

	h.	m.	s.				
R.A. "α Crucis" ..... =	12	20	55·79	62° 32′ 00″ = Co-latitude ..... =			c
Sidereal Time ..... =	15	36	51·67	27. 27. 37·8 = Polar Distᵗ (90°±Declⁿ.) ..... =			p
Hour Angle "α Crucis" = P =	3	15	55·88	89. 59. 37·8 = (p+c), 44° 59′ 48″·9 =			½(p+c)
½ " " ..... = P/2 =	1	37	57·94	35. 4. 22·2 = (p~c), 17 32 11·1 =			½(p~c)

① To find Star's Azimuth.

½(p~c) = 17° 32′ 11″	Log. Cos. =	9·9793324	..... Log. Sin. = 9·4790156
½(p+c) = 44° 59′ 49″	" Sec. =	10·1504918	..... " Cosec. = 10·1505382
P/2 = 1h 37m 58s	" Cot. =	10·3414634	..... " Cot. = 10·3414634
½(Z+S) = 71° 19′ 58″	" Tan. =	10·4712876	½(Z~S) 43° 05′ 22″ " Tan. = 9·9710172

½(Z + S) = 71°. 19′. 58″
½(Z ~ S) = 43 : 05. 22
Z = Azimuth = ... 28. 14. 36
180. 0. 0
True Bearing of "α Crucis" as req.d 208. 14. 36

N.B. When Sidereal Time is less than R. A. the Azimuth Angle is to East of South, and must be subtracted from 180° for True bearing. When the Time is greater than R. A. the Angle is West of South and must be added to 180° for True Bearing.

② To find Star's Altitude.

p ..... =	27°	27′	38″
P ..... =	3h	15m	56s
Z ..... =	28°	14′	36″
Altitude .... =	42°	40′	15″

Log. Sin. = 9. 6638308
" Sin. = 9. 8776700
" Cosec. = 0. 3249395
" Cos. = 9. 8664403

The Star will occupy the same position in the heavens 3m 56s earlier on each successive day.

MAGNETIC OBSERVATIONS.

LOCALITY, OBSERVING STATION, NATURE OF GROUND, ETC.	TIME. Day.	a.m. or p.m.	h.	m.	READINGS ON REFERRING MARK. Box Direct. North End. Ver. A.	Box Direct. North End. Ver. B.	Box Direct. South End. Ver. A.	Box Direct. South End. Ver. B.	Box Reversed. South End. Ver. A.	Box Reversed. South End. Ver. B.	Box Reversed. North End. Ver. A.	Box Reversed. North End. Ver. B.	MEAN BEARING OF REFERRING MARK.	REMARKS.
Station 2. South East corner of Portion 64 v Parish of Tottenham. Red volcanic soil.	21st January 1898.	A.M.	10	20	359°35'20"	179°35'0"	359°33'40"	179°33'20"	359°24'20"	179°24'0"	359°54'0"	179°53'50"	359° 36' 41"	
			10	45	359°27'40"	179°27'20"	359°45'40"	179°45'20"	359°24'20"	179°24'0"	359°57'40"	179°57'20"	359° 38' 40"	
		P.M.	6	50	359°27'20"	179°27'0"	359°46'20"	179°46'0"	359°21'40"	179°21'20"	359°51'20"	179°51'0"	359° 36' 30"	
		"	7	20	359°24'20"	179°24'20"	359°43'30"	179°43'0"	359°24'0"	179°23'30"	359°55'40"	179°55'20"	359° 36' 42"	

Thos. Brown.

Licensed Surveyor.

Sum	1438° 28' 33"
Mean	359° 37' 8"
True Bearing of Referring Mark	6° 45' 24"
Magnetic Declination	7° 8' 16"

RETURN OF LANDS FOR RESUMPTION.

Name of Run Eastgrove

Name of Lessee or Licensee Thomas Robinson

Date of Inspection from 3rd to 13th August 1898.

1. What is the distance from railway?

About 48 miles from Downead Station on the Bundaberg-Gladstone Railway line and about 44 miles from Mt Perry.

2. What is the route used for carriage of produce and supplies?

The road to Downead is seldom used on account of the broken nature of the country. The road most in use is down Splinter Creek for about 25 m. where it strikes the Mt Perry-Wallood road, thence along this road 19 m. to Mt Perry. A much shorter road is now in course of construction and will, eventually, be the main route for the carriage of supplies. It is down Splinter Ck. for about 6 m., then southeasterly to the watershed between the Burnett and Roland Rivers, thence along that watershed to Wolca - total distance about 30 miles.

3. What is the cost per ton to and from seaboard?

From Eastgrove to Mt Perry, carriers charge £2.5.0 per ton and the average railway rate from Mt Perry to Bundaberg is about £2.0.0 per ton, making a total cost to seaboard of £4.5.0 per ton.

4. What is the average annual rainfall? *

* N.B—To be filled in at Head Office.

To the Under Secretary for Lands.

98. 1947. S. G. Note:—Separate Vouchers must be rendered for filling in these forms addressed to the *Under Secretary for Lands.*

5. What is the rock formation?

In the northern and eastern parts the formation is granite, but towards the west and south it is, generally, limestone and basalt.

6. What is the nature of the soil, and what proportion of the land is agricultural, or pastoral?

In the southern parts the soil is generally good. The flats along the creeks consist of black or chocolate alluvium but are too limited to allow of being profitably utilized for agriculture. Towards the north and east the soil changes, becoming more sandy and gravelly and is suited for grazing purposes only.

7. What is the conformation and character of the land? Is it plain, or timbered, or scrubby, or partly one and partly the other, and what is the description of the timber and scrub on it? If of a mixed character, what are the proportions of the different kinds?

The northern and eastern parts (about one fourth of the whole area) are rough and broken by the gullies that form the heads of Splinter Creek and, with the exception of the ranges which are covered in parts by pine scrubs, are heavily and thickly timbered with bloodwood, gum and ironbark.

The remainder consists of fairly open gum and apple flats and undulating forest country, thickly timbered with ironbark, bloodwood and gum.

About one-twentieth of the whole area is scrub, — one-tenth open flats and the remainder thickly timbered, the timber towards the North and East being very heavy.

8. What are the various kinds of pasturage? What area is store country, what area is fattening country, and what area is grass seedy?

The southern part (about three fourths) is well grassed with good fattening grasses. The remainder, except in the scrubs, is for the most part fairly well grassed and valuable as affording good winter shelter for stock.

9. What rivers, creeks, lakes, or lagoons afford a natural supply of water?

The whole area is well and permanently watered by Splinter Creek and its tributaries.

10. What area is sufficiently watered from the natural supply referred to in the preceding question?

The whole area.

11. What area is liable to floods, and to what depth? Is the land flooded to any dangerous extent?

The land is too high and too near the sources of the creeks for any serious floods to take place.

12. Is the locality favourable for putting down Bores, and what would approximate depth be?

As the natural supply of water is abundant and unfailing, this locality has never been tested.

13. What are the improvements which give an artificial supply of water? Give a summary of them.

Nil.

14. What area is sufficiently watered from the artificial supply referred to in the preceding question?

Nil.

15. What is the carrying capacity of the land in ordinary seasons, expressed in acres per sheep:
1st. As unimproved;
2nd. Under existing condition of improvements, and without water supply, &c., existing on other lands;
3rd. As fully improved?

No 1. I estimate three acres to a sheep.
No 2. The water supply being natural and permanent, the carrying capacity is not dependent upon an outside supply.
No 3. I estimate two acres per sheep.

16. Mention any special characteristics or circumstances in connection with the Holding, which, in your opinion, affect its value for pastoral occupation?—*i.e.*, rabbits, poison bush, prickly pear, &c., &c.

Bathurst burr is somewhat prevalent near the southwest corner and, if allowed to increase, will affect the value of the land, otherwise this land is free from all noxious weeds.

NOTE.—The sketch plan, upon which whenever practicable such notations should be made as will assist to explain or illustrate the answers to questions, should, with the schedule of forfeited improvements, if any is supplied, be returned with this report.

I HEREBY CERTIFY that I have inspected the land shown on the accompanying tracing, and known as Eastgrove and I have also made inquiry concerning its character and capabilities, and I declare that the statements as to facts contained in this Report are correct to the best of my knowledge, and that they are given to the best of my judgment and capabilities.

Thos. Brown L.S.

(Place) Bundaberg

(Date) 25th August 1898.

RULES MADE BY THE BOARD OF EXAMINERS FOR SURVEYORS UNDER SECTION 56 OF "THE LAND ACT, 1897."

1. Examinations of candidates for licenses as surveyors will be held at such time and place as may from time to time be notified in the *Gazette*.

2. Every candidate shall forward to the Secretary of the Board notice of his intention to present himself for examination, with documentary evidence of having complied with the preliminary conditions specified hereunder, all of which must reach the Secretary at least ten days before the date fixed for the examination.

PRELIMINARY CONDITIONS.

3. Every candidate shall satisfy the Board that he will be of the full age of twenty years at the time of examination, but no certificate will be issued until the candidate shall have reached his majority.

4. Candidates who do not produce evidence of good character will not be admitted to examination.

5. (*a*) A candidate shall have served continuously under articles, or other similar agreement, with some qualified surveyor or surveyors for a period of four years, three of which must have been in the field, and eighteen months of which must have been served with a surveyor or surveyors working for the Survey Department; and he shall further produce satisfactory evidence of having received such education as will qualify him for the proper exercise of his profession.

(*b*) Or he must produce documentary evidence that he has passed, at an Australasian University, the Matriculation Examination, including English, geography, arithmetic, geometry, algebra, and physics, or such other examination as shall, in the opinion of the Board, be equivalent thereto; and that he has served continuously under articles, or other similar agreement, with some qualified surveyor or surveyors for not less than three years, two of which must have been in the field, and one of which must have been served with a surveyor or surveyors working for the Survey Department.

(*c*) Or, that he has taken the degree of Bachelor in Engineering at an Australasian University, and has been employed in the field continuously for a period of two years with a qualified surveyor or surveyors, one year of which must have been served with a surveyor or surveyors working for the Survey Department.

6. In addition to evidence of service, every candidate shall produce in the following form, or to the like effect, a certificate from a qualified surveyor employed by the Survey Department, with whom he has served, that he is competent to undertake surveys for the Survey Department:—

Form of Certificate of Competency for Presentation to the Board of Examiners.

I, A.B., a registered Land Surveyor, employed by the Survey Department of Queensland, hereby certify that C.D. has been continuously employed with me as , in the practice of land surveying for the period of , viz., from to , and that he is fully competent to undertake surveys for the Survey Department.

[Here describe the survey work on which C.D. was employed.]

(Signed) A.B.
Date.

7. A candidate shall produce before examination his original field notes, and plan plotted by him therefrom, of the survey of an area of not less than forty (40) acres, one of the boundaries of which shall be a water-course or other natural feature, or be bounded by road lines of devious direction. The plan must be signed and dated, and bear the following certificate:—"I hereby certify that this plan was plotted and drawn by myself from surveys made by myself, and that the accompanying field notes and computations are my work."

8. Each candidate presenting himself for examination shall provide himself with a book of logarithms, a 40-20 scale, a parallel ruler, protractor, and necessary appliances for plan drawing, except paper.

9. If the foregoing preliminary conditions are complied with, to the satisfaction of the Board, the candidate's name will be entered for the examination.

SUBJECTS OF EXAMINATION.

10. The examination shall embrace the following subjects:—

Mathematics.

Trigonometry, plane and spherical; Geometry and Algebra. These subjects will be treated as far as they are applicable to surveying.

Computation.

Reduction of traverses. Computation connected with the setting out of roads and curves. Adjustment of discrepancies in surveys. Computation of areas, including such as have irregular and curved boundaries.

PRINCIPLES AND PRACTICE OF SURVEYING.

Details of field practice—including the keeping of field notes. Topographical surveying. Setting out of areas. Re-determination of boundaries. Laying out roads. Setting out curves. Plotting from field notes. Stadia surveying. Barometric and other measurement of heights. Surveying under Real Property Acts. Writing description of boundaries.

LEVELLING, &c.

Levelling. Measurement of earthwork.

Principles of construction, adjustment, and use of the following instruments, &c.:—Theodolite, sextant, tacheometer, level, compass, clinometer, barometer, thermometer, and steel band.

FIELD ASTRONOMY, GEODESY, &c.

Determination of time, latitude, and azimuth. Reduction of star places. Elementary geodesy—including spherical excess and convergence of meridians. Declination of the magnetic needle.

DRAWING.

Plan drawing. Compilation of Plans. Projection of Maps and Charts.

MISCELLANEOUS.

Elementary optics and light in relation to the construction and use of surveying instruments. Elementary stratigraphical geology.

11. The examination will be conducted before the Board, and will be partly written and partly oral.

CONDITIONS UNDER WHICH SURVEYORS, DULY QUALIFIED OUTSIDE QUEENSLAND, MAY BE LICENSED TO EFFECT SURVEYS UNDER "THE LAND ACT, 1897."

12. Applications for licenses under these circumstances, together with certificates of character, of competency, and of service, must reach the Secretary at least ten clear days before the first days of March and September in each year.

13. Surveyors who have passed the similar and simultaneous examination in any of the Australian colonies since June, 1895, may be recommended to the Minister for licenses on production of certificates of character, of competency, and of six months' service in the field in Queensland under a surveyor employed by the Survey Department.

14. Surveyors who obtained their qualification in New Zealand or in Tasmania, in any year, or in any of the Australian colonies prior to June, 1895, may be recommended to the Minister for licenses, under any of the following conditions:—

(*a*) The production of certificates of character, of competency, of six months' service in the field in Queensland under a surveyor employed by the Survey Department, such service having been completed within the twelve months immediately preceding the date of application, and the passing, if required by the Board, of a *viva voce* examination in field practice and field astronomy.

(*b*) The passing of the general examination conducted by the Board, the production of certificates of character, of competency, and of six months' service in the field in Queensland under a surveyor employed by the Survey Department, such service having been completed within the twelve months immediately preceding the date of application.

(*c*) The passing of the general examination conducted by the Board, and the production of certificates of character, of competency, and of six months' subsequent service in the field in Queensland, under a surveyor employed by the Survey Department.

CONDUCT OF INQUIRIES.

15. *Offences.*—Any charge of inaccuracy, unreliable work, carelessness, false representation, or any other offence under "*The Land Act*, 1897," and Regulations thereunder, made against any surveyor licensed under the Act, shall be submitted to the Board in writing, signed by the person making the charge, and if it appear to the Board that the charge is one that ought to be investigated, they shall fix the time and place of a meeting for that purpose.

16. *Notice of Charge.*—Thirty days prior to the date fixed for such meeting, notice shall be sent by the Secretary of the Board to the last known postal address of the Surveyor so charged, informing him of the time and place fixed for the inquiry, and supplying him with a copy of the charge or charges so made.

17. *Surveyors to be heard in Defence.*—A Surveyor charged with an offence shall be entitled to be heard in defence at any meeting held for the purpose of taking evidence or examining witnesses. The Board may examine any witness, and should such Surveyor not attend, may, nevertheless, proceed with the investigation, take evidence and such other steps as they may deem desirable to satisfy themselves as to the validity or otherwise of the charge.

18. *Evidence.*—All evidence shall be taken down in writing and, with the finding of the Board, shall be signed by the Chairman and Secretary, and an abstract of the same entered in the minute-book.

19. *Action after Inquiry.*—The finding of the Board shall be communicated in writing to the Minister, and shall be communicated to the Surveyor charged.

A. McDOWALL.
R. G. McDOWALL.
ALLAN A. SPOWERS.
R. J. WILLOCK.
F. J. CHARLTON.

Office of the Board of Examiners,
Brisbane, 17th June, 1898.

Appendix No. xiv.

TABLE of FRONTAGES (TWO-THIRDS DEPTH) in accordance with SECTION 87 of "THE LAND ACT, 1897," for AREAS from 1 ACRE to 20,000 ACRES.

Area.	Frontage.	Area.	Frontage.	Area.	Frontage.	Diff.	Area.	Frontage.	Diff.	Area.	Frontage.	Diff.	Area.	Frontage.	Diff.	Area.	Frontage.	Diff.
Acres.	Links.	Acres.	Links.	Acres.	Links.	Links for every Ac.	Acres.	Links.	Links for every 2 Ac.	Acres.	Links.	Links for every 4 Ac.	Acres.	Links.	Links for every 8 Ac.	Acres.	Links.	Links for every 10 Ac.
...	...	...	...	160	32 66	...	960	80 00	...	2,560	130 64	...	5,760	195 96	...	12,000	282 84	...
1	2 58·2	81	23 24	170	33 67	10·1	980	80 83	8·3	2,600	131 66	10·2	5,840	197 32	13·6	12,100	284 02	11·8
2	3 65·2	82	23 38	180	34 64	9·7	1,000	81 65	8·2	2,640	132 67	10·1	5,920	198 66	13·4	12,200	285 19	11·7
3	4 47·2	83	23 52	190	35 59	9·5	1,020	82 46	8·1	2,680	133 67	10·0	6,000	200 00	13·4	12,300	286 36	11·7
4	5 16·4	84	23 66	200	36 52	9·3	1,040	83 27	8·1	2,720	134 66	9·9	6,080	201 33	13·3	12,400	287 52	11·6
5	5 77·4	85	23 80	210	37 42	9·0	1,060	84 06	7·9	2,760	135 65	9·9	6,160	202 65	13·2	12,500	288 68	11·6
6	6 32·5	86	23 94	220	38 30	8·8	1,080	84 85	7·9	2,800	136 63	9·8	6,240	203 96	13·1	12,600	289 83	11·5
7	6 83·1	87	24 08	230	39 16	8·6	1,100	85 63	7·8	2,840	137 60	9·7	6,320	205 26	13·0	12,700	290 98	11·5
8	7 30·3	88	24 22	240	40 00	8·4	1,120	86 41	7·8	2,880	138 56	9·6	6,400	206 56	13·0	12,800	292 12	11·4
9	7 74·6	89	24 36	250	40 83	8·3	1,140	87 18	7·7	2,920	139 52	9·6	6,480	207 85	12·9	12,900	293 26	11·4
10	8 16·5	90	24 50	260	41 63	8·0	1,160	87 94	7·6	2,960	140 48	9·6	6,560	209 13	12·8	13,000	294 39	11·3
11	8 56·4	91	24 63	270	42 43	8·0	1,180	88 69	7·5	3,000	141 42	9·4	6,640	210 40	12·7	13,100	295 52	11·3
12	8 94·4	92	24 77	280	43 21	7·8	1,200	89 44	7·5	3,040	142 36	9·4	6,720	211 66	12·6	13,200	296 65	11·3
13	9 31·0	93	24 90	290	43 97	7·6	1,220	90 19	7·3	3,080	143 29	9·3	6,800	212 92	12·6	13,300	297 77	11·2
14	9 66·1	94	25 03	300	44 72	7·5	1,240	90 92	7·3	3,120	144 22	9·3	6,880	214 17	12·5	13,400	298 89	11·2
15	10 00·0	95	25 17	310	45 46	7·4	1,260	91 65	7·3	3,160	145 14	9·2	6,960	215 41	12·4	13,500	300 00	11·1
16	10 33	96	25 30	320	46 19	7·3	1,280	92 38	7·1	3,200	146 06	9·2	7,040	216 64	12·3	13,600	301 11	11·1
17	10 65	97	25 43	330	46 90	7·1	1,300	93 09	7·2	3,240	146 97	9·1	7,120	217 87	12·3	13,700	302 21	11·0
18	10 95	98	25 56	340	47 61	7·1	1,320	93 81	7·1	3,280	147 87	9·0	7,200	219 09	12·2	13,800	303 31	11·0
19	11 25	99	25 69	350	48 30	6·9	1,340	94 52	7·0	3,320	148 77	9·0	7,280	220 30	12·1	13,900	304 41	11·0
20	11 55	100	25 82	360	48 99	6·9	1,360	95 22		3,360	149 67	9·0	7,360	221 51	12·1	14,000	305 51	
21	11 83	101	25 95	370	49 67	6·8	1,380	95 92	7·0	3,400	150 55	8·8	7,440	222 71	12·0	14,100	306 59	10·8
22	12 11	102	26 08	380	50 33	6·6	1,400	96 61	6·9	3,440	151 44	8·9	7,520	223 90	11·9	14,200	307 68	10·9
23	12 38	103	26 20	390	50 99	6·6	1,420	97 30	6·9	3,480	152 32	8·8	7,600	225 09	11·9	14,300	308 76	10·8
24	12 65	104	26 33	400	51 64	6·5	1,440	97 98	6·8	3,520	153 19	8·7	7,680	226 27	11·8	14,400	309 84	10·8
25	12 91	105	26 46	410	52 28	6·4	1,460	98 66	6·7	3,560	154 06	8·7	7,760	227 45	11·8	14,500	310 91	10·7
26	13 17	106	26 58	420	52 92	6·4	1,480	99 33	6·7	3,600	154 92	8·6	7,840	228 62	11·7	14,600	311 98	10·7
27	13 42	107	26 71	430	53 54	6·2	1,500	100 00	6·6	3,640	155 78	8·6	7,920	229 78	11·6	14,700	313 05	10·7
28	13 66	108	26 83	440	54 16	6·2	1,520	100 66	6·6	3,680	156 63	8·5	8,000	230 94	11·6	14,800	314 11	10·6
29	13 90	109	26 96	450	54 77	6·1	1,540	101 32	6·6	3,720	157 48	8·5	8,080	232 09	11·5	14,900	315 17	10·6
30	14 14	110	27 08	460	55 38	6·1	1,560	101 98		3,760	158 32	8·4	8,160	233 24	11·5	15,000	316 23	
31	14 38	111	27 20	470	55 98	6·0	1,580	102 63	6·5	3,800	159 16	8·4	8,240	234 38	11·4	15,100	317 28	10·5
32	14 61	112	27 33	480	56 57	5·9	1,600	103 28	6·5	3,840	160 00	8·4	8,320	235 51	11·3	15,200	318 33	10·5
33	14 83	113	27 45	490	57 15	5·8	1,620	103 92	6·4	3,880	160 83	8·3	8,400	236 64	11·3	15,300	319 37	10·4
34	15 06	114	27 57	500	57 73	5·8	1,640	104 56	6·4	3,920	161 66	8·3	8,480	237 77	11·3	15,400	320 42	10·5
35	15 28	115	27 69	510	58 31	5·8	1,660	105 20	6·4	3,960	162 48	8·2	8,560	238 89	11·2	15,500	321 46	10·4
36	15 49	116	27 81	520	58 88	5·7	1,680	105 83	6·3	4,000	163 30	8·2	8,640	240 00	11·1	15,600	322 49	10·3
37	15 71	117	27 93	530	57 44	5·6	1,700	106 46	6·3	4,040	164 11	8·1	8,720	241 11	11·1	15,700	323 52	10·3
38	15 92	118	28 05	540	60 00	5·6	1,720	107 08	6·2	4,080	164 92	8·1	8,800	242 21	11·0	15,800	324 55	10·3
39	16 12	119	28 17	550	60 55	5·5	1,740	107 70	6·2	4,120	165 73	8·1	8,880	243 31	11·0	15,900	325 58	10·3
40	16 33	120	28 29	560	61 10	5·5	1,760	108 32	6·2	4,160	166 53	8·0	8,960	244 40	10·9	16,000	326 60	10·2
41	16 53	121	28 40	570	61 64	5·4	1,780	108 93	6·1	4,200	167 33	8·0	9,040	245 49	10·9	16,100	327 62	10·2
42	16 73	122	28 52	580	62 18	5·4	1,800	109 54	6·1	4,240	168 13	7·9	9,120	246 58	10·9	16,200	328 63	10·1
43	16 93	123	28 64	590	62 72	5·4	1,820	110 15	6·1	4,280	168 92	7·9	9,200	247 66	10·8	16,300	329 65	10·2
44	17 13	124	28 75	600	63 25	5·3	1,840	110 76	6·0	4,320	169 71	7·8	9,280	248 73	10·7	16,400	330 66	10·1
45	17 32	125	28 87	610	63 77	5·2	1,860	111 36	6·0	4,360	170 49	7·8	9,360	249 80	10·7	16,500	331 66	10·0
46	17 51	126	28 98	620	64 29	5·2	1,880	111 95	5·9	4,400	171 27	7·8	9,440	250 87	10·7	16,600	332 67	10·1
47	17 70	127	29 10	630	64 81	5·2	1,900	112 55	6·0	4,440	172 05	7·8	9,520	251 93	10·6	16,700	333 67	10·0
48	17 89	128	29 21	640	65 32	5·1	1,920	113 14	5·9	4,480	172 82	7·7	9,600	252 98	10·5	16,800	334 66	9·9
49	18 07	129	29 33	650	65 83	5·1	1,940	113 72	5·8	4,520	173 59	7·7	9,680	254 03	10·5	16,900	335 66	10·0
50	18 26	130	29 44	660	66 33	5·0	1,960	114 31	5·9	4,560	174 36	7·7	9,760	255 08	10·5	17,000	336 65	9·9
51	18 44	131	29 55	670	66 83	5·0	1,980	114 89	5·8	4,600	175 12	7·6	9,840	256 12	10·4	17,100	337 64	9·9
52	18 62	132	29 66	680	67 33	5·0	2,000	115 47	5·8	4,640	175 88	7·6	9,920	257 16	10·4	17,200	338 62	9·8
53	18 80	133	29 78	690	67 82	4·9	2,020	116 05	5·8	4,680	176 64	7·6	10,000	258 20	10·4	17,300	339 61	9·9
54	18 97	134	29 89	700	68 31	4·9	2,040	116 62	5·7	4,720	177 39	7·5	10,080	259 23	10·3	17,400	340 59	9·8
55	19 15	135	30 00	710	68 80	4·9	2,060	117 19	5·7	4,760	178 14	7·5	10,160	260 26	10·3	17,500	341 57	9·8
56	19 32	136	30 11	720	69 28	4·8	2,080	117 76	5·7	4,800	178 89	7·5	10,240	261 28	10·2	17,600	342 54	9·7
57	19 49	137	30 22	730	69 76	4·8	2,100	118 32	5·6	4,840	179 63	7·4	10,320	262 30	10·2	17,700	343 51	9·7
58	19 66	138	30 33	740	70 24	4·8	2,120	118 88	5·6	4,880	180 37	7·4	10,400	263 31	10·1	17,800	344 48	9·7
59	19 83	139	30 44	750	70 71	4·7	2,140	119 44	5·6	4,920	181 11	7·3	10,480	264 32	10·1	17,900	345 45	9·6
60	20 00	140	30 55	760	71 18	4·7	2,160	120 00	5·5	4,960	181 84	7·3	10,560	265 33	10·0	18,000	346 41	9·6
61	20 17	141	30 66	770	71 65	4·6	2,180	120 55	5·6	5,000	182 57	7·3	10,640	266 33	10·0	18,100	347 37	9·6
62	20 33	142	30 77	780	72 11	4·6	2,200	121 11	5·5	5,040	183 30	7·3	10,720	267 33	10·0	18,200	348 33	9·5
63	20 49	143	30 88	790	72 57	4·6	2,220	121 66	5·4	5,080	184 03	7·2	10,800	268 33	9·9	18,300	349 28	9·6
64	20 66	144	30 98	800	73 03	4·6	2,240	122 20	5·5	5,120	184 75	7·2	10,880	269 32	9·9	18,400	350 24	9·5
65	20 82	145	31 09	810	73 49	4·5	2,260	122 75	5·4	5,160	185 47	7·2	10,960	270 31	9·8	18,500	351 19	9·5
66	20 98	146	31 20	820	73 94	4·5	2,280	123 29	5·4	5,200	186 19	7·1	11,040	271 29	9·8	18,600	352 14	9·4
67	21 13	147	31 30	830	74 39	4·4	2,300	123 83	5·4	5,240	186 90	7·2	11,120	272 27	9·8	18,700	353 08	9·4
68	21 29	148	31 41	840	74 83	4·5	2,320	124 37	5·3	5,280	187 62	7·1	11,200	273 25	9·8	18,800	354 02	9·4
69	21 45	149	31 52	850	75 28	4·4	2,340	124 90	5·3	5,320	188 33	7·0	11,280	274 23	9·7	18,900	354 96	9·4
70	21 60	150	31 62	860	75 72		2,360	125 43		5,360	189 03		11,360	275 20		19,000	355 90	
71	21 76	151	31 73	870	76 16	4·4	2,380	125 96	5·3	5,400	189 74	7·1	11,440	276 16	9·6	19,100	356 84	9·4
72	21 91	152	31 83	880	76 59	4·3	2,400	126 49	5·3	5,440	190 44	7·0	11,520	277 13	9·7	19,200	357 77	9·3
73	22 06	153	31 94	890	77 03	4·4	2,420	127 02	5·3	5,480	191 14	7·0	11,600	278 09	9·6	19,300	358 70	9·3
74	22 21	154	32 04	900	77 46	4·3	2,440	127 54	5·2	5,520	191 83	6·9	11,680	279 05	9·6	19,400	359 63	9·3
75	22 36	155	32 15	910	77 89	4·3	2,460	128 06	5·2	5,560	192 53	7·0	11,760	280 00	9·5	19,500	360 56	9·3
76	22 51	156	32 25	920	78 32	4·3	2,480	128 58	5·2	5,600	193 22	6·9	11,840	280 95	9·5	19,600	361 48	9·2
77	22 66	157	32 35	930	78 74	4·2	2,500	129 10	5·1	5,640	193 91	6·9	11,920	281 90	9·5	19,700	362 40	9·2
78	22 80	158	32 46	940	79 16	4·2	2,520	129 61	5·2	5,680	194 59	6·8	12,000	282 84	9·4	19,800	363 32	9·2
79	22 95	159	32 56	950	79 58	4·2	2,540	130 13	5·1	5,720	195 28	6·9	12,080	283 78	9·4	19,900	364 23	9·1
80	23 09	160	32 66	960	80 00		2,560	130 64		5,760	195 96	6·8	12,160	284 72	9·4	20,000	365 15	9·2

FRONTAGES.

By section 87 of "*The Land Act*, 1897," the frontage of a portion is restricted to two-thirds the depth, except where all the available land is included, and under clause 29 of the "Directions to Surveyors" the method of computing such frontage is laid down, and it is also provided that "generally the depth of a portion should not exceed three times its mean breadth."

Except for the first fifteen acres, the frontages in the Table have been computed to the nearest link for every acre up to 160 acres. In order to avoid making the Table unduly long, the frontages for every ten acres, with differences for every acre, are given from 160 acres to 960 acres; then for every twenty acres, and so on. So as to maintain accuracy, and yet not burden the Table with numbers to more than one place of decimals, the differences for areas greater than 960 acres have been worked out to every two, four, eight and ten acres, as set forth at the head of their respective columns of differences. Should the frontage of an area not exactly arranged for by the Table be required, it may easily be obtained by adding to the frontage for the next lower area given in the Table, a proportion of the corresponding difference.

Where diminishing differences are being operated upon without regard to minute fractions, inequalities must occasionally arise. Some of these appear in the Table and there are others hidden under the column of Differences, but, as a general rule, the errors in frontage caused thereby do not exceed half-a-link, and in no case do they amount to a whole link—provided that the differences are faithfully applied. Fractions of less than half-a-link have been disregarded; half-a-link or more has always been taken as one link.

Besides showing the maximum frontage that may be allowed for any given area, the minimum breadth may also be taken out—the minimum frontage (one-third depth) being equal to the maximum frontage of half the area.

For convenience of reference the following more frequently occurring areas are given in detail:—

Area.	Frontage ⅔ Depth.		Frontage ½ Depth.		Area.
	Frontage must not Exceed—	Depth must not be Less than—	Frontage should not be Less than—	Depth should not Exceed—	
Acres.	Links.	Links.	Links.	Links.	Acres.
40 ...	1633	2450	1155	3464	40
80 ...	2309	3465	1633	4899	80
120 ...	2829	4242	2000	6000	120
160 ...	3266	4899	2309	6930	160
240 ...	4000	6000	2829	8484	240
320 ...	4619	6928	3266	9798	320
480 ...	5657	8486	4000	12000	480
560 ...	6110	9166	4321	12960	560
640 ...	6532	9798	4619	13856	640
960 ...	8000	12000	5657	16971	960
1,120 ...	8641	12962	6110	18331	1,120
1,280 ...	9238	13856	6532	19596	1,280
2,560 ...	13064	19596	9238	27712	2,560
5,120 ...	18475	27714	13064	39192	5,120
10,000 ...	25820	38730	18257	54774	10,000
20,000 ...	36515	54773	25820	77460	20,000

TABLE OF LINKS TO BE DEDUCTED FROM EACH CHAIN ON THE SLOPE TO REDUCE IT TO HORIZONTAL MEASUREMENT.

M.	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	M.
0	0·00	0·02	0·06	0·14	0·24	0·38	0·55	0·75	0·97	1·23	1·52	1·84	2·19	2·56	2·97	3·41	3·87	4·37	4·89	5·45	6·03	6·64	7·28	7·95	8·65	9·37	10·12	10·90	11·71	12·54	13·40	0
1	...	...	...	...	·25	...	...	...	·98	·24	·52	·84	·19	·57	·98	·41	·88	·38	·90	·46	·04	·65	·29	·96	·66	·38	·13	·91	·72	·55	·41	1
2	...	...	...	...	...	·39	...	...	...	...	·53	·85	·20	·58	·98	·42	·89	·39	·91	·47	·05	·66	·30	·97	·67	·39	·15	·93	·73	·57	·43	2
3	...	...	...	...	...	...	·56	·76	·99	...	·53	·85	·20	·58	·99	·43	·90	·40	·92	·48	·06	·67	·31	·98	·68	·41	·16	·94	·75	·58	·44	3
4	...	...	·07	...	...	...	...	...	...	·25	·54	·86	·21	·59	3·00	·44	·91	·40	·93	·49	·07	·68	·33	8·00	·69	·42	·17	·95	·76	·59	·46	4
5	...	...	...	...	...	...	...	...	...	...	·54	·87	·22	·60	·01	·45	·91	·41	·94	·50	·08	·69	·34	·01	·70	·48	·18	·97	·77	·61	·47	5
6	0·00	0·02	0·07	0·15	0·26	0·40	0·57	0·77	1·00	1·26	1·55	1·87	2·22	2·60	3·01	3·45	3·92	4·42	4·95	5·51	6·09	6·70	7·35	8·02	8·72	9·44	10·20	10·98	11·79	12·62	13·48	6
7	...	...	...	...	...	...	...	...	...	...	·55	·88	·23	·61	·02	·46	·93	·43	·96	·51	·10	·72	·36	·03	·73	·46	·21	·99	·80	·64	·50	7
8	...	...	...	...	...	...	...	...	·01	·27	·56	·88	·23	·62	·03	·47	·94	·44	·97	·52	·11	·73	·37	·04	·74	·47	·22	11·01	·81	·65	·51	8
9	...	...	...	...	...	...	·58	·78	...	...	·57	·89	·24	·62	·03	·48	·95	·45	·98	·53	·12	·74	·38	·05	·75	·48	·24	·02	·83	·67	·53	9
10	...	...	...	...	...	·41	...	...	...	·28	·57	·89	·25	·63	·04	·48	·95	·45	·98	·54	·13	·75	·39	·06	·76	·49	·25	·03	·84	·68	·54	10
11	0·00	0·02	0·07	0·15	0·27	0·41	0·58	0·78	1·02	1·28	1·58	1·90	2·25	2·64	3·05	3·49	3·96	4·46	4·99	5·55	6·14	6·76	7·40	8·08	8·78	9·50	10·26	11·05	11·86	12·69	13·56	11
12	...	...	...	·16	...	...	...	·79	...	·29	·58	·90	·26	·64	·06	·50	·97	·47	5·00	·56	·15	·77	·41	·09	·79	·52	·27	·06	·87	·71	·57	12
13	...	...	...	...	...	...	·59	...	·03	...	·59	·91	·26	·65	·06	·51	·98	·48	·01	·57	·16	·78	·42	·10	·80	·53	·29	·07	·88	·72	·59	13
14	...	...	·08	...	...	·42	...	·80	...	·30	·59	·92	·27	·66	·07	·51	·99	·49	·02	·58	·17	·79	·43	·11	·81	·54	·30	·08	·90	·74	·60	14
15	...	...	...	...	...	...	...	...	...	...	·60	·92	·28	·66	·08	·52	4·00	·50	·03	·59	·18	·80	·45	·12	·82	·55	·31	·10	·91	·75	·62	15
16	0·00	0·02	0·08	0·16	0·28	0·42	0·60	0·80	1·04	1·31	1·60	1·93	2·28	2·67	3·08	3·53	4·00	4·51	5·04	5·60	6·19	6·81	7·46	8·13	8·84	9·57	10·33	11·11	11·92	12·76	13·63	16
17	...	·03	...	...	...	...	...	·81	...	...	·61	·93	·29	·68	·09	·54	·01	·52	·05	·61	·20	·82	·47	·14	·85	·58	·34	·12	·94	·78	·65	17
18	...	...	·17	...	·43	...	...	...	·05	...	·61	·94	·30	·68	·10	·54	·02	·52	·06	·62	·21	·83	·48	·16	·86	·59	·35	·14	·95	·79	·66	18
19	...	...	...	...	...	...	·61	...	...	·32	·62	·94	·30	·69	·11	·55	·03	·53	·07	·63	·22	·84	·49	·17	·87	·60	·36	·15	·97	·81	·68	19
20	...	...	...	...	·29	...	...	·82	·06	...	·62	·95	·31	·70	·11	·56	·04	·54	·08	·64	·23	·85	·50	·18	·88	·62	·38	·16	·98	·82	·69	20
21	0·00	0·03	0·08	0·17	0·29	0·44	0·61	0·82	1·06	1·33	1·63	1·96	2·31	2·70	3·12	3·57	4·04	4·55	5·08	5·65	6·24	6·86	7·51	8·19	8·90	9·63	10·39	11·18	11·99	12·84	13·70	21
22	...	...	·09	...	...	...	·62	·83	...	...	·63	·96	·32	·71	·13	·58	·05	·56	·09	·66	·25	·87	·52	·20	·91	·64	·40	·19	12·01	·85	·72	22
23	...	...	...	...	...	...	...	...	·07	·34	·64	·97	·33	·72	·13	·58	·06	·57	·10	·67	·26	·88	·53	·21	·92	·65	·42	·21	·02	·86	·73	23
24	...	...	...	·18	...	...	...	...	...	...	·64	·97	·33	·72	·14	·59	·07	·58	·11	·68	·27	·89	·55	·22	·93	·67	·43	·22	·04	·88	·75	24
25	...	...	...	...	·30	·45	·63	·84	·08	·35	·65	·98	·34	·73	·15	·60	·08	·58	·12	·69	·28	·91	·56	·24	·94	·68	·44	·23	·05	·89	·76	25
26	0·00	0·03	0·09	0·18	0·30	0·45	0·63	0·84	1·08	1·35	1·65	1·98	2·35	2·74	3·16	3·61	4·09	4·59	5·13	5·70	6·29	6·92	7·57	8·25	8·96	9·69	10·45	11·25	12·06	12·91	13·78	26
27	...	...	...	...	...	...	...	...	·09	·36	·66	·99	·35	·74	·16	·61	·09	·60	·14	·71	·30	·93	·58	·26	·97	·70	·47	·26	·08	·92	·79	27
28	...	...	...	...	...	...	·64	·85	...	...	·66	2·00	·36	·75	·17	·62	·10	·61	·15	·72	·31	·94	·59	·27	·98	·72	·48	·27	·09	·94	·81	28
29	...	...	...	...	·31	·46	...	...	...	·37	·67	·00	·36	·76	·18	·63	·11	·62	·16	·73	·32	·95	·60	·28	·99	·73	·49	·29	·10	·95	·82	29
30	...	...	·10	·19	...	...	...	·86	·10	...	·67	·01	·37	·76	·19	·64	·12	·63	·17	·74	·33	·96	·61	·29	9·00	·74	·51	·30	·12	·96	·84	30
31	0·00	0·04	0·10	0·19	0·31	0·46	0·65	0·86	1·10	1·38	1·68	2·01	2·38	2·77	3·19	3·64	4·13	4·64	5·18	5·75	6·34	6·97	7·62	8·31	9·02	9·75	10·52	11·31	12·13	12·98	13·85	31
32	...	...	...	...	...	·47	...	...	·11	...	·69	·02	·38	·78	·20	·65	·13	·65	·19	·76	·35	·98	·63	·32	·03	·77	·53	·33	·15	·99	·87	32
33	...	...	...	...	·32	...	...	·87	...	·39	·69	·02	·39	·78	·21	·66	·14	·65	·20	·77	·36	·99	·65	·33	·04	·78	·55	·34	·16	13·01	·88	33
34	...	...	...	...	...	...	·66	...	·12	...	·70	·03	·40	·79	·21	·67	·15	·66	·20	·77	·37	7·00	·66	·34	·05	·79	·56	·35	·17	·02	·90	34
35	·01	...	...	·20	...	...	...	...	...	·40	·70	·04	·40	·80	·22	·68	·16	·67	·21	·78	·38	·01	·67	·35	·06	·80	·57	·37	·19	·04	·91	35
36	0·01	0·04	0·10	0·20	0·32	0·48	0·66	0·88	1·12	1·40	1·71	2·04	2·41	2·80	3·23	3·68	4·17	4·68	5·22	5·79	6·39	7·02	7·68	8·36	9·08	9·82	10·58	11·38	12·20	13·05	13·93	36
37	...	...	...	...	...	...	·67	...	·13	·41	·71	·05	·41	·81	·24	·69	·18	·69	·23	·80	·40	·03	·69	·38	·09	·83	·60	·39	·22	·06	·94	37
38	...	...	·11	...	·33	...	...	·89	...	...	·72	·05	·42	·82	·24	·70	·18	·70	·24	·81	·41	·04	·70	·39	·10	·84	·61	·41	·23	·08	·96	38
39	...	...	...	...	...	·49	...	...	·14	...	·72	·06	·43	·82	·25	·71	·19	·71	·25	·82	·42	·05	·71	·40	·11	·85	·62	·42	·24	·09	·97	39
40	...	...	...	...	...	...	·68	...	...	·42	·73	·07	·43	·83	·26	·72	·20	·72	·26	·83	·44	·07	·72	·41	·12	·87	·64	·43	·26	·11	·99	40
41	0·01	0·04	0·11	0·21	0·33	0·49	0·68	0·90	1·15	1·42	1·73	2·07	2·44	2·84	3·27	3·72	4·21	4·73	5·27	5·84	6·45	7·08	7·73	8·42	9·14	9·88	10·65	11·45	12·27	13·12	14·00	41
42	...	...	...	...	·34	...	...	...	...	·43	·74	·08	·45	·85	·27	·73	·22	·73	·28	·85	·46	·09	·75	·43	·15	·89	·66	·46	·29	·14	·01	42
43	...	...	...	...	...	·50	·69	·91	·16	...	·74	·08	·45	·85	·28	·74	·23	·74	·29	·86	·47	·10	·76	·45	·16	·90	·68	·47	·30	·16	·03	43
44	...	·05	...	...	...	...	...	...	...	·44	·75	·09	·46	·86	·29	·75	·23	·75	·30	·87	·48	·11	·77	·46	·17	·92	·69	·49	·31	·17	·04	44
45	...	...	·12	...	...	...	...	...	...	...	·75	·10	·47	·87	·30	·75	·24	·76	·31	·88	·49	·12	·78	·47	·19	·93	·70	·50	·33	·18	·06	45
46	0·01	0·05	0·12	0·22	0·35	0·51	0·70	0·92	1·17	1·45	1·76	2·10	2·47	2·87	3·30	3·76	4·25	4·77	5·32	5·89	6·50	7·13	7·79	8·48	9·20	9·94	10·72	11·51	12·34	13·19	14·07	46
47	...	...	...	...	...	...	...	...	...	...	·77	·11	·48	·88	·31	·77	·26	·78	·33	·90	·51	·14	·80	·49	·21	·96	·73	·53	·36	·21	·09	47
48	...	...	...	...	...	...	...	·93	·18	·46	·77	·11	·49	·89	·32	·78	·27	·79	·34	·91	·52	·15	·81	·50	·22	·97	·74	·54	·37	·22	·10	48
49	...	...	...	...	...	...	·71	...	...	...	·78	·12	·49	·89	·33	·79	·28	·80	·34	·92	·53	·16	·82	·52	·23	·98	·75	·56	·38	·24	·12	49
50	...	...	...	...	·36	·52	...	...	·19	·47	·78	·13	·50	·90	·33	·79	·28	·80	·35	·93	·54	·17	·84	·53	·25	·99	·77	·57	·40	·25	·13	50
51	0·01	0·05	0·12	0·23	0·36	0·52	0·71	0·94	1·19	1·47	1·79	2·13	2·50	2·91	3·34	3·80	4·29	4·81	5·36	5·94	6·55	7·18	7·85	8·54	9·26	10·01	10·78	11·58	12·41	13·27	14·15	51
52	...	...	·13	...	...	...	·72	...	·20	·48	·79	·14	·51	·91	·35	·81	·30	·82	·37	·95	·56	·19	·86	·55	·27	·02	·79	·60	·43	·28	·16	52
53	...	...	...	...	...	·53	...	·95	...	...	·80	·14	·52	·92	·35	·82	·31	·83	·38	·96	·57	·21	·87	·56	·28	·03	·81	·61	·44	·30	·18	53
54	...	...	...	...	·37	...	...	...	...	·49	·80	·15	·52	·93	·36	·83	·32	·84	·39	·97	·58	·22	·88	·57	·30	·04	·82	·62	·45	·31	·19	54
55	...	·06	...	...	...	...	·73	...	·21	...	·81	·16	·53	·94	·37	·83	·33	·85	·40	·98	·59	·23	·89	·59	·31	·06	·83	·64	·47	·32	·21	55
56	0·01	0·06	0·13	0·24	0·37	0·54	0·73	0·96	1·21	1·50	1·82	2·16	2·54	2·94	3·38	3·84	4·34	4·86	5·41	5·99	6·60	7·24	7·90	8·60	9·32	10·07	10·85	11·65	12·48	13·34	14·22	56
57	...	...	...	...	...	...	...	...	·22	...	·82	·17	·54	·95	·38	·85	·34	·87	·42	6·00	·61	·25	·92	·61	·33	·08	·86	·66	·50	·35	·24	57
58	...	...	...	...	·38	...	·74	·97	...	·51	·83	·17	·55	·96	·39	·86	·35	·88	·43	·01	·62	·26	·93	·62	·34	·10	·87	·68	·51	·37	·25	58
59	...	...	·14	...	...	...	...	...	·23	...	·83	·18	·56	·96	·40	·87	·36	·89	·44	·02	·63	·27	·94	·63	·36	·11	·89	·69	·52	·38	·27	59
60	·02	...	...	...	...	·55	·75	...	...	·52	·84	·19	·56	·97	·41	·87	·37	·89	·45	·03	·64	·28	·95	·65	·37	·12	·90	·71	·54	·40	·28	60
M.	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	M.

Table of Temperature Corrections, in Fractions of a Link, for each Degree Fah., from 1° to 100°, and from 1 to 10 Chains.

°Fah.	1	2	3	4	5	6	7	8	9	10
1	·001	·001	·002	·002	·003	·004	·004	·005	·006	·006
2	·001	·002	·004	·005	·006	·007	·009	·010	·011	·012
3	·002	·004	·006	·007	·009	·011	·013	·015	·017	·019
4	·002	·005	·007	·010	·012	·015	·017	·020	·022	·025
5	·003	·006	·009	·012	·016	·019	·022	·025	·028	·031
6	·004	·007	·011	·015	·019	·022	·026	·030	·034	·037
7	·004	·009	·013	·017	·022	·026	·031	·035	·039	·044
8	·005	·010	·015	·020	·025	·030	·035	·040	·045	·050
9	·006	·011	·017	·022	·028	·034	·039	·045	·051	·056
10	·006	·012	·019	·025	·031	·037	·044	·050	·056	·062
11	·007	·014	·021	·027	·034	·041	·048	·055	·062	·069
12	·007	·015	·022	·030	·037	·045	·052	·060	·067	·075
13	·008	·016	·024	·032	·041	·049	·057	·065	·073	·081
14	·009	·017	·026	·035	·044	·052	·061	·070	·079	·087
15	·009	·019	·028	·037	·047	·056	·066	·075	·084	·094
16	·010	·020	·030	·040	·050	·060	·070	·080	·090	·100
17	·011	·021	·032	·042	·053	·064	·074	·085	·096	·106
18	·011	·022	·034	·045	·056	·067	·079	·090	·101	·112
19	·012	·024	·036	·047	·059	·071	·083	·095	·107	·119
20	·012	·025	·037	·050	·062	·075	·087	·100	·112	·125
21	·013	·026	·039	·052	·066	·079	·092	·105	·118	·131
22	·014	·027	·041	·055	·069	·082	·096	·110	·124	·137
23	·014	·029	·043	·057	·072	·086	·101	·115	·129	·144
24	·015	·030	·045	·060	·075	·090	·105	·120	·135	·150
25	·016	·031	·047	·062	·078	·094	·109	·125	·141	·156
26	·016	·032	·049	·065	·081	·097	·114	·130	·146	·162
27	·017	·034	·051	·067	·084	·101	·118	·135	·152	·169
28	·017	·035	·052	·070	·087	·105	·122	·140	·157	·175
29	·018	·036	·054	·072	·091	·109	·127	·145	·163	·181
30	·019	·037	·056	·075	·094	·112	·131	·150	·169	·187
31	·019	·039	·058	·077	·097	·116	·136	·155	·174	·194
32	·020	·040	·060	·080	·100	·120	·140	·160	·180	·200
33	·021	·041	·062	·082	·103	·124	·144	·165	·186	·206
34	·021	·042	·064	·085	·106	·127	·149	·170	·191	·212
35	·022	·044	·066	·087	·109	·131	·153	·175	·197	·219

°Fah.	1	2	3	4	5	6	7	8	9	10
36	·022	·045	·067	·090	·112	·135	·157	·180	·202	·225
37	·023	·046	·069	·092	·116	·139	·162	·185	·208	·231
38	·024	·047	·071	·095	·119	·142	·166	·190	·214	·237
39	·024	·049	·073	·097	·122	·146	·171	·195	·219	·244
40	·025	·050	·075	·100	·125	·150	·175	·200	·225	·250
41	·026	·051	·077	·102	·128	·154	·179	·205	·231	·256
42	·026	·052	·079	·105	·131	·157	·184	·210	·236	·262
43	·027	·054	·081	·107	·134	·161	·188	·215	·242	·269
44	·027	·055	·082	·110	·137	·165	·192	·220	·247	·275
45	·028	·056	·084	·112	·141	·169	·197	·225	·253	·281
46	·029	·057	·086	·115	·144	·172	·201	·230	·259	·287
47	·029	·059	·088	·117	·147	·176	·206	·235	·264	·294
48	·030	·060	·090	·120	·150	·180	·210	·240	·270	·300
49	·031	·061	·092	·122	·153	·184	·214	·245	·276	·306
50	·031	·062	·094	·125	·156	·187	·219	·250	·281	·312
51	·032	·064	·096	·127	·159	·191	·223	·255	·287	·319
52	·032	·065	·097	·130	·162	·195	·227	·260	·292	·325
53	·033	·066	·099	·132	·166	·199	·232	·265	·298	·331
54	·034	·067	·101	·135	·169	·202	·236	·270	·304	·337
55	·034	·069	·103	·137	·172	·206	·241	·275	·309	·344
56	·035	·070	·105	·140	·175	·210	·245	·280	·315	·350
57	·036	·071	·107	·142	·178	·214	·249	·285	·321	·356
58	·036	·072	·109	·145	·181	·217	·254	·290	·326	·362
59	·037	·074	·111	·147	·184	·221	·258	·295	·332	·369
60	·037	·075	·112	·150	·187	·225	·262	·300	·337	·375
61	·038	·076	·114	·152	·191	·229	·267	·305	·343	·381
62	·039	·077	·116	·155	·194	·232	·271	·310	·349	·387
63	·039	·079	·118	·157	·197	·236	·276	·315	·354	·394
64	·040	·080	·120	·160	·200	·240	·280	·320	·360	·400
65	·041	·081	·122	·162	·203	·244	·284	·325	·366	·406
66	·041	·082	·124	·165	·206	·247	·289	·330	·371	·412
67	·042	·084	·126	·167	·209	·251	·293	·335	·377	·419
68	·042	·085	·127	·170	·212	·255	·297	·340	·382	·425
69	·043	·086	·129	·172	·216	·259	·302	·345	·388	·431
70	·044	·087	·131	·175	·219	·262	·306	·350	·394	·437

°Fah.	1	2	3	4	5	6	7	8	9	10
71	·044	·089	·133	·177	·222	·266	·311	·355	·399	·444
72	·045	·090	·135	·180	·225	·270	·315	·360	·405	·450
73	·046	·091	·137	·182	·228	·274	·319	·365	·411	·456
74	·046	·092	·139	·185	·231	·277	·324	·370	·416	·462
75	·047	·094	·141	·187	·234	·281	·328	·375	·422	·469
76	·047	·095	·142	·190	·237	·285	·332	·380	·427	·475
77	·048	·096	·144	·192	·241	·289	·337	·385	·433	·481
78	·049	·097	·146	·195	·244	·292	·341	·390	·439	·487
79	·049	·099	·148	·197	·247	·296	·346	·395	·444	·494
80	·050	·100	·150	·200	·250	·300	·350	·400	·450	·500
81	·051	·101	·152	·202	·253	·304	·354	·405	·456	·506
82	·051	·102	·154	·205	·256	·307	·359	·410	·461	·512
83	·052	·104	·156	·207	·259	·311	·363	·415	·467	·519
84	·052	·105	·157	·210	·262	·315	·367	·420	·472	·525
85	·053	·106	·159	·212	·266	·319	·372	·425	·478	·531
86	·054	·107	·161	·215	·269	·322	·376	·430	·484	·537
87	·054	·109	·163	·217	·272	·326	·381	·435	·489	·544
88	·055	·110	·165	·220	·275	·330	·385	·440	·495	·550
89	·056	·111	·167	·222	·278	·334	·389	·445	·501	·556
90	·056	·112	·169	·225	·281	·337	·394	·450	·506	·562
91	·057	·114	·171	·227	·284	·341	·398	·455	·512	·569
92	·057	·115	·172	·230	·287	·345	·402	·460	·517	·575
93	·058	·116	·174	·232	·291	·349	·407	·465	·523	·581
94	·059	·117	·176	·235	·294	·352	·411	·470	·529	·587
95	·059	·119	·178	·237	·297	·356	·416	·475	·534	·594
96	·060	·120	·180	·240	·300	·360	·420	·480	·540	·600
97	·061	·121	·182	·242	·303	·364	·424	·485	·546	·606
98	·061	·122	·184	·245	·306	·367	·429	·490	·551	·612
99	·062	·124	·186	·247	·309	·371	·433	·495	·557	·619
100	·062	·125	·187	·250	·312	·375	·437	·500	·562	·625

Co-efficient of expansion for steel = ·00000625.

TABLE showing the DIFFERENCES between STANDARD TIME and MEAN TIME of the UNDERMENTIONED PLACES in QUEENSLAND.

STANDARD TIME in QUEENSLAND is the mean time of the 150th meridian of East Longitude (*see* Section 3 of "*The Standard Time Act of* 1894.")

			Minutes.
Adavale	put clock	ON	21½
Allora	,,	BACK	8
Aramac	,,	ON	19
Augathella	,,	,,	13½
Avon Downs	,,	,,	11
Ayr	,,	,,	10½
Ayrshire Downs	,,	,,	29
Banana	,,	BACK	1
Barcaldine	,,	ON	19
Beaudesert	,,	BACK	12
Beenleigh	,,	,,	13
Blackall	,,	ON	18
Bloomsbury	,,	,,	6
Bollon	,,	,,	10
Boonberry	,,	,,	2
Boulia	,,	,,	40½
Bowen	,,	,,	7
Brisbane	,,	BACK	12
Bundaberg	,,	,,	10
Burketown	,,	ON	42
Burnett Heads	,,	BACK	10
Bustard Head	,,	,,	7
Caboolture	,,	,,	12
Cairns	,,	ON	17
Camboon	,,	BACK	2
Camooweal	,,	ON	47½
Cape Bowling Green	,,	,,	10
Cape Capricorn	,,	BACK	5
Cape Cleveland	,,	ON	12
Cape Moreton	,,	BACK	14
Cardwell	,,	ON	16
Charleville	,,	,,	15
Charters Towers	,,	,,	15
Childers	,,	BACK	9
Clare	,,	ON	11
Clarke River	,,	,,	18
Clermont	,,	,,	10
Cleveland	,,	BACK	13
Cloncurry	,,	ON	38
Coen	,,	,,	27
Collaroy	,,	,,	3
Cooktown	,,	,,	19
Cressbrook	,,	BACK	10
Crow's Nest	,,	,,	8½
Croydon	,,	ON	31
Cumberland	,,	,,	27
Cunnamulla	,,	,,	17
Dalby	,,	BACK	5
Dirranbandi	,,	ON	7
Donaldson	,,	,,	38½
Donor's Hill	,,	,,	37½
Double Island Point	,,	BACK	13
Dugandan	,,	,,	11
Dungeness	,,	ON	14½
Dunwich	,,	BACK	14
Durah	,,	,,	4
Eidsvold	,,	,,	4
Emerald	,,	ON	7½
Emu Park	,,	BACK	3½
Esk	,,	,,	10
Eulo	,,	ON	20
Fairview	,,	,,	22
Fassifern	,,	BACK	10½
Flat-Top Island	,,	ON	3
Floraville	put clock	ON	40½
Gatcombe Head	,,	BACK	5½
Gayndah	,,	,,	6
Georgetown	,,	ON	26
Geraldton	,,	,,	16
Gilbert River	,,	,,	29
Gin Gin	,,	BACK	8
Gladstone	,,	,,	5
Goondiwindi	,,	,,	1
Gympie	,,	,,	11
Hawkwood	,,	,,	3
Herberton	,,	ON	18
Hillgrove	,,	,,	17
Hughenden	,,	,,	23
Ingham	,,	,,	15
Inglewood	,,	BACK	4½
Inskip Point	,,	,,	12
Ipswich	,,	,,	11
Isis	,,	,,	9
Isisford	,,	ON	22½
Jimbour	,,	BACK	5
Junction Creek	,,	ON	22½
Jundah	,,	,,	28
Karumba	,,	,,	36⅔
Keppel Bay	,,	BACK	4
Kilkivan	,,	,,	9
Killarney	,,	,,	9½
Laidley	,,	,,	10
Lake Nash	,,	ON	48
Laura	,,	,,	22
Leyburn	,,	BACK	6½
Limestone (Groganville)	,,	ON	22½
Longreach	,,	,,	23
Lytton	,,	BACK	13
Mackay	,,	ON	3
Mackinlay	,,	,,	34½
Magazine Island	,,	,,	13
Magnetic Island	,,	,,	13
Marburg	,,	BACK	10½
Marecba	,,	ON	18
Marlborough	,,	,,	1
Maryborough	,,	BACK	11
Maytown	,,	ON	23
McDonnell	,,	,,	30
Mein	,,	,,	28
Miles	,,	BACK	½
Mirani	,,	ON	4½
Miriam Vale	,,	BACK	6
Mitchell	,,	ON	8
Montalbion	,,	,,	19
Moreton	,,	,,	29½
Morven	,,	,,	11½
Mount McConnell	,,	,,	12
Mount Morgan	,,	BACK	2
Mount Perry	,,	,,	7
Mungindi	,,	ON	4
Musgrave	,,	,,	26
Muttaburra	,,	,,	22
Nanango	,,	BACK	8
Nebo	,,	ON	5
Nerang	,,	BACK	13½
Normanton	,,	ON	36
One-Mile Creek (Gympie)	,,	BACK	10½
Palmerville	put clock	ON	23⅓
Paterson	,,	,,	30½
Pialba	,,	BACK	11
Pile Lighthouse (Moreton Bay)	,,	,,	13
Pittsworth	,,	,,	6½
Point Archer	,,	ON	18⅓
Port Alma	,,	BACK	3⅓
Port Douglas	,,	ON	18
Queenton	,,	,,	15
Raglan	,,	BACK	3⅓
Ravenswood	,,	ON	12
Redcliffe	,,	BACK	13
Richmond Downs	,,	ON	27½
Rockhampton	,,	BACK	2
Rolleston	,,	ON	6
Roma	,,	,,	5
Rosedale	,,	BACK	7½
Sandgate	,,	,,	12
Sandy Cape	,,	,,	13
Sea Hill	,,	,,	4
South Passage	,,	,,	14
Southport	,,	,,	14
Springsure	,,	ON	8
Stanthorpe	,,	BACK	8
St. George	,,	ON	6
St. Helena	,,	BACK	13
St. Lawrence	,,	ON	2
Surat	,,	,,	4
Tallebuggera	,,	BACK	14
Tambo	,,	ON	15
Tangaluma	,,	BACK	14
Tangorin	,,	ON	23
Taroom	,,	,,	1
Tate River	,,	,,	23
Tewantin	,,	BACK	12
Thargomindah	,,	ON	26
Thornborough	,,	,,	19½
Thursday Island	,,	,,	31
Tiaro	,,	BACK	10½
Toowoomba	,,	,,	8
Townsville	,,	ON	13
Urandangi	,,	,,	47
Wallangarra	,,	BACK	8
Walsh River	,,	ON	24
Wangaratta	,,	,,	10
Warwick	,,	BACK	8
Watsonville	,,	ON	19
Welford Lagoon	,,	,,	25½
West Leichhardt	,,	,,	41
Westwood	,,	BACK	½
White Cliffs	,,	,,	12
Windorah	,,	ON	29½
Winton	,,	,,	28
Woodford	,,	BACK	11
Woody Island Station	,,	,,	12
Woowoonga	,,	,,	8
Wyandotte	,,	ON	20⅓
Yaamba	,,	BACK	1½
Yandilla	,,	,,	5½
Yelvertoft	,,	ON	45
Yeppoon	,,	BACK	3

TABLE showing the POSITIONS of PLACES in QUEENSLAND determined ASTRONOMICALLY.

Place.*	Latitude S.	Longitude E.†	Longitude in Time.	Difference with Brisbane.	Instrument used— for Latitude.	Instrument used— for Longitude.	When Determined.
	° ′ ″	° ′ ″	h. m. sec.	h. m. sec.			
Adavale	25 54 39·48	144 36 01·05	9 38 24·07	— 0 33 42·33	8″ Altazimuth ...	8″ Altazimuth	September, 1892
‡Alpha	23 39 01·05	...	...	...	8″ ditto ...	...	October, 1894
Angathella	25 47 48·22	146 35 03·22	9 46 20·21	— 0 25 46·18	8″ ditto ...	8″ Altazimuth	June, 1895
Blackall	24 25 35·39	145 28 03·27	9 41 52·22	— 0 30 14·18	20″ Transit ...	20″ Transit ...	December, 1887, and January, 1888
Bloodwood	27 22 48·37	151 34 35·60	10 06 18·37	— 0 05 48·03	Zenith Telescope	12″ Altazimuth	February to April, 1886
						20″ Transit ...	July, 1888
Brisbane (Transit Pier)	27 27 59·91	153 01 36·00	10 12 06·40	...	ditto ...	30″ ditto ...	July, 1884, August, 1891, and February, 1892
Boulia	22 54 45·43	139 54 30·90	9 19 38·06	— 0 52 28·34	20″ Transit ...	20″ ditto ...	April, 1887
Bowen Flagstaff ...	20 01 00·99	148 14 53·61	9 52 59·57	— 0 19 06·83	12″ Altazimuth ...	12″ Altazimuth	November, 1892
Burketown	17 44 38·70	139 32 54·90	9 18 11·66	— 0 53 54·74	12″ ditto ...	12″ ditto	August, 1891
Bustard Head	24 01 24·20	151 45 56·46	10 01 03·76	— 0 05 02·64	12″ ditto ...	12″ ditto	July, 1892
Cairns	16 55 27·50	145 46 53·40	9 43 07·56	— 0 28 58·84	12″ ditto ...	12″ ditto	November, 1891
‡Camoola	22 59 20·00	...	...	...	8″ ditto ...	...	November, 1896
Cape Moreton	27 01 57·21	153 28 05·62	10 13 52·38	+ 0 01 45·98	12″ ditto ...	12″ Altazimuth	May, 1892
Charleville	26 24 10·75	146 14 16·80	9 44 57·12	— 0 27 09·28	8″ ditto ...	8″ ditto	July, 1893
Charters Towers ...	20 04 10·00	146 15 08·55	9 45 00·57	— 0 27 05·83	12″ ditto ...	12″ ditto	July, 1891
‡Clermont	22 49 11·23	...	...	...	8″ ditto ...	...	October, 1894
Cloncurry	20 42 53·00	140 30 20·25	9 22 01·35	— 0 50 05·15	5″ Theodolite ...	Sextant ...	September, 1891
Cooktown	15 27 35·00	145 15 11·79	9 41 00·79	— 0 31 05·61	Sextant	ditto	
Croydon	18 12 13·69	142 14 58·35	9 28 59·89	— 0 43 06·51	12″ Altazimuth ...	12″ Altazimuth	September, 1891
Cunnamulla	28 04 14·32	145 40 53·77	9 42 43·58	— 0 29 22·81	8″ ditto ...	8″ ditto	July, 1894
‡Duaringa	23 42 03·88	...	...	...	8″ ditto ...	...	September, 1894
Emerald	23 31 34·70	148 09 47·40	9 52 39·19	— 0 19 27·24	12″ ditto ...	12″ Altazimuth	August, 1892
‡Gayndah	25 37 36·40	...	...	...	5″ Theodolite ...	...	January, 1893
Georgetown	18 17 18·00	143 32 34·50	9 34 10·30	— 0 37 56·10	5″ ditto ...	Sextant ...	October, 1891
Goondiwindi	28 32 55·08	150 18 19·72	10 01 13·31	— 0 10 53·09	8″ Altazimuth ...	8″ Altazimuth	May, 1893
Herberton	17 23 14·00	145 23 20·55	9 41 33·37	— 0 30 33·03	5″ Theodolite ...	Sextant ...	November, 1891
Hughenden	20 50 41·43	144 11 59·10	9 36 47·94	— 0 35 18·46	12″ Altazimuth ...	12″ Altazimuth	December, 1891
‡Inglewood	28 25 06·35	...	...	...	8″ ditto ...	...	June, 1893
Jimbour	26 57 46·00	151 14 11·89	10 04 56·79	— 0 07 09·61	...	...	November, 1882
Jundah	24 49 57·56	143 03 46·05	9 32 15·07	— 0 39 51·33	8″ Altazimuth ...	8″ Altazimuth	August, 1892
Longreach	23 26 39·52	144 15 00·30	9 37 00·02	— 0 35 06·38	12″ ditto ...	12″ ditto	August, 1892
Maryborough	25 32 12·46	152 42 16·12	10 10 49·08	— 0 1 17·32	12″ ditto ...	12″ ditto	June, 1892
‡Miles	26 39 36·53	...	...	...	8″ ditto ...	...	July, 1894
Mount McConnell ...	20 48 08·80	146 59 04·80	9 47 56·32	— 0 24 10·08	8″ ditto ...	8″ Altazimuth	October, 1896
Normanton	17 40 14·33	141 04 43·80	9 24 18·92	— 0 47 47·48	12″ ditto ...	12″ ditto	August, 1891
Ravenswood	20 05 40·93	146 52 51·75	9 47 31·45	— 0 24 34·95	8″ ditto ...	8″ ditto	October, 1896
‡ Ditto "A" ...	20 06 48·45	...	...	...	8″ ditto ...	...	October, 1896
Richmond	20 44 26·10	143 09 40·50	9 32 38·70	— 0 39 27·70	5″ Theodolite ...	Sextant ...	December, 1891
Roma	26 34 31·32	148 47 11·50	9 55 08·77	— 0 16 57·03	Zenith Telescope...	20″ Transit ...	April and May, 1888
Rockhampton	23 22 43·06	150 30 56·40	10 02 03·76	— 0 10 02·64	12″ Altazimuth ...	12″ Altazimuth	July, 1892
Sandy Cape	24 43 50·27	153 12 37·65	10 12 50·51	+ 0 0 44·11	12″ ditto ...	12″ ditto	June, 1892
St. George	28 01 47·60	148 35 29·40	9 54 21·96	— 0 17 44·44	5″ Theodolite ...	5″ Theodolite	September, 1892
Surat	27 09 10·00	149 04 19·95	9 56 17·33	— 0 15 49·07	5″ ditto ...	5″ ditto	August, 1892
Tambo	24 53 05·19	146 15 23·10	9 45 01·54	— 0 27 04·86	8″ Altazimuth ...	8″ Altazimuth	August, 1892
Tangorin	21 45 43·55	144 13 30·70	9 36 54·05	— 0 35 12·35	8″ ditto ...	8″ ditto	November, 1896
Taroom	25 38 28·13	149 47 44·25	9 59 10·95	— 0 12 55·45	8″ ditto ...	8″ ditto	October, 1893
‡Thargomindah ...	27 59 47·67	...	...	...	5″ Theodolite ...	...	October, 1894
Thursday Island ...	10 35 07·48	142 13 14·40	9 28 52·96	— 0 43 13·44	12″ Altazimuth ...	12″ Altazimuth	October, 1892
Townsville	19 15 21·43	146 48 48·60	9 47 15·24	— 0 24 51·16	12″ ditto ...	12″ ditto	June, 1891
Twin Hills	21 57 40·10	146 56 36·00	9 47 46·40	— 0 24 20·00	8″ ditto ...	8″ ditto	September, 1896
Windorah	25 25 25·69	142 39 27·15	9 30 37·81	— 0 41 28·59	8″ ditto ...	8″ ditto	August, 1892

* The "Place" is a specific point in or near the localities mentioned.

† By chronographic exchange of time signals, the adopted longitude of Sydney being 10 hrs. 4 min. 49·54 sec. in time, 151° 12′ 23·10″ in arc. The instrument used for finding the clock errors at Brisbane was a 30″ transit.

‡ Latitudes only determined.

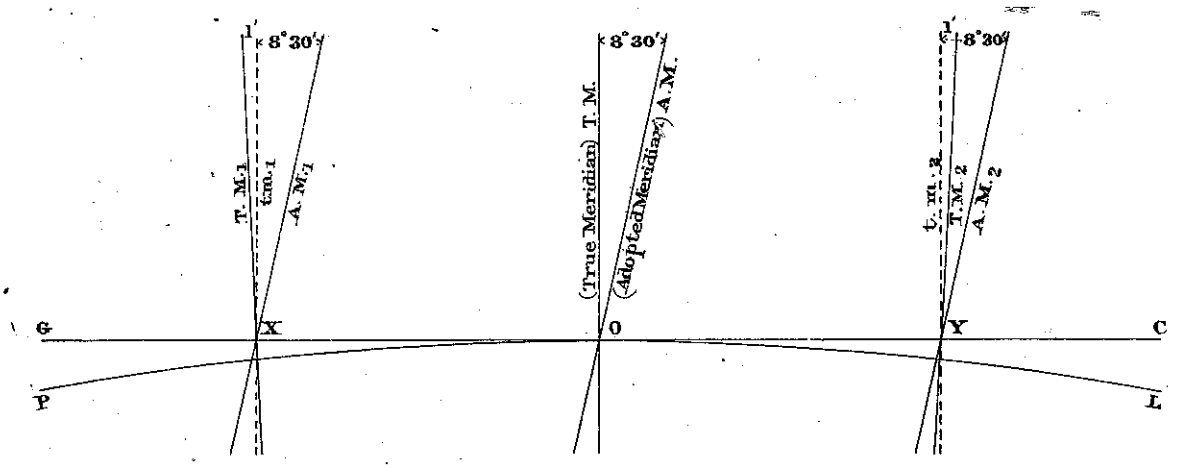
TABLE showing the GEODETIC POSITIONS of TRIGONOMETRICAL STATIONS, taking position of Jimbour* as datum.

Station.	Latitude S.	Longitude E.	Altitude in Feet.	Station.	Latitude S.	Longitude E.	Altitude in Feet.
	° ′ ″	° ′ ″			° ′ ″	° ′ ″	
Bald Hill No. 1	27 16 56·39	151 59 07·20	2,469·17	Magnus Mountain ...	28 30 20·20	151 49 50·07	3,206·00
Bald Hill No. 2	27 16 43·77	151 59 54·24		Main Camp Hill ...	26 59 40·24	151 17 06·61	
Bloodwood	27 22 48·35	151 34 42·17	1,464·32	Mallard	27 43 47·23	151 36 30·23	1,943·39
Bodumba	28 12 37·27	151 22 33·33		Ma Ma	27 38 39·08	152 09 14·12	1,689·79
Brisbane Signal Tower ...	27 28 02·65	153 01 30·94	199·00	Maria Mountain ...	27 28 11·09	151 29 19·90	1,403·83
Bullaganang	28 35 05·98	151 24 56·92		Mitchell Mountain ...	28 03 39·88	152 23 31·94	3,751·00
Burrabaranga	28 21 19·46	151 41 24·29	2,605·00	Mocatta	26 59 11·78	151 41 21·79	2,695·26
Coot-tha Mountain, One-tree Hill	27 29 12·30	152 57 40·35	703·00	Mowbullan Mountain ...	26 53 25·46	151 36 10·62	3,604·66
				Norman Mountain ...	28 51 54·00	151 57 42·01	4,066·00
Cooyar	26 56 48·36	151 45 57·50	2,449·00	Picnic Point	27 34 49·14	151 59 23·49	2,319·62
Dalby Town Clock ...	27 11 04·25	151 15 58·10		Perseverance	27 24 54·98	152 09 50·31	2,643·82
D'Aguilar	27 18 09·55	152 46 22·90	2,438·88	Petrie Mountain	27 31 32·90	153 08 12·11	550·47
Dangore Mountain ...	26 27 31·48	151 36 28·30	1,945·49	Rolleston	27 47 37·95	151 42 41·61	1,975·58
Domville Mountain ...	28 00 49·84	151 14 38·02	2,099·53	Rubieslaw	27 44 51·19	151 47 40·95	2,202 05
Eildon Hill	27 25 56·35	153 01 36·82		Russell Mountain ...	27 33 44·22	151 31 12·07	1,640·45
Fair Hill	27 03 29·80	151 43 48·57	2,446·39	Samson Mountain ...	27 18 15·07	152 48 12·11	2,251·00
Flinders Peak	27 48 51·45	152 48 44·67	2,240·73	Silverwood	28 21 49·98	151 58 58 28	2,744·00
Gammie Mountain ...	28 07 03·38	151 42 30·81	2,206·01	Squaretop	27 01 02·79	151 25 10·06	1,811·41
Gowrie Mountain	27 31 08·91	151 49 55·19	2,211·21	St. Helena	27 23 42·32	153 14 19·72	61·20
Grandchester Mountain ...	27 38 03·64	152 29 16·91	1,157·62	Tabletop	27 59 02·92	151 59 29·47	2,023·50
Hallen Mountain	27 20 00·19	152 24 53·39	1,265·24	Tambourine Mountain ...	27 55 13 28	153 09 43·92	1,809·15
Haly Mountain	26 46 06·43	151 31 21·19	3,130·40	Texas	28 51 25·91	151 12 46·50	1,642·00
Haly's Round Mountain...	26 46 35·20	151 41 38·63	2,120·32	Walker Mountain ...	...	...	1,550·46
Haystack Mountain ...	29 13 04·12	151 24 06·03	2,710·00	Warwick	28 13 00·61	152 02 06·62	
Irving Mountain	27 30 43·68	151 35 33·73	1,514·63	Wyagampinny	27 37 31·69	151 36 18·60	2,216·63
Jibbinbar Mountain ...	28 47 54·02	151 38 01·23	3,225·00	Zahel Mountain	27 48 41·92	152 19 45·51	2,885·45

* This was deduced astronomically from the telegraphic longitude of Sydney (10 h. 4 m. 49·54 sec.) by Capt. Morris, of the Transit of Venus Expedition, in 1882.

The application of Convergence.

The following diagram and explanation show how the necessary allowances for Convergence are to be made, and illustrate the use of the table given on the Solar Observation form. (*see* Appendix No. ix.)



Let GC be part of a great circle run out on an East and West bearing from O.

PL part of a parallel of latitude passing through O.

TM part of the true meridian passing through O.

TM_1 TM_2 parts of true meridians passing through X and Y respectively West and East of O.

tm_1 tm_2 lines passing through X and Y respectively, and making the same angle with GC as that made by TM.

AM the adopted meridian passing through O.

AM_1 AM_2 lines passing through X and Y respectively, and making the same angle with GC as that made by AM.

The lines GC, AM_1, AM_2, are the survey lines on the meridian of AM, having a variation of 8° 30′ from the true meridian as observed at O. The convergence of meridians at X and Y is taken at 1′ each way.

It is obvious from the diagram that the variation of AM_1 is 1′ more than that of AM, which again is 1′ more than that of AM_2. For the variation of AM is the angular difference between AM and TM—viz. 8° 30′, and this is equal to the angular difference between AM_1 and tm_1. But the variation of AM_1 is the angular difference between AM_1 and TM_1, which is 1′ greater than that between AM_1 and tm_1. So also the variation of AM_2 is 1′ less than that of AM.

For exactly similar reasons the angle (TM_1 XO) at which the surveyed line GC cuts the meridian TM_1 at X is 1′ greater than (TM OY) that at which TM cuts GC at O, and this again is 1′ greater than the angle (TM_2 YC) made by TM_2 and GC at Y.

Hence the rules that "*Corrections for Convergence must be deducted for a station East and added for a station West of the initial station,*" and that "*The true bearing of a line run out with a theodolite constantly decreases as the line is run easterly and increases as it is run westerly.*"

Thus in the example worked out in Appendix ix, as station 42 lies West of the initial station, the 40″ of Convergence must be added to the variation at the initial station and the computed variation found. The difference of this with the actual variation found by observation gives the instrumental error of 1′ 12″.

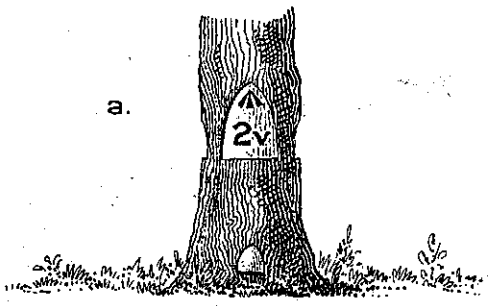
But the process of addition and substraction for Convergence must be reversed if the true bearing of a line to the East or West of a place be known and it is desired to reduce it to the meridian of that place. Thus if the true bearing of the line YC is known to be 89° 59′ and that the Convergence between Y and O is 1′, it is clear, from the diagram, that to reduce YC to the meridian of AM, the angle between TM_2 and tm_2 must be added, making the bearing, on the meridian of AM, 90°.

There are, therefore, two problems:—

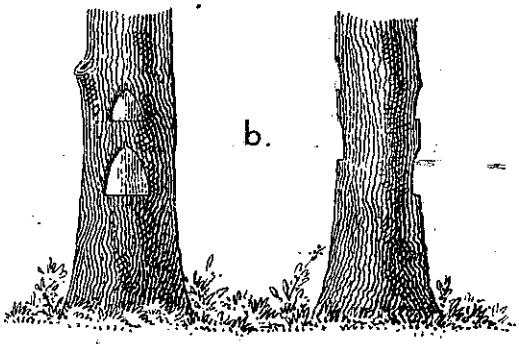
1. When the variation at an initial station is given and that at a second is required on the same meridian—Convergence must be added to the initial variation for stations West and deducted for stations East of the initial station.

2. When it is required to reduce the true bearing at a given station to the meridian of an initial station—Convergence must be added for stations East and deducted for stations West of the initial Station.

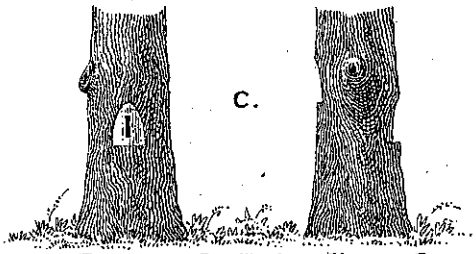
Appendix No. xx.



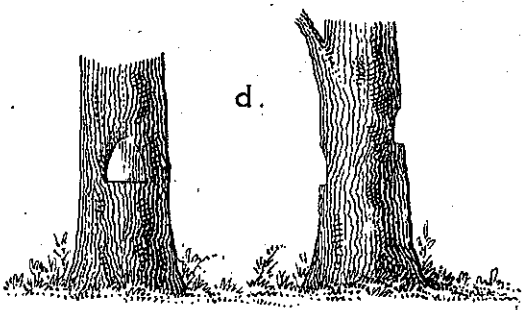
Corner tree – Country portion



Trees on boundary lines
Country portions

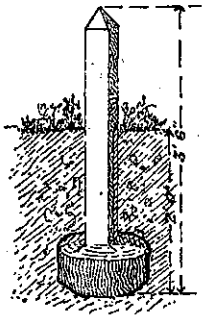


Trees on building lines of town allotments

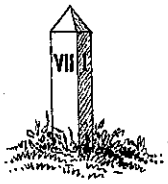


Trees near boundary lines

Appendix No. xxi.



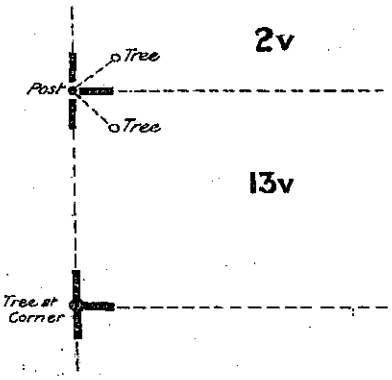
Corner post Country portion showing butt.



Corner post Town section showing section and allotment numbers.

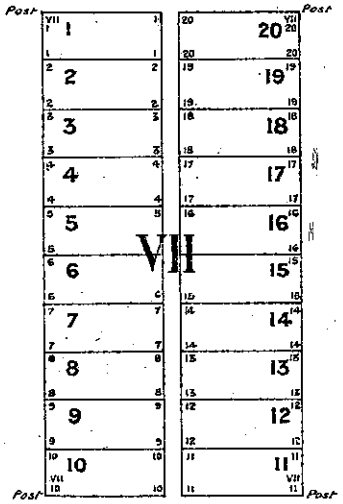
Appendix No. xxii.

Town section with lockspits



Corners of country portions showing posts, trees and lockspits.

Appendix No. xxiii.



Town section, showing method of numbering allotments.

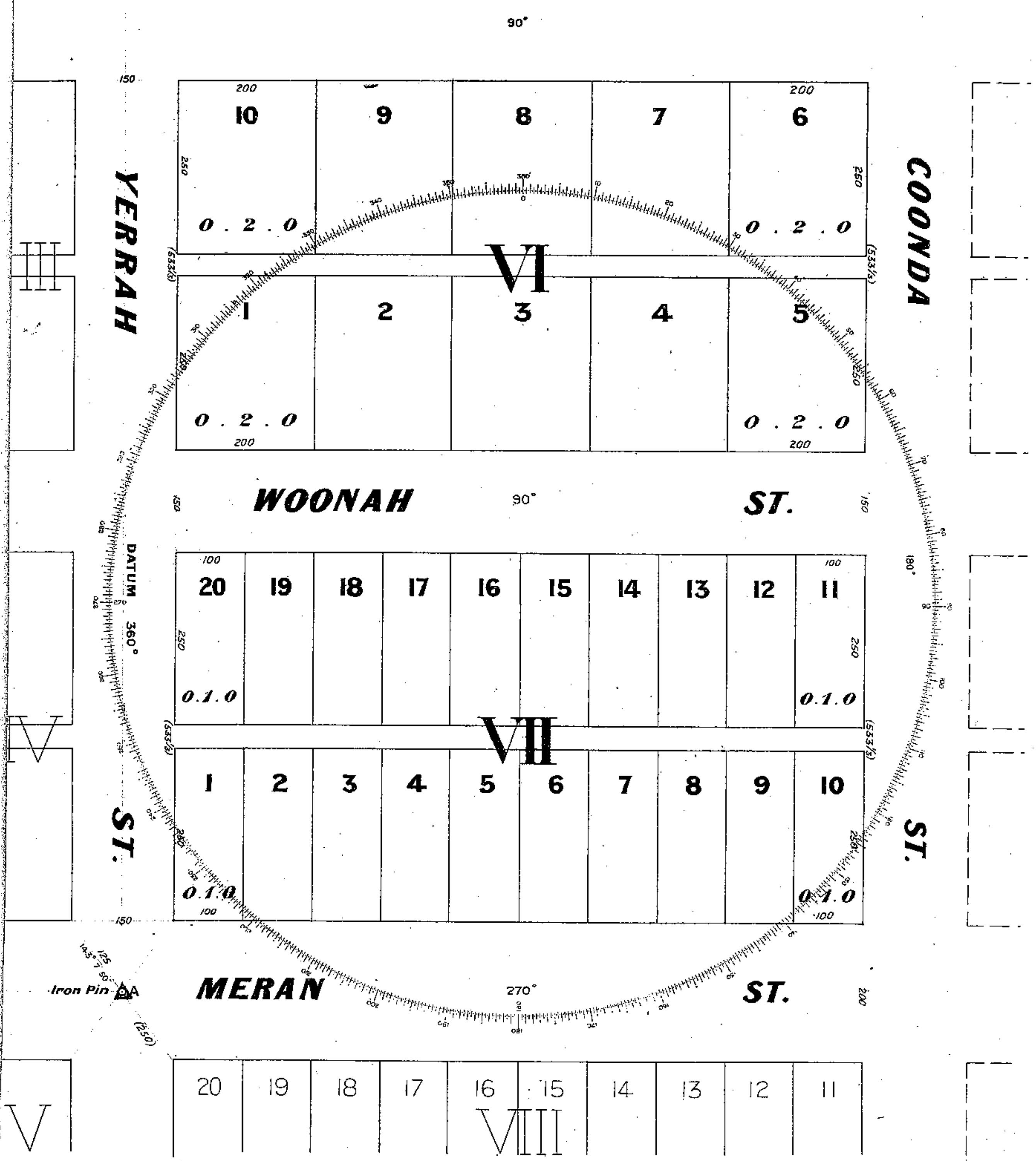
Reference to Traverse and Road Secants.

Line.	Bearing.	Dist.

Particulars

Por. Nº	Date of ...	Form. Nº	Selector	Survey Fee.	...	Remarks.

Date of Instructions 22. 6. 98
Date of transmission of plans &c. 2. 8. 98
Examined and Charted
Voucher Nº *Passed for payment.*
Sales Register Vol. *Fol.*
Scale 2 Chains to an Inch.



NOTE:— These Sections, though a little lower, lie in a continuation of the ridge first chosen as the Town Site — the fall is towards the North East. The land is lightly timbered with Gum and Bloodwood and as the soil is stony and porous the allotments form excellent building sites

I hereby certify that I, in person, made, and on the 21st July 1898 completed the survey represented by this plan, on which are written the bearings and lengths of the lines surveyed by me, and that the survey has been executed in accordance with the existing regulations of the Surveyor-General's Department.

Thos. Brown
Licd. Surveyor

Meridian Observations
(This form can also be adapted to stellar observations.)

Register Nº	Station Nº	Date.	Lat.	Long.	Bearing of R.O.	Apparent ... of Sun	Readings on R.O.	Time.	H.C. on Sun.	Observed Altitude.	Observed Z. Distance	Variation.
	A	20 JULY 1898	23°56'20" (Obs.d)	Standard Time	360°0'0"	β Argus W. Elongation	360°0'10"	h m s 6 40 46	196° 45' 00"	25° 44' 21" (Cal.d)		6° 0' 0"
						α Pavonis E. Elongation	360°0'20"	h m s 7 31 49	157° 29' 25"		61° 3' 27" (Cal.d)	6° 0' 0"

TOWN OF COORA
PLAN OF
~~Portion Nº~~ **Sections VI and VII**
PARISH OF RIVERSTON
County of Clinton
Land Agents District of **Gladstone**
Cat. Nº

Particulars

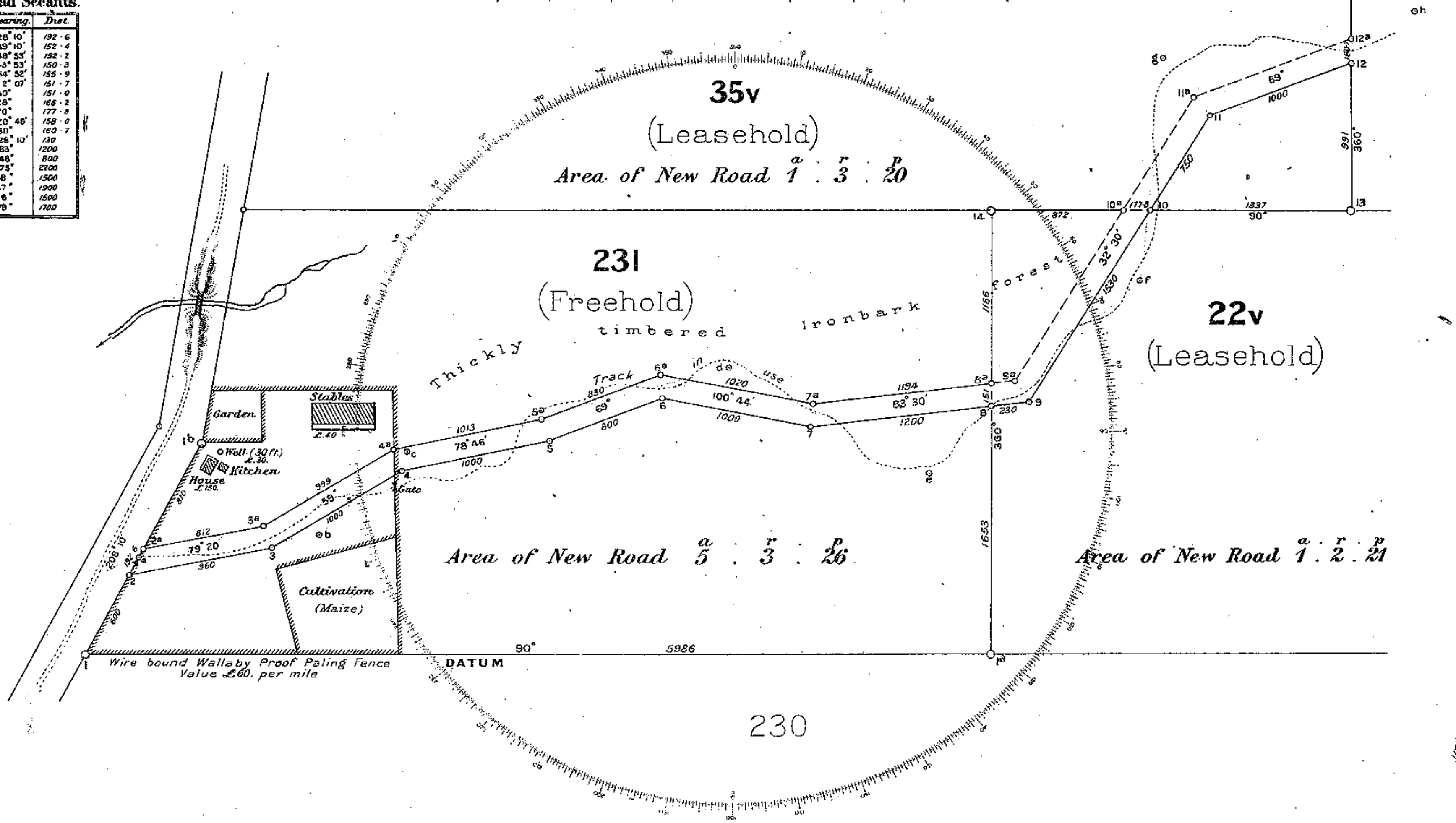
Por. Nº	Date of Proclⁿ opening to sel.	Farm Nº	Selector	Survey Fee	Dand D. passed on	Remarks

Reference to Traverse and Road Secants.

Line.	Bearing.	Dist.
2 to 2a	28° 10'	192·6
3 . 3a	339° 10'	152·4
4 . 4a	338° 53'	152·2
5 . 5a	343° 53'	150·3
6 . 6a	354° 52'	155·9
7 . 7a	2° 07'	151·7
8 . 8a	360°	151·0
9 . 9a	328°	166·2
10 . 10a	270°	177·8
11 . 11a	320° 46'	158·0
12 . 12a	360°	160·7
2 . a	28° 10'	130
a . b	83°	1200
b . c	48°	800
c . d	75°	2200
d . e	118°	1500
e . f	47°	1900
f . g	6°	1500
g . h	79°	1700

Reference to Corners.

Cor.	Bearing.	From	Links	Marks.
1	255° 30'	Ironbark	29	↑ 230, 231 R
1a	179° 30'	"	75	" " 22v
1b	296°	Gum	23·6	" 231 R
2	Post	no tree near		" R 231
2a	"	"		" " "
3	"	"		" "
3a	"	"		" "
4	"	"		" "
4a	"	"		" "
5	290° 15'	Ironbark	78	" "
5a	211°	Gum	12·5	" "
6	29° 30'	Bloodwood	85·7	" "
6a	170°	"	8·5	" "
7	30°	"	11	"
7a	190° 45'	"	69·7	" "
8	56° 15'	"	84	" " 231, 22v
8a	142° 30'	Gum	46	" " " "
9	60° 20'	"	47	" " "
9a	174°	Bloodwood	9·5	" "
10	331°	Ironbark	35	" " 22v
10a	111° 30'	"	27	" " "
11	289° 40'	"	32·5	" "
11a	120°	"	13	" "
12	52° 10'	"	116	" " 35v
12a	139° 45'	"	77	" " "
13	162° 45'	"	38·6	" 35v
14	38° 20'	"	29	" 231, 22v



I hereby certify that I, in person, made, and on the 21st Jan.y 1898 completed the survey represented by this plan, on which are written the bearings and lengths of the lines surveyed by me, and that the survey has been executed in accordance with the existing regulations of the Surveyor-General's Department.

Jno. Brown
Lic. Surveyor

Meridian Observations

(This form can also be adapted to stellar observations.)

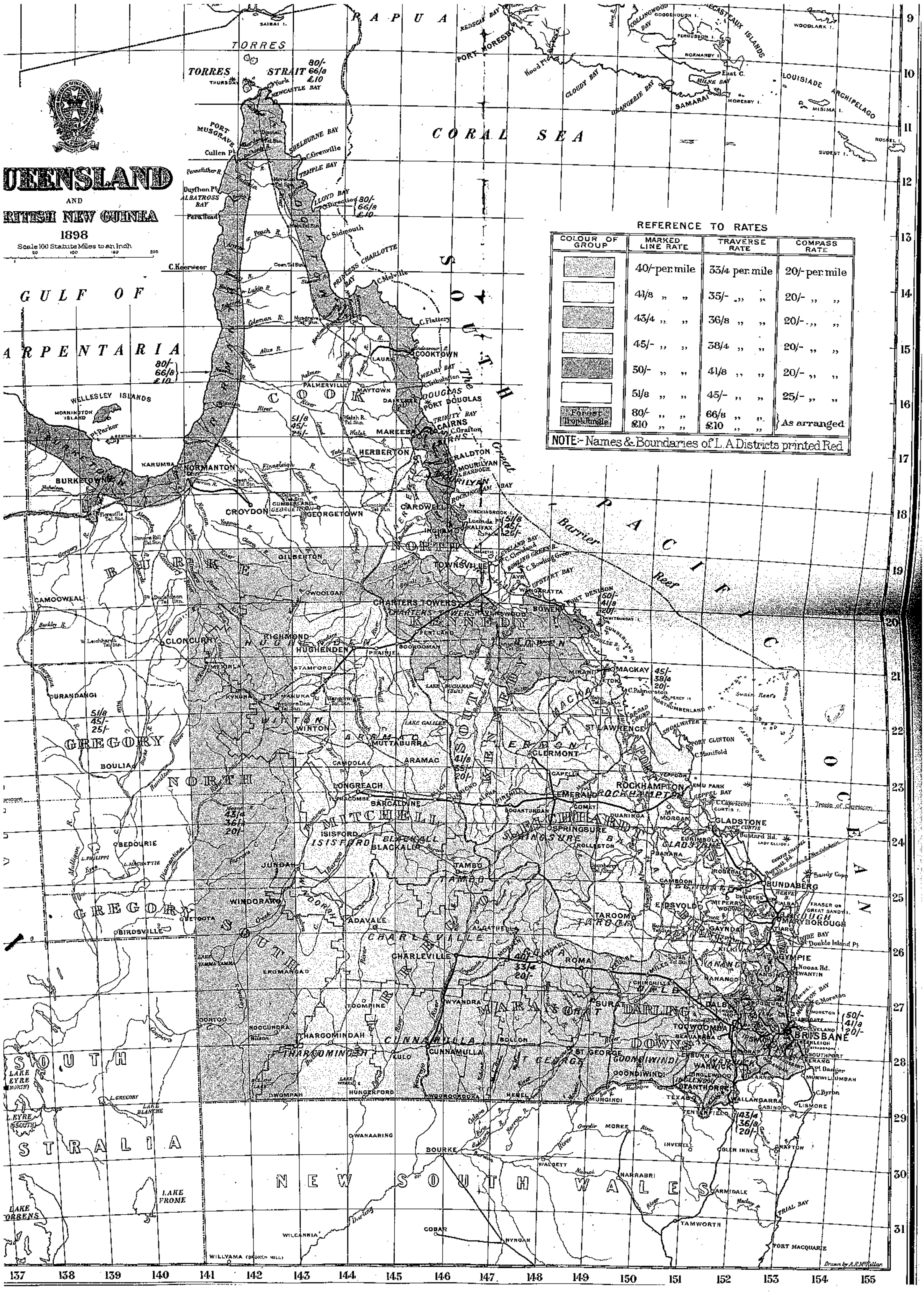
Register Nº	Sub-Reg. Nº	Date	Lat.	Long.	Apparent posⁿ of Sun	Bearing of R.O.	Time	H. Cor. Sun	Altitude	Zenith Distance	Variation
Weather unfavorable for meridian observations											
Variation by previous stellar observation at Station 1a 7° 21' 15"											

Date of Instructions 23rd December 1897
Date of transmission of plans &c. 29th January 1898
Examined and Charted.
Voucher Nº   Passed for payment
Sales Register Vol.   Fol.

Scale 10 Chains to an Inch.

PLAN OF ROAD THROUGH

PORTIONS Nº 231, 22v & 35v
PARISH OF KOLAN
County of Cook.
Land Agent's District of Bundaberg
Cat. Nº



QUEENSLAND
AND
BRITISH NEW GUINEA
1898
Scale 100 Statute Miles to an Inch
REFERENCE TO RATES
COLOUR OF GROUP | MARKED LINE RATE | TRAVERSE RATE | COMPASS RATE
40/- per mile | 33/4 per mile | 20/- per mile
41/8 „ „ | 35/- „ „ | 20/- „ „
43/4 „ „ | 36/8 „ „ | 20/- „ „
45/- „ „ | 38/4 „ „ | 20/- „ „
50/- „ „ | 41/8 „ „ | 20/- „ „
51/8 „ „ | 45/- „ „ | 25/- „ „
Forest Scrub Jungle | 80/- „ „ £10 „ „ | 66/8 „ „ £10 „ „ | As arranged
NOTE:- Names & Boundaries of L. A. Districts printed Red.
PAPUA
TORRES STRAIT
CORAL SEA
GULF OF CARPENTARIA
SOUTH PACIFIC OCEAN
Great Barrier Reef
COOK
BURKE
GREGORY NORTH
GREGORY SOUTH
KENNEDY NORTH
KENNEDY SOUTH
MITCHELL
WARREGO
MARANOA
DARLING DOWNS
LEICHHARDT
PORT CURTIS
WIDE BAY
MORETON
BURNETT
SOUTH AUSTRALIA
NEW SOUTH WALES
BRISBANE
ROCKHAMPTON
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CHARTERS TOWERS
MACKAY
BOWEN
CAIRNS
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NORMANTON
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LONGREACH
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CHARLEVILLE
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GLADSTONE
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