

QUEENSLAND.

THE SURVEYORS' BOARD.

DIRECTIONS

For the Guidance of Surveyors effecting
Surveys under the Real Property Acts of
1861 and 1877.

Published by the Authority of His
Excellency the Governor in Council.

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Department of Public Lands,

Brisbane, 26th May, 1910.

HIS Excellency the Governor, with the advice of the Executive Council, has been pleased to approve of the following By-law under the provisions of "*The Land Surveyors Act of 1908.*"

E.M. 26-5-10. 10-9240 P.D.

D. DENHAM.

Directions for the Guidance of Surveyors effecting Surveys
under the Real Property Acts of 1861 and 1877.

BY-LAW No. 2.

WHEREAS by the provisions of section 24 of "*The Land Surveyors Act of 1908*" the Surveyors Board is authorised to make By-laws for all or any of the purposes in the said Act mentioned: It is hereby resolved by the said Board that the following additional By-law shall be in force from the date of the publication hereof in the *Gazette*:—

BY-LAW No. 2.

Interpretation.

In the interpretation of this By-law, unless the context otherwise indicates, the following terms shall have the meanings set against them respectively, that is to say:—

"Board"—The Surveyors Board constituted under "*The Land Surveyors Act of 1908.*"

"The Real Property Act"—The Real Property Acts of 1861 and 1877.

"The Registrar of Titles"—The Registrar of Titles appointed by the Governor in Council under the provisions of "*The Registrar of Titles Act of 1884.*"

The following terms, viz.:—"Land," "Transfer," "Grant," "Instrument," "Proprietor," "Certificate of Title" shall have the meanings set against them respectively in the third section of "*The Real Property Act of 1861.*"

DIRECTIONS FOR THE GUIDANCE OF SURVEYORS
EFFECTING SURVEYS UNDER THE REAL PRO-
PERTY ACTS OF 1861 AND 1877.

GENERAL.

*Surveys by authorised surveyors in accordance with these
Directions.*

1. Every survey, resurvey, or subdivision made for the purposes of any application or dealings under the Real Property Act shall be made by a surveyor authorised by registration under "The Land Surveyors Act of 1908," and such survey, resurvey, or subdivision, and every plan submitted purporting to represent the same respectively, must be made in strict accordance with these Directions.

"The Undue Subdivision of Land Prevention Act of 1885."

2. No survey or plan of subdivision of any land may be made, for the purposes of the Real Property Act, contrary to the provisions of "The Undue Subdivision of Land Prevention Act of 1885."

Surveyor should obtain all available information.

3. Before making a survey of any land, the surveyor should obtain all available information respecting it in the offices of the Surveyor-General and the Registrar of Titles.

"The Local Authorities Act of 1902."

4. In case of a subdivision, involving the opening of any new road, the attention of surveyors is directed to the provisions of section 76 of "The Local Authorities Act of 1902."

Surveyor to disclose all doubts and discrepancies.

5. The surveyor will be expected to disclose all doubts, discrepancies, and difficulties, and to afford all information obtainable by him relative to the property under survey that may aid in securing accuracy and completeness in the title to the land.

In these matters he must consider himself as an agent and adviser of the Government, and regard for the interests of his employer will not be considered as excusing in any degree the withholding of any information affecting the survey, even though the plan and description supplied may be technically correct.

*Existing titles to be satisfied; if necessary survey to be
extended to adjoining lands.*

6. Whenever the survey of an area discloses more land than is comprised in the deed thereof, the survey shall not be considered to be complete unless it shows, so far as may be practicable, that there is or is not sufficient land left to satisfy the reserved widths of adjoining streets, lanes, and roads, and the titles of adjoining owners under the most liberal interpretation of their rights.

*Resurveys necessitating the Surveyor-General's endorsement
or the correction of deed.*

7. In the event of a resurvey of any land held in fee from the Crown differing from the original survey to any serious extent, the resurvey must receive the Surveyor-General's endorsement, or the deed must be corrected before it will be accepted by the Registrar of Titles.

*Surveyor to comply with requisition for amendment
of survey.*

8. On receipt of a requisition from the Surveyor-General or the Registrar of Titles to amend a survey or to supply more information concerning it than is contained in the field-notes or shown on the plan, the surveyor concerned must immediately, and so far as may be practicable, comply with the requisition.

*Disputes in relation to conduct of a survey may be referred to
the Board.*

9. In the event of a dispute arising between the Registrar of Titles and a surveyor as to whether any survey made under these Directions has been properly effected, the matter may be referred to the Board, which shall inquire into it and advise the Registrar of Titles and the surveyor of its finding.

Greatest accuracy in survey work essential; inaccurate work to be reported to the Board.

10. The necessity for the greatest accuracy cannot be too strongly impressed upon surveyors. In many instances no means may exist whereby errors can be immediately detected; this renders it all the more necessary to deal stringently with surveyors whose work is found to be inaccurate.

If, therefore, it is found that the work of any surveyor is inaccurate and defective, it shall be the duty of the Surveyor-General, the Registrar of Titles, or other Authority to report the matter to the Board, which shall inquire into it and deal with the surveyor in accordance with the provisions of Section 18 of "*The Land Surveyors Act of 1908.*"

Board may tax cost of survey.

11. The Board shall have power to tax the cost of any survey effected under these Directions.

FIELD WORK.

Angular work to be effected with theodolite; linear measurements to be made with steel band.

12. All surveys effected under these Directions must be made with a theodolite in accurate adjustment and a steel band maintained in adjustment to the standard of the Survey Office. Every boundary or traverse line must be laid out instrumentally and measured.

All bearings to be determined by angular measurements.

13. All bearings shall be determined by angular measurement and be recorded in degrees, minutes, and seconds of arc reading from zero round through east to 360 degrees.

All measurements to be in links.

14. All measurements shall be in links and in decimal parts of a link.

Datum of bearings of resurveys.

15. Usually in a resurvey, the original bearing of the longest side—of which the terminal points have been verified—should be adopted as the datum of the bearings of the resurvey.

Traverse and offset lines.

16. Traverse lines following watercourse boundaries should be located within an offset limit of three chains on country lands and one chain on town and suburban lands. Offsets should be taken at intervals of about two chains, or at shorter intervals if necessary to correctly define the irregularities of the boundary.

The boundaries originally marked on the ground are the true boundaries—Diligent search should be made for marks of original survey.

17. In the resurvey of lands held under grant, the surveyor must adhere to the principle that the boundaries originally marked on the ground by the Government surveyor are the true boundaries, although the bearings and lengths of such boundaries may not on resurvey be found to agree with the bearings and lengths recorded on the original plans.

But where it is evident that some of the original marks found have been placed in error and do not reasonably represent the metes and bounds of the land conveyed, it may be desirable to ignore these marks. In this case a full report of the circumstances shall be made to the Surveyor-General, and approval sought of the action proposed to be taken.

In the reinstatement of original boundaries the following system of procedure shall be practised:—

Action where corner-post and reference-tree are found.

18. Where the corner-post and reference-tree are found, the position of the post shall be checked by comparing its actual bearing and distance with that originally determined and recorded on the plan.

Action where reference-tree only is found.

19. At a corner where the reference-tree only is found, the post shall be reinstated on the originally determined and recorded bearing and distance therefrom.

Action where line-pegs, lockspits, or blazed trees are found.

20. Where neither post at corner nor reference-tree are found, but indications of the original survey are afforded by line-pegs, lockspits, or blazed trees, boundaries and corners must be reinstated in correct relation to such marks, but before adoption shall be checked by measured reference to existing adjacent corners or boundaries.

Action where no marks are found.

21. Where no marks of original survey can be found, it must be shown that the boundaries and corners have been reinstated in correctly measured relation to adjacent boundaries, to those situated on opposite sides of roads, to fences, or to such other evidence of original location as may be found.

The position of marks to be entered in field-book.

22. The position of all original marks found must be shown in the field-book and on the plan. (See Clause 42.)

Action where lengths as resurveyed are in excess.

23. Where resurvey 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 shall be ascertained by the actual measurement of so much of the boundaries of adjoining lands as is necessary to ascertain whether such boundaries contain their granted lengths in full.

Surveyed connections to original corners.

24. If part only of the land in a Grant or a Certificate of Title is subdivided, the subdivisional survey must be connected by actual survey:—

On country lands—to a corner or corners of the previous survey.

On town lands—to a corner or corners of the previous survey, or to the corners of sections, or to the intersections of streets or lanes, or to permanent marks established by alignment, standard traverse, or other official survey.

MARKING.

Boundary and road lines.—Clearing and blazing.

25. Resurveyed and subdivisional boundary lines on town and on country lands shall be cleared to a width of two feet by the removal of all scrub, undergrowth, and trees less than six inches in diameter. In scrub and in forest country the trees standing nearest to the line shall be marked with a horseshoe mark cut into the heartwood on opposite sides of the tree in such positions that the marks face along the boundary line.

Trees left standing, through which the line passes, shall be double marked on opposite sides in such positions that the marks face along the boundary line.

Pegs, and lockspits, on boundary and road lines on country lands.

26. On resurveyed and on subdivisional boundary lines on country lands, at distances not exceeding ten chains apart, and always so situated as to be visible one from the other, hardwood pegs eighteen inches long and two inches square shall be aligned with the theodolite and driven twelve inches into the ground.

On each side of the pegs and distant about one foot, lockspits three feet long and six inches deep shall be dug in the direction of the boundary lines, and the earth taken out of the trenches shall be heaped up round the pegs.

On very stony lands, rows of stones placed in the direction of the boundary lines may be substituted for dug-out lockspits.

In dense scrubs lockspits at pegs are not required.

Country lands.—Posts, pegs, and lockspits at corners.

27. In subdivisional surveys on country lands, the principal corners shall be marked with hardwood posts, not less than four inches square and three feet long, sunk two feet into the ground. All other corners shall be marked with hardwood pegs, not less than three inches square and two feet long, sunk eighteen inches into the ground. Outside a fifteen-inch radius from the posts and from the pegs lockspits three feet long and six inches deep shall be dug in the direction of the boundary lines.

The numbers of the subdivisions shall be cut into the posts and pegs, or into the nearest suitable tree, which should be referred by recorded bearing and distance to the post or peg.

Town lands.—Posts or pegs and lockspits at corners.

28. In subdivisional surveys, where the subdivisions are marked out in blocks or sections, each block or section corner shall be marked with a hardwood post, not less than four inches square, sunk two feet into the ground. Outside a fifteen-inch radius from the post, lockspits three feet long and six inches deep shall be dug in the direction of the boundary lines. The number of the section and the number of the corner subdivision are to be cut into the post, or painted thereon with black figures upon a white ground.

All other subdivisional corners shall be marked with hardwood pegs, two inches square and eighteen inches long, driven twelve inches into the ground.

Outside a radius of twelve inches from the pegs, lockspits two feet long and six inches deep shall be dug in the direction of the boundary lines.

The pegs shall be marked with the numbers of the subdivisions, or painted with black figures upon a white ground.

Town lands.—Iron rods, survey to be connected thereto.

29. As permanent datum points, in connection with the survey of sections or blocks of city or township subdivisions, iron rods one inch in diameter and twelve inches in length shall 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 or other lines parallel thereto of the principal streets. Sites for these rods shall be selected where streets are unlikely to require other than surface formation. In connection with the survey of one section or block of subdivisions two rods shall be inserted; and in the survey of two or more sections or blocks of subdivisions three or more rods shall be inserted; in no case should the distances between the rods exceed twenty chains and the sites shall be visible one from the other. The survey shall be connected by angular and linear measurement with these rods and their positions shall be shown on the plan and noted in the field-book.

Rocks at corners.

30. If rocks that cannot be removed are found to be situated at corners of subdivisions, they should be marked by a hole drilled to a depth of not less than one inch and with pick-marks in the direction of the boundary lines. If practicable, the subdivisional numbers should be cut into the rock.

Re-marking original boundaries.

31. Original boundaries being resurveyed shall be marked, posted, pegged, and lockspitted in accordance with the requirements of the foregoing directions, and old reference-trees shall be dressed up or new reference-trees provided.

FIELD-BOOKS.

Size of field-book.

32. The field-book used should in size be in proportion to the extent of the survey of which it is a record.

To be carefully kept.

33. The field-book shall be so lucidly kept as to enable a draftsman, without other information than it affords, to draw a true plan of the survey.

The first page.

34. The first page of the field-book shall contain the signature of the surveyor, the title of the survey, with particulars of the county, parish, town, &c., in which it is situated; and the date of the commencement of the survey.

The first page—Certificate that steel tape used has been compared with standard.

35. The first page of the field-book shall also contain the following statement duly filled in by the surveyor:—

“The steel tape used on this survey agrees in length with standard steel tape No. [or official standard laid down at _____, as the case may be] as determined by comparison made on the _____ day of _____, 19 _____.”

Datum of survey to be described.

36. The details of the survey work shall be prefaced by a description of the datum upon which the survey is based; if obtained by the adoption of an original boundary, the original marks found on it and the data by which they were identified shall be described in the field-book.

Field-notes of "Surround," by separate entry.

37. The field-notes of the surround of a resurvey should be kept together, be separated from those of the internal subdivision, and each line should be entered separately in the sequence in which it is measured.

Subdivisional work, by separate entry or by diagram.

38. The internal subdivisional work on country lands should also be entered separately in sequence; but the internal subdivisional work on town lands may be shown in the field-book by diagrams.

Angular and linear measurements to be recorded in detail.

39. Field-notes shall contain a clear record of the instrumental bearings of lines, the actually measured or contour lengths, the angles of elevation and depression, and corrections therefor; the temperature, and correction for changes thereof; the horizontal lengths of lines; the measurement of offsets to watercourse boundaries; the bearings and distances from the reference-trees; and the measurements made to improvements.

Closure and intersections to be recorded.

40. The angular closure, and the measured positions of the points of intersection of all surveyed lines, shall be recorded in the field-notes of the intersecting and intersected lines.

Distance to traverse, to post, and to watercourse to be recorded.

41. Field-notes of boundaries terminating at watercourses shall show the distance to traverse, to post, and to watercourse, respectively.

Exact positions of all permanent marks to be recorded.

42. The exact position of any permanent mark found or inserted shall be entered in the field-notes, and shall be described by noting at the reduced distance the word "post," "peg," &c., as the case may require.

Field-notes to be certified to.

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

"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.

Field-book shall accompany the plan.

44. In every case the field-book shall accompany the plan of survey.

COMPUTATIONS.

Measurements to be checked by closure.

45. The measurements made on each survey shall 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.

Areas by double longitudes.

46. Areas of portions or subdivisions, except such as are rectangular, shall be carefully computed by double longitudes.

Computations to be forwarded.

47. Calculations of closure and of area shall be forwarded with the field-books and plans to which they refer.

Limit of error.

48. The error in the linear measurement of surveys should not exceed

On Town Lands—

1 inch in ten chains, equal to 1 link in a mile.

On Country Lands—

On undulating country, 1 link in 50 chains.

On rough and broken country, 2 links in 50 chains.

PLANS.

Drafting.

49. All plans shall be drawn by the surveyor himself, or under his supervision, on the plan forms supplied by the Registrar of Titles.

Scale of plans.

50. Plans should be accurately plotted with the North point upwards, and should be drawn to the scales prescribed by section 120 of "*The Real Property Act of 1861*," viz.:—

Not exceeding 1 acre—not less than 2 chains to 1 inch.

Not exceeding 5 acres—not less than 5 chains to 1 inch.

Not exceeding 80 acres—not less than 10 chains to 1 inch.

Exceeding 80 acres—20 chains to 1 inch.

The scale to which the plan is drawn should be stated on the plan form.

Diagrams.

51. Diagrams, on enlarged scales, may be drawn on plans to show clearly details of measurements or of improvements.

Limit of fractional quantities.

52. On plans of survey of country lands, fractional quantities shall be omitted from areas as specified hereunder:—

In areas not exceeding 2 acres—less than 1/10 perch.

More than 2 acres, but not exceeding 10 acres—less than 1/2 perch.

More than 10 acres, but not exceeding 40 acres—less than 1 perch.

More than 40 acres, but not exceeding 640 acres—less than 1 rood.

Plans may not be coloured.

53. Plans shall not be coloured or tinted.

Delineation of lines.

54. Boundaries shall be ruled in firm black lines, the actual measurements made and the bearings observed in the field shall be written along the lines in black figures. Original lengths and bearings may also be written but shall be in red figures.

Of traverse lines.

55. Traverses shall be ruled in firm blue lines, and the actual measurements made and the bearings observed in the field shall be written along the lines in blue figures, or these particulars may be written in a tablet on the plan form.

Coasts and watercourses.

56. Lines of coast, banks of rivers, creeks, &c., where surveyed shall be shown by firm black lines, and where unsurveyed by broken black lines.

Opposite sides of watercourses and an arrow pointing down stream shall be sketched on plans.

Title.

57. The title of the plan shall be written on the plan form in the space provided for it, and shall show the numbers of the subdivisions, allotments, sections, or portions measured, the names of the county, parish, town, or other particular locality in which the survey is situated.

Plan forms.

58. For convenience of record, plans shall not be drawn on forms larger than is necessary to contain the work.

Plan must show details.

59. Every plan must show with their respective names all roads, streets, passages, thoroughfares, rights-of-way, easements, squares, or reserves appropriated or set apart for the use of the purchasers or for public use, and also all the subdivisions into which the land has been divided, marked with distinct numbers, and must also show the areas of the said subdivisions.

Plan must show widths of roads, &c.

60. The widths of all roads, streets, lanes, or rights-of-way adjoining the land under survey shall be recorded in the field-notes and be shown on the plans; but no width of any road, street, lane, or right-of-way shall be recorded or shown unless it has been accurately measured in the course of the survey.

Plan must show original boundaries.

61. When a subdivisional survey includes more than one original allotment or portion, the true position of the original boundaries must be shown on the plan, but a plan may not show subdivisions including more than one original allotment or portion unless such belong to the same proprietor.

Disputed ownership.

62. Should the location of a common boundary be in dispute between the owners of adjoining lands, all particulars of occupation and evidences of original location must be shown on the plan.

Plan must show nature of boundaries.

63. Every plan of a resurvey must show the nature of the boundaries at the time of resurvey, whether lines, fences, roads, streets, natural features, buildings, or walls.

If a boundary is a wall, it shall be described on the plan as "not a party wall," "party wall," "two walls," &c. The width of all party walls shall be stated, and it shall be shown if the boundary divides the wall evenly, if not its position relative to the centre of the wall shall be stated.

Such detailed information can be satisfactorily shown by a large scale diagram.

Encroachment must be shown.

64. If any building encroach beyond the building line of a street, the extent of the encroachment must be shown on the plan, preferably by a large scale diagram.

Statutory declaration.

65. In accordance with the provisions of section 119 of "The Real Property Act of 1861," each map or plan must be accompanied by a declaration in the form as set out in the Schedule hereto.

DESCRIPTIONS.

Descriptions must agree or be corrected.

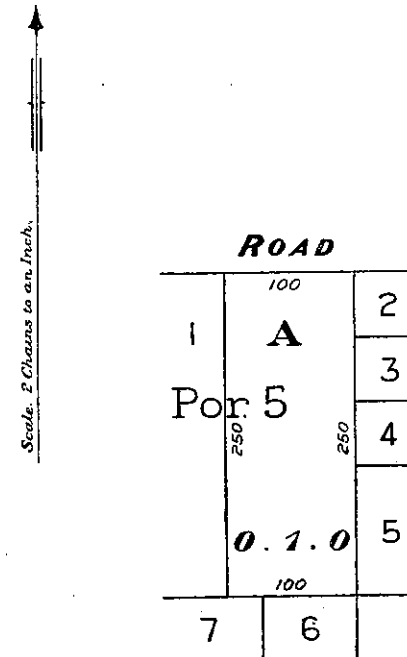
66. Descriptions of subdivisions inserted in the transfers or other instruments lodged for registration must agree, or be corrected to agree, with the certified plan as finally approved.

Alterations must be initialled.

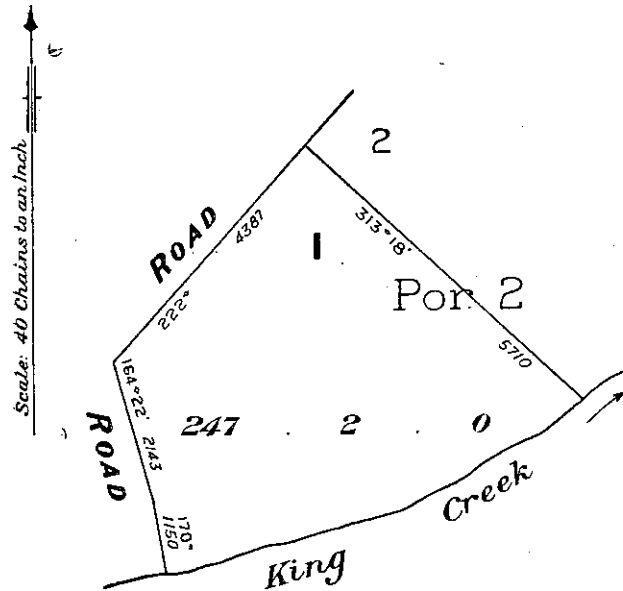
67. Any material alteration in any description, or in any plan relating thereto made after the original execution of the instrument or lodgment of the plan, must be initialled in token of approval by all persons whose rights or interests may be affected by such alteration: Provided always that in the correction of any such error the original words or figures shall not be erased or rendered illegible, and the date of alteration shall be affixed and initialled.

Forms of description.

68. With aim to uniformity in the writing of descriptions of the metes and bounds of areas the following forms shall, as far as practicable, be adopted:—



Commencing at the north-east corner of subdivision 1, and bounded thence on the north by a road bearing east 1 chain, on the east by subdivisions 2 to 5 bearing south 2 chains 50 links, on the south by subdivisions 6 and 7 bearing west 1 chain, and on the west by subdivision 1 bearing north 2 chains 50 links to the point of commencement.



Commencing on the left bank of King Creek at the south-west corner of subdivision 2 and bounded thence on the north-east by that subdivision bearing $313^{\circ} 18' 57''$ chains and 10 links; on the north-west by a road bearing $222^{\circ} 43'$ chains and 87 links; on the west by a road bearing $164^{\circ} 22' 21''$ chains and 43 links, and $170^{\circ} 11'$ chains and 50 links to King Creek, and thence by the left bank of that creek downwards to the point of commencement.

SCHEDULE.

I, _____, do hereby solemnly and sincerely declare that I have faithfully and truly surveyed, measured, and marked on the ground the portion of land referred to in the within declaration, and that the measurements and boundaries given in this plan _____ situated in the county of _____, parish of _____, are correct, and do not, to the best of my belief, in any way interfere with the rights or property of any persons, owners, or occupiers of land adjoining the above land, and described in the said plan; and I make this solemn declaration, conscientiously believing the same to be true, and by virtue of the provisions of the "Oaths Act of 1867."

(Signature)

Authorised Surveyor.

Made and signed at _____ this _____ day of _____ 19____, before me—

(Signature of Registrar of Titles or of a Magistrate.)

Certificate.

The foregoing By-law was made and passed by the Surveyors' Board on the fourteenth day of March, 1910.

ALLAN A. SPOWERS, President.

APPENDIX 1.

REDUCING TABLE.

Table of Links to be deducted from each chain measured on a slope to reduce it to horizontal measurement.

REDUCTION PER CHAIN.

	0°	1°	2°	3°	4°	5°	
0	0·0000	0·0152	0·0609	0·1371	0·2436	0·3805	0
2	·0000	·0163	·0630	·1401	·2477	·3856	2
4	·0001	·0173	·0651	·1432	·2518	·3907	4
6	·0002	·0184	·0672	·1463	·2559	·3959	6
8	·0003	·0196	·0693	·1495	·2601	·4011	8
10	·0004	·0207	·0715	·1527	·2643	·4063	10
12	·0006	·0219	·0737	·1559	·2686	·4116	12
14	·0008	·0232	·0760	·1592	·2728	·4169	14
16	·0011	·0244	·0782	·1625	·2771	·4222	16
18	·0014	·0257	·0806	·1658	·2815	·4275	18
20	·0017	·0271	·0829	·1692	·2859	·4329	20
22	·0021	·0284	·0853	·1726	·2903	·4384	22
24	·0024	·0299	·0877	·1760	·2947	·4438	24
26	·0029	·0313	·0902	·1795	·2992	·4493	26
28	·0033	·0328	·0927	·1830	·3037	·4548	28
30	·0038	·0343	·0952	·1865	·3083	·4604	30
32	·0043	·0358	·0977	·1901	·3129	·4660	32
34	·0049	·0374	·1003	·1937	·3175	·4716	34
36	·0055	·0390	·1029	·1973	·3221	·4773	36
38	·0061	·0406	·1056	·2010	·3268	·4830	38
40	·0068	·0423	·1083	·2047	·3315	·4887	40
42	·0075	·0440	·1110	·2084	·3363	·4944	42
44	·0082	·0458	·1138	·2122	·3411	·5002	44
46	·0090	·0475	·1166	·2160	·3459	·5061	46
48	·0098	·0493	·1194	·2199	·3507	·5119	48
50	·0106	·0512	·1223	·2237	·3556	·5178	50
52	·0114	·0531	·1251	·2276	·3605	·5238	52
54	·0123	·0550	·1281	·2316	·3655	·5297	54
56	·0133	·0569	·1310	·2356	·3705	·5357	56
58	·0142	·0589	·1340	·2396	·3755	·5418	58
60	·0152	·0609	·1371	·2436	·3805	·5478	60

REDUCING TABLE—continued.

Table of Links to be deducted from each chain measured on a slope to reduce it to horizontal measurement.

REDUCTION PER CHAIN.

	6°	7°	8°	9°	10°	
0	0·5478	0·7454	0·9732	1·2312	1·5192	0
2	·5539	·7525	·9813	1·2403	1·5293	2
4	·5600	·7596	·9895	1·2494	1·5395	4
6	·5662	·7668	·9976	1·2586	1·5497	6
8	·5724	·7740	1·0059	1·2678	1·5599	8
10	·5786	·7813	1·0141	1·2771	1·5702	10
12	·5849	·7885	1·0224	1·2864	1·5804	12
14	·5912	·7958	1·0307	1·2957	1·5908	14
16	·5975	·8032	1·0390	1·3050	1·6011	16
18	·6039	·8106	1·0474	1·3144	1·6115	18
20	·6103	·8180	1·0558	1·3239	1·6219	20
22	·6167	·8254	1·0643	1·3333	1·6324	22
24	·6232	·8329	1·0728	1·3428	1·6429	24
26	·6297	·8404	1·0813	1·3523	1·6534	26
28	·6363	·8479	1·0898	1·3619	1·6639	28
30	·6428	·8555	1·0984	1·3714	1·6745	30
32	·6494	·8631	1·1070	1·3811	1·6851	32
34	·6561	·8708	1·1157	1·3907	1·6958	34
36	·6627	·8785	1·1244	1·4004	1·7065	36
38	·6694	·8862	1·1331	1·4101	1·7172	38
40	·6762	·8939	1·1418	1·4199	1·7279	40
42	·6829	·9017	1·1506	1·4297	1·7387	42
44	·6897	·9095	1·1594	1·4395	1·7495	44
46	·6966	·9173	1·1683	1·4493	1·7604	46
48	·7035	·9252	1·1772	1·4592	1·7713	48
50	·7104	·9331	1·1861	1·4691	1·7822	50
52	·7173	·9411	1·1950	1·4791	1·7931	52
54	·7243	·9491	1·2040	1·4891	1·8041	54
56	·7313	·9571	1·2130	1·4991	1·8152	56
58	·7383	·9651	1·2221	1·5091	1·8262	58
60	·7454	·9732	1·2312	1·5192	1·8373	60

Table of Links to be deducted from each chain measured on a slope to reduce it to horizontal measurement.

REDUCING TABLE—continued.

	11°	12°	13°	14°	15°
0	1.8372	2.1852	2.5630	2.9704	3.4074
2	1.8484	2.1973	2.5761	2.9845	3.4225
4	1.8595	2.2095	2.5892	2.9986	3.4376
6	1.8707	2.2217	2.6024	3.0128	3.4527
8	1.8819	2.2339	2.6156	3.0270	3.4679
10	1.8932	2.2461	2.6288	3.0412	3.4831
12	1.9045	2.2584	2.6421	3.0555	3.4983
14	1.9158	2.2707	2.6554	3.0697	3.5136
16	1.9271	2.2831	2.6687	3.0841	3.5289
18	1.9385	2.2954	2.6821	3.0984	3.5443
20	1.9499	2.3078	2.6955	3.1128	3.5596
22	1.9614	2.3203	2.7089	3.1272	3.5750
24	1.9729	2.3328	2.7224	3.1417	3.5905
26	1.9844	2.3453	2.7359	3.1562	3.6059
28	1.9959	2.3578	2.7494	3.1707	3.6214
30	2.0075	2.3704	2.7630	3.1852	3.6369
32	2.0191	2.3830	2.7766	3.1998	3.6525
34	2.0308	2.3956	2.7902	3.2144	3.6681
36	2.0425	2.4083	2.8039	3.2291	3.6837
38	2.0542	2.4210	2.8176	3.2438	3.6994
40	2.0659	2.4338	2.8313	3.2585	3.7151
42	2.0777	2.4465	2.8451	3.2732	3.7308
44	2.0895	2.4593	2.8589	3.2880	3.7466
46	2.1014	2.4722	2.8727	3.3028	3.7624
48	2.1133	2.4851	2.8866	3.3177	3.7782
50	2.1252	2.4980	2.9005	3.3325	3.7941
52	2.1371	2.5109	2.9144	3.3474	3.8099
54	2.1491	2.5239	2.9283	3.3624	3.8259
56	2.1611	2.5369	2.9423	3.3774	3.8418
58	2.1732	2.5499	2.9564	3.3924	3.8578
60	2.1852	2.5630	2.9704	3.4074	3.8738

REDUCTION PER CHAIN.

Table of Links to be deducted from each chain measured on a slope to reduce it to horizontal measurement.

REDUCING TABLE—continued.

	16°	17°	18°	19°	20°
0	3.8738	4.3695	4.8943	5.4481	6.0307
2	3.8899	4.3865	4.9123	5.4671	6.0506
4	3.9060	4.4036	4.9304	5.4861	6.0706
6	3.9221	4.4207	4.9484	5.5051	6.0906
8	3.9382	4.4378	4.9665	5.5242	6.1106
10	3.9544	4.4550	4.9846	5.5432	6.1306
12	3.9706	4.4722	4.9928	5.5624	6.1507
14	3.9869	4.4894	5.0020	5.5815	6.1708
16	4.0032	4.5066	5.0392	5.6199	6.1909
18	4.0195	4.5239	5.0574	5.6584	6.2111
20	4.0358	4.5412	5.0757	5.6991	6.2313
22	4.0522	4.5586	5.0940	5.7384	6.2515
24	4.0686	4.5760	5.1124	5.7777	6.2718
26	4.0850	4.5934	5.1308	5.8164	6.2921
28	4.1015	4.6108	5.1492	5.8549	6.3124
30	4.1180	4.6283	5.1676	5.8938	6.3328
32	4.1346	4.6458	5.1861	5.9333	6.3532
34	4.1511	4.6634	5.2046	5.9747	6.3736
36	4.1677	4.6809	5.2232	6.0142	6.3940
38	4.1844	4.6985	5.2417	6.0545	6.4145
40	4.2010	4.7162	5.2603	6.0950	6.4350
42	4.2177	4.7338	5.2790	6.1356	6.4556
44	4.2345	4.7516	5.2976	6.1762	6.4762
46	4.2512	4.7693	5.3163	6.2168	6.4968
48	4.2680	4.7871	5.3351	6.2574	6.5174
50	4.2849	4.8049	5.3538	6.2981	6.5381
52	4.3017	4.8227	5.3726	6.3388	6.5588
54	4.3186	4.8406	5.3915	6.3795	6.5795
56	4.3355	4.8585	5.4103	6.4203	6.6003
58	4.3525	4.8764	5.4292	6.4611	6.6211
60	4.3695	4.8943	5.4481	6.5019	6.6420

REDUCTION PER CHAIN.

Table of Links to be deducted from each chain measured on a slope to reduce it to horizontal measurement.

REDUCING TABLE—*continued*.

	26°	27°	28°	29°	30°
0	10.1206	10.8993	11.7052	12.5380	13.3974
2	10.1461	10.9257	11.7325	12.5662	13.4265
4	10.1716	10.9522	11.7599	12.5945	13.4557
6	10.1972	10.9787	11.7873	12.6227	13.4848
8	10.2228	11.0052	11.8147	12.6510	13.5140
10	10.2484	11.0317	11.8421	12.6794	13.5432
12	10.2741	11.0583	11.8696	12.7077	13.5725
14	10.2998	11.0849	11.8971	12.7361	13.6018
16	10.3256	11.1116	11.9247	12.7645	13.6311
18	10.3513	11.1382	11.9522	12.7930	13.6604
20	10.3771	11.1649	11.9798	12.8215	13.6898
22	10.4029	11.1917	12.0074	12.8500	13.7192
24	10.4288	11.2184	12.0351	12.8786	13.7486
26	10.4547	11.2452	12.0628	12.9071	13.7780
28	10.4806	11.2720	12.0905	12.9358	13.8075
30	10.5065	11.2989	12.1182	12.9644	13.8370
32	10.5325	11.3258	12.1460	12.9930	13.8666
34	10.5585	11.3527	12.1738	13.0217	13.8962
36	10.5845	11.3796	12.2017	13.0505	13.9258
38	10.6106	11.4066	12.2295	13.0792	13.9554
40	10.6367	11.4336	12.2574	13.1080	13.9850
42	10.6628	11.4606	12.2853	13.1368	14.0147
44	10.6890	11.4877	12.3133	13.1656	14.0444
46	10.7152	11.5147	12.3413	13.1945	14.0742
48	10.7414	11.5419	12.3693	13.2234	14.1040
50	10.7676	11.5690	12.3973	13.2523	14.1338
52	10.7939	11.5962	12.4254	13.2813	14.1636
54	10.8202	11.6234	12.4535	13.3103	14.1935
56	10.8465	11.6506	12.4816	13.3393	14.2234
58	10.8729	11.6779	12.5098	13.3683	14.2533
60	10.8993	11.7052	12.5380	13.3974	14.2832

REDUCTION PER CHAIN.

Table of Links to be deducted from each chain measured on a slope to reduce it to horizontal measurement.

REDUCING TABLE—*continued*.

	25°	24°	23°	22°	21°
0	9.3692	8.6454	7.9495	7.2816	6.6420
2	9.3938	8.6691	7.9723	7.3034	6.6628
4	9.4185	8.7166	7.9950	7.3253	6.6837
6	9.4431	8.7642	8.0178	7.3471	6.7047
8	9.4678	8.7403	8.0407	7.3690	6.7256
10	9.4925	8.7642	8.0636	7.3909	6.7466
12	9.5173	8.8118	8.0865	7.4129	6.7676
14	9.5421	8.8587	8.1094	7.4349	6.7887
16	9.5669	8.8357	8.1324	7.4570	6.8098
18	9.5918	8.8597	8.1554	7.4790	6.8309
20	9.6166	8.8836	8.1784	7.5011	6.8520
22	9.6415	8.9076	8.2014	7.5232	6.8732
24	9.6665	8.9316	8.2245	7.5454	6.8944
26	9.6914	8.9557	8.2477	7.5676	6.9157
28	9.7164	8.9798	8.2708	7.5898	6.9369
30	9.7415	9.0039	8.2940	7.6120	6.9582
32	9.7665	9.0280	8.3172	7.6343	6.9796
34	9.7916	9.0522	8.3404	7.6566	7.0010
36	9.8168	9.0764	8.3637	7.6789	7.0224
38	9.8419	9.1006	8.3870	7.7013	7.0438
40	9.8671	9.1249	8.4104	7.7238	7.0653
42	9.8923	9.1492	8.4337	7.7462	7.0867
44	9.9175	9.1735	8.4571	7.7687	7.1083
46	9.9428	9.1979	8.4806	7.7911	7.1298
48	9.9681	9.2222	8.5040	7.8137	7.1514
50	9.9935	9.2467	8.5275	7.8362	7.1730
52	10.0188	9.2711	8.5510	7.8588	7.1947
54	10.0442	9.2956	8.5746	7.8814	7.2164
56	10.0697	9.3201	8.5982	7.9041	7.2381
58	10.0951	9.3446	8.6218	7.9268	7.2598
60	10.1206	9.3692	8.6454	7.9495	7.2816

REDUCTION PER CHAIN.

APPENDIX 2. Correction for Expansion or Contraction of Steel Measuring Tapes.

For each degree Fah. above or below that at which they are
standard length at a constant tension and supported throughout:—

Co-efficient = .00000625.

Example.

Tape standard at	...	...	...	...	...	...	...	...	...	...
Observed temperature	...	...	...	...	...	...	...	...	...	...
Difference	...	...	...	...	...	...	...	...	...	...
Difference = 28°										

Measured distance = 2500 links.

.00000625	Co-efficient, as above.	28	Difference in temperature.	2500	Measured distance.	00087500	0.000175	2500	Correction (expansion).	000350	+ 000.437500	2500	Corrected distance.	2500.44 =
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APPENDIX 3. TABLE OF GRADIENTS.

Angle.	Gradient, 1 in.	Angle.	Gradient, 1 in.	Angle.	Gradient, 1 in.	Angle.	Gradient, 1 in.
0.57	60.31	3.0	19.08	5.0	11.43	7.0	8.14
1.5	52.88	3.5	18.56	5.5	11.24	7.15	7.86
1.9	49.82	3.10	18.07	5.10	11.06	7.30	7.60
1.15	45.83	3.15	17.61	5.15	10.88	7.45	7.35
1.20	42.96	3.20	17.17	5.20	10.71	8.0	7.12
1.25	40.44	3.25	16.75	5.25	10.55	8.15	6.90
1.30	38.19	3.30	16.35	5.30	10.39	8.30	6.69
1.35	36.18	3.35	15.97	5.35	10.23	8.45	6.50
1.40	34.37	3.40	15.60	5.40	10.08	9.0	6.31
1.45	32.73	3.45	15.26	5.45	9.93	9.15	6.14
1.50	31.24	3.50	14.92	5.50	9.79	9.30	5.98
1.55	29.88	3.55	14.61	5.55	9.65	9.45	5.82
2.0	28.64	4.0	14.30	6.0	9.51	10.0	5.67
2.5	27.49	4.5	14.01	6.5	9.38	10.15	5.53
2.10	26.43	4.10	13.73	6.10	9.26	10.30	5.40
2.15	25.45	4.15	13.46	6.15	9.13	10.45	5.27
2.20	24.54	4.20	13.20	6.20	9.01	11.0	5.14
2.25	23.69	4.25	12.95	6.25	8.89	11.15	5.03
2.30	22.90	4.30	12.71	6.30	8.78	11.30	4.92
2.35	22.16	4.35	12.47	6.35	8.66	11.45	4.81
2.40	21.47	4.40	12.25	6.40	8.55	12.0	4.70
2.45	20.82	4.45	12.03	6.45	8.45	12.15	4.61
2.50	20.21	4.50	11.83	6.50	8.34	12.30	4.51
2.55	19.63	4.55	11.62	6.55	8.24	12.45	4.42
3.0	19.08	5.0	11.43	7.0	8.14	13.0	4.33

Table for Converting Links to Feet.

Links.	Feet and Decimals.	Links.	Feet and Decimals.	Links.	Feet and Decimals.	Links.	Feet and Decimals.
1	0.66	28	18.48	55	36.30	82	54.12
2	1.32	29	19.14	56	36.96	83	54.78
3	1.98	30	19.80	57	37.62	84	55.44
4	2.64	31	20.46	58	38.28	85	56.10
5	3.30	32	21.12	59	38.94	86	56.76
6	3.96	33	21.78	60	39.60	87	57.42
7	4.62	34	22.44	61	40.26	88	58.08
8	5.28	35	23.10	62	40.92	89	58.74
9	5.94	36	23.76	63	41.58	90	59.40
10	6.60	37	24.42	64	42.24	91	60.06
11	7.26	38	25.08	65	42.90	92	60.72
12	7.92	39	25.74	66	43.56	93	61.38
13	8.58	40	26.40	67	44.22	94	62.04
14	9.24	41	27.06	68	44.88	95	62.70
15	9.90	42	27.72	69	45.54	96	63.36
16	10.56	43	28.38	70	46.20	97	64.02
17	11.22	44	29.04	71	46.86	98	64.68
18	11.88	45	29.70	72	47.52	99	65.34
19	12.54	46	30.36	73	48.18	100	66.00
20	13.20	47	31.02	74	48.84	200	132.00
21	13.86	48	31.68	75	49.50	300	198.00
22	14.52	49	32.34	76	50.16	400	264.00
23	15.18	50	33.00	77	50.82	500	330.00
24	15.84	51	33.66	78	51.48	600	396.00
25	16.50	52	34.32	79	52.14	700	462.00
26	17.16	53	34.98	80	52.80	800	528.00
27	17.82	54	35.64	81	53.46	900	594.00

APPENDIX 4.

Table for Converting Feet to Links.

Feet.	Links.	Feet.	Links.	Feet.	Links.	Feet.	Links.
1	1.5	28	42.4	55	83.3	82	124.2
2	3.0	29	43.9	56	84.8	83	125.8
3	4.5	30	45.4	57	86.4	84	127.3
4	6.0	31	47.0	58	87.9	85	128.8
5	7.6	32	48.5	59	89.4	86	130.3
6	9.1	33	50.0	60	90.9	87	131.8
7	10.6	34	51.5	61	92.4	88	133.3
8	12.1	35	53.0	62	93.9	89	134.8
9	13.6	36	54.5	63	95.4	90	136.3
10	15.1	37	56.1	64	97.0	91	137.9
11	16.7	38	57.6	65	98.5	92	139.4
12	18.2	39	59.1	66	100.0	93	140.9
13	19.7	40	60.6	67	101.5	94	142.4
14	21.2	41	62.1	68	103.0	95	143.9
15	22.7	42	63.6	69	104.5	96	145.4
16	24.2	43	65.1	70	106.0	97	147.0
17	25.8	44	66.7	71	107.6	98	148.5
18	27.3	45	68.2	72	109.1	99	150.0
19	28.8	46	69.7	73	110.6	100	151.5
20	30.3	47	71.2	74	112.1	200	303.0
21	31.8	48	72.7	75	113.6	300	454.5
22	33.3	49	74.2	76	115.1	400	606.0
23	34.8	50	75.7	77	116.7	500	757.6
24	36.3	51	77.3	78	118.2	600	909.1
25	37.9	52	78.8	79	119.7	700	1060.6
26	39.4	53	80.3	80	121.2	800	1212.1
27	40.9	54	81.8	81	122.7	900	1363.6

APPENDIX 5.