

MARKING THE LANDSCAPE

A Short History of Survey Marking in New South Wales



Edited by I H Marshall

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FOREWORD

This volume is a major contribution to practitioners, students and researchers in the field of boundary demarcation. It traces the evolution of the type and frequency of marks which indicated and continue to indicate the extent and character of property use in New South Wales. Such marking by man has a long history going back into the mists of time. Boundaries have existed between religious sites where one related power weakened in deference to the next or, as has been claimed elsewhere, the aboriginal extent of land was related to the gravitational fields centred on specific religious sites. Both possibilities are equally likely and probably true since timidity associated with unfamiliar grounds - lack of friendly and known spirits or terrain - has been common throughout history to the present. This man/land relationship has its roots in the concept of territoriality which is the primary expression of social power. Its changing functions help us to understand the historical relationship between society and space. Territoriality occurs to varying degrees in numerous social contexts, traversing, for example, the interests of nomadic tribes, the home environment and the work place.

Territoriality may mean marking out an area and influencing everything encompassed within it. The delineated territory could be marked by man made monuments, or a fence, or a hedgerow, or a plantation tree line, or a boundary such as a catchment, in which case the territory is marked out by the landscape. Or the territory may be recorded, in the mind, as with the aboriginal use of song lines.

Clearly, there is no absolute definition or explanation for territoriality, mainly because it is an abstract concept, and appears in different forms depending on culture, lifestyle or environment. In most societies, ownership of, or influence over, territory is a major basis of power and allows an individual, group or position to influence and control other individuals, objects and natural resources. Consequently and importantly, territoriality is intimately related to how humans use and exploit the environment.

But what converts concepts and suppositions of the shape, extent and character of proprietorial interests in land are the marks which remain in the wake of the delineator of land - the boundary surveyor.

For some eight years, when Ian Marshall was a member of the Board of Surveyors of New South Wales, he was pestered by me and others to assemble what was the evolution of marking in our State. With his many other duties he has at last done that, with assistance from Paul Kelly, Deputy Surveyor General, who has provided an edited commentary. The work is not the romantic story of those who did the marking. That is for others to tell. It does however track a passage of land administration, economic expression and depression and societal behaviour. It charts the way that survey administration has been implemented and survey practice conducted. That survey administration has probably served the past well and it is timely that a record should be put in place.

The spatial information needed for the next millennium will move away from the physically marked, unintegrated survey system of the past. It will be an information system based on rigorous spatial fixation related to absolute positioning in real time. The surveyors of post 2000 will need the same imagination and determination which the early surveyors of New South Wales displayed. They will be crossing new frontiers of survey practice. There will be little protection from legislation. Indeed, there will be little legislation to provide the signposts which are to be found in this treatise on historical practice.

To Ian, on behalf of the present and future surveyors of New South Wales, I say thank you for sharing your knowledge with us. And to Paul, your co-editor a round of applause for your contribution. To the members of the Board of Surveyors and to others who have joined in this important work, I express my appreciation for a job long overdue but a task well done.

D M GRANT, AM
Surveyor General of New South Wales

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Ian Marshall, a former member of the Board, a registered surveyor with extensive experience with rural surveys, and therefore a student of survey marking practices since the early days of the colony collated the various extracts of regulations and instructions shown in the publication.

Research was augmented from Kylie Jackson's paper entitled "The Development of Survey Marking in New South Wales" (1990) and kindly made available by the Department of Civil, Surveying and Environmental Engineering of the University of Newcastle. Professor John Fryer's support for this project is appreciated.

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The guidance and support of the Surveyor General, Don Grant, is gratefully acknowledged.

Front Cover: " Plan of the Settlements in New South Wales" by C. Grimes, Deputy Surveyor General 1796

INDEX

1	Overview of Survey Marking Practice in New South Wales.....	6
2	Calendar of Some Significant Events	8
3	Surveyor General's Circulars 1836-95	12
3.1	Introduction	12
3.2	Circular 1 January 1836.....	15
3.3	Circular 15 April 1836.....	16
3.4	Circular 10 April 1848.....	17
3.5	Circular “Instructions for Marking Crown Land by Government Surveyors”, 9 July 1853	19
3.6	Explanatory Letter regarding Circular 94-41 reprinted in The Surveyor 18 April 1895. “Special Marking of Survey”	20
4	Regulations for the Employment of Licensed Surveyors 1864-1914.....	22
4.1	Introduction	22
4.2	Regulations Issued 1864 - Extracts	24
4.3	Regulations Issued 1872 - Extracts	30
4.4	Regulations Issued 1882 - Extracts	35
4.5	Regulations Issued 1886 - Extracts	40
4.6	Regulations Issued 1901 - Extracts	48
4.7	Regulations Issued 1914 - Extracts	59
5	General Instructions to Salaried Surveyors 1884	70
5.1	Introduction	70
5.2	Extracts from General Instructions for Salaried Surveyors - 1884	70
6	Directions for the Employment of Surveyors by the Department of Lands 1963	74
6.1	Introduction	74
6.2	Extracts from Survey Directions 1963	74

7	Directions for the Employment of Surveyors by the Crown Lands Office 1981	78
	7.1 Introduction	78
	7.2 Extracts from Survey Directions 1981	78
8	Registrar General’s Department Instructions issued in 1915 to Surveyors Licensed under the provisions of the Real Property Act.....	85
	8.1 Introduction	85
	8.2 Extracts from Instructions to Surveyors - 1915	86
9	Survey Practice Regulations 1933	89
	9.1 Regulations Promulgated in 1933	89
	9.2 Subsequent Amendments	91
10	Local Government Act 1919 - Ordinance 32	92
	10.1 Ordinance Promulgated in 1922	92
	10.2 Amendments in 1933	94
	10.3 Amendments in 1964	97
11	Survey Co-ordination Act 1949	99
12	Survey Practice Regulation 1990	107
	12.1 Introduction	107
	12.2 Extracts from Survey Practice Regulation 1990.....	107
13	Surveyors (Practice) Regulation 1996	115
14	Surveyor General’s Directions for Survey Practice 1993	115
	APPENDIX A Extracts from “The Surveyor” and “Australian Surveyor”	116
	APPENDIX B History of the State Control Survey	120
	BIBLIOGRAPHY	123

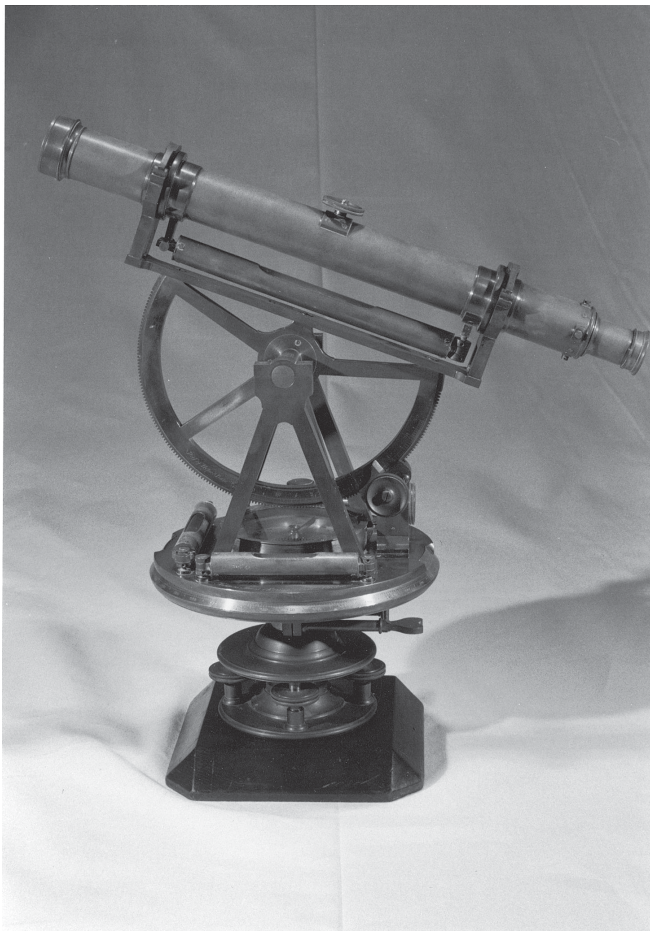
1 OVERVIEW OF SURVEY MARKING PRACTICE IN NEW SOUTH WALES

The marking of the landscape in New South Wales has to be viewed in the context of economic activity and social needs since 1788. The early colonial period was marked by a rapid spread of settlement. Land surveys were needed to delineate new land rights as settlers fanned out from the beach head in Sydney. Early maps contained key topographical detail necessary to plan transport routes and the siting of towns and villages. Late colonial and early Federation times brought a maturing society and increased wealth. One need only look at the colonial splendour of the New South Wales Lands Department Building erected around 1890 to see that wealth was derived largely from land use (and especially land sales).

Maps derived from surveys were required across New South Wales to administer land, and to plan rapidly growing urban areas. The need for better information for defence and national development was recognised, but it was not until after the Second World War that governments were galvanised by a close encounter with invasion to provide more comprehensive spatial information in the form of aerial photography and maps, underpinned by a comprehensive survey system.

The pace of land development was accelerated by the post war reconstruction and economic boom. Inventories of natural resources, better planning processes instituted to manage urban growth and an increase in government programs providing community services all needed better survey information.

The position of Surveyor General has traditionally been the principal office in government dealing with the regulation of survey practice. At various times during the past 200 years, the Surveyor General in New South Wales has been the regulator of survey and mapping practice and standards, provider of physical infrastructure such as the survey control mark network, coordinator of provision of spatial data collection and mapping programs in New South Wales and provider of the State's base maps and aerial photography coverage.










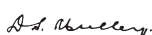













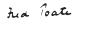




Mitchell's Theodolite

One of a pair made to the specifications of Surveyor-General Thomas Livingstone Mitchell by Thomas Jones of Charing Cross, London in 1820

Surveyors General N.S.W.

from the foundation of the Colony.

Name	Signature	Term of Office	Name	Signature	Term of Office
Augustus T. H. Alt		1787-1803	Henry Fraser Hall		1925-1926
Charles Grimes		1803-1811	Hamilton Bartlett Mathews		1926-1937
John Oxley		1812-1828	Arthur Max Allen		1937-1945
Sir Thomas Mitchell		1828-1855	Harold George Barrie		1945-1946
Lt. Col. George Barney		1855-1859	Daniel Stern Mulley		1946-1953
Alexander Grant Mac Lean		1861-1862	George Mastley Vincent		1953-1960
Walker Rannie Davidson		1862-1868	Charles E. Elphinstone		1960-1963
Philip Francis Adams		1868-1887	Henry Edward Hind Barr		1963-1965
Edward Twynnam		1887-1901	Leo Hoel Fletcher		1965-1978
Joseph Witter Allworth		1901-1904	Jack Darby		1979-1985
Edward MacFarlane		1904-1908	Donald Morrison Grant		1986-
Robert Mc. Donald		1908-1911			
Frederick Poate		1911-1916			
John Broughton		1916-1922			
Alfred Henry Chesterman		1922-1925			

2 CALENDAR OF SOME SIGNIFICANT EVENTS

1 January 1836

- First recorded directions - Surveyor General Mitchell to all Surveyors.

10 April 1848

- Specification for corner marking - Surveyor's personalised marks.

9 July 1853

- Blazed lines, numbered reference trees and lockspitting.

11 August 1855

- Report from the Commissioners appointed to inquire into the Surveyor General's Department.

9 May 1864

- Line marking and trenches 20 links in length (Clause 13). Town sections to be lockspitted six links long and allotments four links only (Clause 4).
- Road surveys - marking of mile trees (Clause 19).
- Adoption of standard needle.
- Reference to corner schedule introduced on plans.
- Rock on boundary line to be marked with a pick line - portion corners with broad arrow (Clause 14).
- Forerunner of permanent marking in town surveys introduced (Clause 82).
- Posts to be mounded (Clause 18).

30 January 1872

- The use of circumferentor is prohibited (Clause 5).
- Maximum offsets to natural features introduced (Clause 40).
- Road marking formalised (Clause 72) - three inch square peg introduced - mile posts four feet six inches long and not less than twelve inches in diameter.
- Trenching standardised to ten links in length in both town and country. Plain country remains at twenty links.
- Corner marking of portions where no tree exists - pegs to be thirty inches long and driven eighteen inches into the ground (Survey Post).
- Expressions of bearing to be related to North and South only (Clause 109).

1 May 1882

- A “dot”, the forerunner of the drill hole is introduced (Clause 127).
- Intervisible line marks of a permanent nature invoked - pegs three inch by two inch by eighteen inches long (Clause 131).
- In plain country and in absence of trees - the peg to be mounded by earth six feet in diameter and two feet high (Clause 135 and 139).
- Steel ribands in use - 66 feet long only (Appendix A).
- True bearing to be determined by stellar or solar observations (Clause 42).
- Bearings to be observed to trigonometrical stations (Clause 106 and 112).
- Fence posts, marked with a broad arrow over the letter R.

September, 1884

- Introduction of limits of error allowable in closes (Clause 45) - (Not by general direction).
- Mode of marking standard length - chain standardisation (Appendix I).

July 1886

- Alignment stakes in lieu of trenching (Clause 131, 132 & 133).
- Permanent marking introduced e.g. bottle, gas-pipe, iron bolt, vertically below survey post at corner, three feet six inches below ground surface (Clause 134) - Homestead Leases only.
- Fence posts marked with the broad arrow over the letters RD (Clause 141).
- Reserve roads to be marked on both sides (Clause 31).
- Lineal closures introduced into regulations (Clause 53).
- Bearings of reference to corners to read 0 to 360 (Clause 180)
- The five chain steel riband introduced to the regulations.

20 February 1895

- Special marking of surveys for recovering of azimuth and the standard of measure of a survey (Chief Surveyor's Circular 94.41).

24 January 1901

- Survey stakes to be four inch by four inch by 24 inches long. Alignment and direction stakes to be eighteen inches long and three inch by two inch. Reference and corner posts to be three feet six inches long, six inches square or eight inches in diameter (Clause 94).
- All corner and/or reference trees to be blazed on four sides (Clause 97).

- Lines of stones acceptable in lieu of lockspits (Clause 99).
- Drilled hole at a corner on rock introduced (Clause 107).
- Line pegs at ten chain intervals - reference stations each 80 chains (Clause 111).
- A concentric circle on plans to indicate a special mark (Clause 131).
- The gunter's chain ceases to be standard equipment (Appendix A).
- Instructions for alignment of streets introduced - consequent to Municipalities Act, No. 23 AD 1897 (Clause 80).
- Omissions of fractional quantities on plans (Clause 174) .

2 December 1914

- Reference trees to be within 200 links of corners (Clause 97).
- Widths of lanes in towns amended to 20 feet wide and not less than 31 links.

1 January 1915

- Issuing of Instructions to Surveyors by the Registrar General's Department - the first instructions specifically for surveyors undertaking surveys of real property land.

June 1920

- Survey marking under the Local Government Act, 1919 introduced in Ordinance 32.

12 May 1933

- The commencement of the Survey Practice Regulations, 1933. These regulations applied to both Crown surveys and Real Property surveys.

1 October 1963

- Portion corner pegs become three inches square and 21 inches long in lieu of four inches square.
- Lockspits become four feet long in lieu of ten links.
- Reference trees beyond 150 links of the corner necessitates placement of additional marking pursuant to Survey Practice Regulations 1933 - reference trees up to 300 links.
- Crown survey bound by Survey Practice Regulations 1933 as well as the special requirements of the Department of Lands.
- Age of fencing defined (Clause 56).
- Dimension of alignment pins prescribed for the first time (Clause 9.12).

1 January 1981

- Lockspits one metre long.

1 September 1990

- Commencement of the Survey Practice Regulation, 1990. Requirements for connection of surveys to the survey control network.

1 October 1994

- Minor amendments to the Survey Practice Regulation 1990 - refinement of requirements for connections to the survey control network and use of the Integrated Survey Grid for orientation.

1 September 1996

- Commencement of the Surveyors (Practice) Regulation 1996.

1 September 1998

- Commencement of the Survey Co-ordination Regulation 1998

Minor amendments were made to clarify certain clauses. The use of “Type 3” State Survey Marks was discontinued.

3 SURVEYOR GENERAL'S CIRCULARS 1836-95

3.1 INTRODUCTION

The Surveyor General issued directions in 1836, 1848, 1853, 1858, 1864, 1872, 1882, 1886, 1895, 1901, 1914, 1963 and the last directions that were issued in 1981. These directions only applied to the survey and marking of Crown Land in New South Wales.

It should be noted that up until the introduction of the New South Wales Surveyors Act in 1929 there were different types of licensing. There were three types of surveyors and these were:

- (1) Surveyors employed by the Surveyor General's Office, and later by the Survey Department of the Lands Department.
- (2) Licensed Surveyors employed for Crown surveys.
- (3) Surveyors with special Licences issued under the Real Property Act of 1863 and 1900.

The difference between Government and Licensed Surveyors must be noted. Beaver (1979) notes that surveyors employed by the Surveyor General's Office and later by the Survey Department of the Lands Department were regarded as government surveyors. Between 1830 and 1855 the system of contract surveys by the Department of Lands was introduced which led to the introduction of surveys by licensed surveyors. The licence was issued by an appointed board and was for the right to carry out surveys under the Crown Lands Act.

These surveyors were all licensed to carry out surveys on Crown Land and as such the directions issued by the Surveyor General were to be followed when carrying out Crown surveys. It should be noted that no licences were required to carry out surveys of old System Title land or their subdivisions.

During the early period of settlement in the colony, there was little need for a private surveyor, since practically all surveys were of Crown Land (Hallmann 1973). Although, the records show that Thomas Florence advertised in Sydney to carry out private surveys in 1826 (Reilly 1970). Florence subsequently joined the Survey Department and took his turn at attempting to reduce the backlog of surveys.

The first licensed surveyors took up their positions in 1844 (Hallman 1973). These surveyors were permitted to carry out private survey service previously not available to the public. This group of surveyors were the forerunner of today's private and consulting surveyors.

Two circulars were prepared in 1836. Circular No. 36/22, dated 1 January 1836 was issued by the Surveyor General of the time, Major Sir Thomas Mitchell, and was directed to the "surveyors and assistant surveyors in the field". This circular was later expanded by circular No. 36/210 issued by Mr. S A Perry who was the Deputy Surveyor General at the time. This circular would appear to be the origin of the existing practice of marking corners.

These two 1836 circulars were not drafted in the manner of present regulations but as a directive to staff surveyors to improve the marking and identification of corners.

As Beaver (1980) points out, the instructions clearly indicate that the reference bearing was to be shown on the plan as being from the corner to the tree. There is no indication in this circular that the trees had to be marked in any particular way, keeping in mind that there were no Parish or portion numbers issued at this period. It should also be noted that the instructions allowed for double marking of corners.

These 1836 instructions only applied to surveys of land for sale at one shilling per acre and not to Crown Grants, that is to gifts from the Crown.

The 1848 Circular contains the first recorded regulations, in the modern sense, to control methods of marking and measurement of surveys.

This instruction was issued by Mr. S A Perry who was the Deputy Surveyor General for most of Mitchell's term as Surveyor General. Williamson (1982) writes that it appears that these regulations were drafted by Perry while Mitchell was on leave in England in 1847 and 1848. Perry was the Acting Surveyor General at this time.

The period between 1833 and 1864 is critical in the development of survey practice in New South Wales. Prior to 1836 very little appears to have been formalised regarding survey directions and the earliest directions so far found are in the form of circulars to improve marking and identification of corners. The 1848 circular begins;

“The work to be performed by the Licensed surveyors is to be in strict accordance with the existing practice of the Surveyor General's Department...”

This seems to indicate that the practices described in this circular were formalised at some time prior to 1848.

The 1853 *“Instructions for Marking Crown Land by Government Surveyors”* is the earliest recorded instruction to Government surveyors and was issued by Mr. J Thompson and is dated 9 July 1853. Mr. Thompson was the Acting Deputy Surveyor General under Mitchell at the time of the instruction. These instructions give a detailed description of the marking to be used.

Truscott (1894) states that “For many years it has been the practice, here and elsewhere, to indicate the position of boundaries by means of a blazed line; but there is often doubt as to whether marks found are properly authentic, particularly on surveys of old grants and land purchases. In connection with these, it is a common opinion that the majority were seldom measured and rarely marked”.

The present method of “blazing” lines was first formally regulated in the 1853 instructions for marking Crown Land by Government Surveyors. Prior to 1850, rock marks were occasionally used but no standard had been adopted. In 1852 an act was passed directing that the official mark for surveys conducted for the government was the broad arrow. The 1853 Instructions made the first reference in any regulations to the numbering of reference trees, and the use of lockspits.

Truscott (1894) indicates that in the period of 1830 to 1850 surveyors were given credit for marking some of the corner trees of portions but it is a matter for speculation as to whether the boundary lines were marked between the corners. The lines were supposed to be blazed with the horse shoe mark but blazing carried out during this period was generally a crude attempt of the horse shoe notch. Truscott notes that on certain surveys carried out in 1839, the bark of trees was removed for about a foot, then three or four horizontal cuts with an axe, one above the other at intervals of a few inches, formed a blaze. It was then the custom as it is now, to mark the trees on both sides.

Truscott observes that the extent to which these marks become obscured by the subsequent regrowth of the tree will vary with the type of timber upon which the mark was made, the age of the tree and situation in which the tree grows. Most trees take about 150 years to reach maturity so judging from the size of some of the trees upon which marks have been found that are 60 years old then many of our trees are several hundred years old.

In 1894, Truscott states that in no case can he remember finding an authentic rock mark made more than 40 years earlier. It must also be pointed out that during the period 1830-1850, in surveys over rough broken ground there is little likelihood of old marks being found because often in portions with river frontages extending back to cliffs, the back lines were generally not run and if the back corners were not easily accessible marking was also omitted. This gives an indication of where not to look for marks in surveys made at the time.

Campbell (1894) states “In the period in question, 1830-1850, the system of contract surveying was tried, and that led to the adoption of survey by licensed surveyors, and though these were mostly retrenched staff surveyors, the marking at first was frequently insufficient, owing to the want of proper inspection, which led to a circular being issued in 1853 describing the marks to be used.”

The 1853 circular also has the first specific reference to “marking out towns” as opposed to marking of farms or surveys in rural areas. This slightly different approach for surveys in urban and rural areas has remained in survey regulations to the present day. The circular gave the first indication of the use of numbered mileposts on public roads, streams and ranges. At this stage it was still the practice to show the reference from the corner to the tree.

An important event regarding surveys during this period was the Royal Commission appointed to inquire into the Surveyor General’s Department in 1855 (Legislative Council of New South Wales 1856). This report, together with the minutes of evidence and appendix are one of the best insights into the survey system up until this time. The system of surveying and marking boundaries was not criticised by the Commissioners, although they recognised the potential problems with the system, that “very serious difficulty might be experienced” if the survey marks were destroyed or lost. The Commissioners recommended that a trigonometric survey should be commenced, based on sound scientific principles and marked in a permanent and conspicuous manner. They suggested that the first step would be to select and monument all the future trigonometric stations and to connect all future surveys to these stations, based on a true astronomic azimuth. The triangulation could follow in due course. Interestingly, this is, in general, the same procedure as is laid down in the Survey Coordination Act, 1949.

The last major development to affect the survey system during this period of time was the introduction of the Real Property Act, 1862. The effect on the survey system was the introduction of a special licence to practise under the Act and a move to generally tighten survey methods and practices. For a period, the Surveyor General (for Crown surveys) and the Registrar General (for private surveys) both issued survey standards.

Following representations by the New South Wales Institution of Surveyors to the Minister of Lands, the Chief Surveyor of the Department of Lands, Mr. E Twynam issued circular No. 94/41 in 1894 and followed this by a more expanded and detailed circular dated 20 February 1895.

The expanded circular was issued because of a difference of opinion as to the detail to be observed with the placement of special marks and because several of the District Surveyors requested further and particular information to be supplied so as to ensure uniformity. It should be noted that the reference given for special marks is from the corner to the mark on Lands Department plans prior to 1933 when the first Survey Practice Regulations came into existence.

3.2 CIRCULAR 1 JANUARY 1836

No.36/22 Surveyor General's Office

1st January 1836

Sir,

Having cause to apprehend that the marking and measuring of the portions of land applied for as purchases are conducted by some of the Surveyors in a very loose, inaccurate and unsatisfactory manner, particularly by their neglecting to trace the course of the Frontage Streams and to mark and ascertain the lengths of the lines dividing conterminous portions - I have to point out to you that - altho' even in the measurement of a Grant (a gift from the Crown) such looseness could scarcely be tolerated. The measurements of the lands in question is altogether a different matter - the Public being now purchasers at 1/- per acre from the Crown on whose faith they depend for the accuracy of the documents used in the progress of the sales - it is of the utmost importance that the most scrupulous exactness should obtain in these Surveys, - for were there found to be a less area in a portion than has been paid for by the purchaser, the Government would be bound to refund - if even the purchaser might not be justified in considering his bargain void - I instance this for the purpose of making evident to you the serious responsibility with which you are charged, and the penalties you may subject yourself to, by any neglect - besides the mischief and embarrassment that could result from the discovery of discrepancies of the nature alluded to - moreover, as the two portions on either side of the stream, must in every case, unless the river is very wide, amount to three sections; any inaccuracy in the area of the portion on one side must lead either to false lines or to a false area on the other side - I have therefore to desire your attention in future to the following particulars:

- 1st: Your plans are to be prepared on a scale of 20 chains to the inch instead of 40 as heretofore.
- 2nd: You will show on your plans by dots your traced lines indicating in the customary manner the stations and the trees that you will mark.
- 3rd: You will show on your plan the bearing and distance of any tree or trees from the actual corners of the portions- being very particular to choose such trees and make such arrangements as may render the ascertaining of these corners a matter of but little difficulty.
- 4th: You will show on your plans that the section lines by which the portion in question is bounded - is actually a continuation of some system of section lines - and not measured so as merely to accord with the General maps, or the tracings there from, which are furnished to you, for the purpose only of ascertaining the localities of the land.

In conclusion I may observe that great inconvenience is experienced by the Public and by the department for the sake of having the lands actually measured as insisted on by the Governor and that unless this is done the sales might just as well be carried on, and the areas calculated, from the General Surveys.

I have the honour to be. etc.

(Signed) T. MITCHELL.

To the Surveyors and Assistant Surveyors in the field.

Surveyors.	Assistant Surveyors.
Robt. Hoddle	Dixon
James Rolfe	G. B. White
	Butler
	H. F. White
	Rusden
	Larmer
	Elliot

REFERENCE: Letters from the Surveyor General to Surveyors.
Archives Reference 4/5425.

3.3 CIRCULAR 15 APRIL 1836

No.36/210

Surveyor General's Office
15th April 1836

Sir,

Referring to the third article of the instructions conveyed in my Circular No.36/22, I have now to request, in order to a more accurate marking and identification of the actual corners of all sections and portions of land measured for sale, that in accordance with the mode adopted by the Government of the United States in their measurements of land for sale, you will letter on your plans the corners of every section and the termination of section lines on frontages, as under, and attach to your plans a table as under, showing the actual situation of the trees marked, their bearing, distance, etc.

Description of Corners

At	Bearing	Distant in links	Trees marked	Bearing	Distant in links	Trees marked
A	corner	on a	She Oak			
B	N45°W95	Ironbark	S16°E	20°		Box
C	N60°E	40	Blue Gum	.....	.....	.....
D	Stake	.....	marked	.....	.....	.....
E	S25°E	60	Box	S40°W	10	Box
F	S30°W	80	Oak	N80°W	20	Stump

I have further to request that the area of the broken sections may always be shown separately on your plans and added to the section so as to make up the entire area; for instance, BCDE is the entire section, 640 acres, and ABEF the broken section, 300 acres, and 640 acres plus 300, makes up 940, the total area.

I have the honour to be
Sir,
Your obedient servant
in absence of the Surveyor General,
S. A. Perry
Dep. Sur. Genl.

3.4 CIRCULAR 10 APRIL 1848

Surveyor General's Office
Sydney, 10th April, 1848.

Sir

The work is to be performed by the licensed surveyors is to be in strict accordance with the existing practice of the Surveyor General's Department, which is as follows, viz:-

- 2 On directions being received by the licensed surveyor (and which shall have been sent through the regular post), to measure any portion or portions of land applied for to purchase, or as a grant to any public body, or to be appropriated for any public purpose, which are to be performed in the usual manner by taking angles with a theodolite, bearings with a circumferentor, and measurement of the lengths of the several boundary lines with a Gunter's chain, verified by comparison with the standard measure. In general the boundaries are to be upon the cardinal points of the compass, with magnetic bearings. Whenever a departure from this rule becomes necessary, either from the windings of a watercourse or road, or from peculiar features in the ground, the reasons for deviations must be made apparent in the plan of the work, and stated in the report which accompanies it. The margins of all lakes, lagoons, and swamps and also the tracks and courses of continuous mountain ranges, must be measured with the chain, and the bearings from each change of station must be noted in the field-book, and furnished in the description. The features of the ground, shewing what part is hilly, and the forms of the hills, and what part is level, must be carefully delineated.
- 3 Every measured portion must be firmly marked at each corner, by driving in stakes where the soil will admit of it, or by cutting into rocks, whenever they may occur, at the corners. The marks in the rocks are to be broad arrows, crosses, triangles or squares, and each licensed surveyor is requested to preserve uniformity in his own marks, so that they maybe easily described and recognised. Marks made by former surveyors are to be noted, but not to be interfered with. Surveys made under these instructions are to be connected with former surveys by means of the marks above referred to, from which measurements with the chain, and bearings of the compass needle, or angles taken with the theodolite, are to be made.
- 4 The documents in the office, to which access will always be afforded, are to be consulted with reference to previous surveys, in the neighbourhood of which any fresh measurements are made.
- 5 In extensive and continuous chaining, conspicuous marks on the trees are to be made, of a sufficient height to render them distinguishable from a distance.
- 6 In laying out a series of country or suburban lots, a way of access must be preserved to each, by marking roads of a chain wide at the back of any range of allotments fronting a river, and leaving a road of half a chain wide between every fourth or fifth allotment, so that the lands at the back may have access to the river or creek for water. It is not essential that each allotment should contain the same area, indeed the windings of a stream will cause the areas to vary, and which is rather desirable than otherwise.
- 7 The scale on which plans are to be drawn is for country lots four inches, and for general survey of features two inches to the mile. Town and suburban lots 1/4 inch to the chain. Plans for towns and villages 1/8 inch to the chain; on the corner of each plan there must be a reference to the marks or marked trees upon the ground, which shew the corners of the surveyed lands.
- 8 The surveyed lines and stations, with their lengths and compass bearings, must be shewn on the plans in red colour, and a proof line, run diagonally, must also be shewn in the same colour.
- 9 Boundary lines must be black, as well as the outlines of existing tracks or features, if surveyed. If merely sketched they must be shewn in black dots, as indicative of uncertainty. The field-books of licensed surveyors are the property of the Government, and are to be handed over on the discontinuance of the licence. Copies of them to be furnished whenever called for.
- 10 Every plan and description, or set of plans and descriptions, transmitted to headquarters, is to be accompanied

by a letter of transmission and concise report, each description being on a separate half-sheet of foolscap paper, and to be complete in every particular, dated, signed, and prepared in the manner in use in the office.

- 11 Payments will be made upon the certificate of the Surveyor General, (or officer conducting in his absence the business of the department), that the work has been examined and found to be correct. If otherwise, the work will be returned for resurvey, if necessary, or for explanation.
- 12 Payments for surveys of lands promised to be granted to public bodies or institutions - such as for churches, schools, and ministers' dwellings, of whatsoever denomination - is to be obtained from the parties for whose benefit the grant is proposed, but for general cemeteries, payment will be made in the same way as for other public work.
- 13 The schedule of fees, of which a copy was forwarded in my circular No.48-92, of 29th March last, will constitute the whole remuneration of licensed surveyors No account for travelling or other contingent expenses will be entertained.
- 14 Licensed surveyors are requested to reside in their respective districts.

I have, &c.,
S. A. PERRY
To the Licensed Surveyors

3.5 CIRCULAR “INSTRUCTIONS FOR MARKING CROWN LAND BY GOVERNMENT SURVEYORS”, 9 JULY 1853

Surveyor General's Office
9th July, 1853.

INSTRUCTIONS FOR MARKING CROWN LAND BY GOVERNMENT SURVEYORS

In survey of farms in forest country the trees should be marked within view of each other as near the boundary line as possible; the mark or blaze should be in the shape of a horseshoe, about breast high; where the tree is big enough to admit of it, the mark should be at least six inches wide, and cut into the wood from one and a half to two inches deep; along the boundary line the trees should be marked on two sides facing in the direction that the line runs; at each corner of the farm or allotment the nearest suitable tree should be marked on four sides, with the horseshoe mark, and a large piece of bark taken off, on which a broad arrow, at least six inches long, should be marked deeply in the wood, and if the allotments of which the tree forms the corner are numbered, such numbers should be cut deeply in the wood in the horseshoe mark, on the side of the tree facing the allotment to which such number applies. A large stake (of split stuff, cleared if possible), should be driven into the ground one foot at least, and left about six inches above the surface at the exact corner, and the bearing and distance of the numbered tree taken from the stake, and noted on the plan. If farms are marked in a plain country where there is no timber, a trench should be cut at every five chains along the line, and a cross cut in the earth, at the corner of each farm; a post-hole hoe will be found to be the most convenient tool for making such marks.

In marking out towns the sides of each of the sections or blocks should be lock-spitted all round about six inches deep, and at the corner of each allotment a tangent line about half a yard long should be lock-spitted; when it is a double section, the dividing line of the allotments should be lock-spitted, or crosses made at the corners of the allotments.

In the general survey of the country, or in a survey made to connect any measured portions, where it extends over more than one mile, Roman numbers should be marked at the end of every mile, giving the distance from the starting point, as these numbers are of great service in taking up the survey at any future period, and are particularly useful on public roads or along the course of streams or ranges.

JOHN THOMPSON
Acting D. S. General

3.6 EXPLANATORY LETTER REGARDING CIRCULAR 94-41 REPRINTED IN THE SURVEYOR 18 APRIL 1895. "SPECIAL MARKING OF SURVEY".

April 18, 1895

The following Circular has been issued by the Chief Surveyor relative to the Permanent Marking of Surveys;

Minl. 95 2,539. — Circular 94.41. — Minl,94.70,768

SPECIAL MARKING OF SURVEY

Referring to the Circular Letter quoted in margin, and lately issued, which directs certain special marks of permanent character to be used henceforth in surveys for this department, attached to which is a specification of such marking, it appears that there is much difference of opinion as to the detail to be observed, and several District Surveyors have expressed a request for further and particular information to be supplied, so as to ensure uniformity; therefore, the following memorandum has been written for circulation:

It has been decided that the Special Marks shall be in the alignment of a boundary of a measured area, or of a road, for the reason that they shall be regarded as part of the prescribed marking of a boundary; thus making it in the interest of proprietors to prevent mischievous interference therewith. In the selection of sites for such marks it is desirable to provide that they shall be intervisible the one from the other; and in the case of a measured portion, one of them near a corner, where the conditions admit, and that they shall be so placed as to be least likely to disturbance.

Position of
Marks

Touching an Iron Tube Mark: After digging a hole one foot deep the tube may generally be driven by a maul, but if the soil be too hard a crowbar may be requisite; and, in driving, a wooden maul should be used, otherwise a wooden or iron cap should be inserted in top of the tube, if a hammer or other metal tool be used.

Iron Tube Mark

It may be pointed out, that if the tube be marked with the board arrow (by means of a punch), it is brought within scope of the Survey Marks Act, 16 Victoria No. 15.

The use of a Bottle Mark is authorised as an alternative to a tube mark, as it is foreseen that in many remote localities it may be somewhat difficult occasionally to obtain iron tubing. The mixture for filling a bottle is composed of one part of cement to three of sand, mixed with a sufficient quantity of water. This mixture when hardened would enable identification of the mark although the bottle may have been broken.

Bottle Mark

The Rock Mark is designed for use in rock where neither of the others is convenient. A hole is to be made with a jumper, about 5 inches deep, into which is to be placed a piece of muntz metal rod, with the widened end and jags downwards, which is then fixed in position by molten sulphur mixed with sand poured in around the plug; this may be found specially adapted to feature survey, and plugs may be obtained from the Head Office on requisition of the District Surveyor. A similar plug, but somewhat larger, is used for marking the trigonometrical stations.

Rock Mark

One of the advantages presented by inserting these marks is that they may be utilised subsequently, when other marks may have become effaced, for recovering the azimuth and the standard of measure of a survey, and, therefore, the desirableness of carefully placing them in alignment, and noting the distances between them and relatively to other marks of the survey.

Advantages
Presented

As to fees for the service; It will be noted that the materials may be bought at low cost -- galvanised iron tube at about 6d. per ft., and cement at about 1d. per lb.; the average number of marks per square mile for alienation surveys is fixed at two in order to minimise expenditure. The circumstances of road surveys vary so much that it is expedient to leave the number of marks per mile to the discretion of the District Surveyor; but it is thought that on the long roads the average should not be less than two per mile. As to price to be paid, it is held that it should not exceed 2s.6d. per mark, and that it is expedient that the local increase shall not be applicable thereto.

Cost

E. Twynam
20 February, 1895 Chief Surveyor

4 REGULATIONS FOR THE EMPLOYMENT OF LICENSED SURVEYORS 1864-1914

4.1 INTRODUCTION

In 1864 “Regulations for the Guidance of Licensed Surveyors” were issued by the Surveyor General for the guidance of licensed surveyors employed by his Department. The marking directions of these regulations was divided into two sections ;

- (1) Directions to be observed in marking building and suburban allotments within town boundaries.
- (2) Directions to be observed in marking boundaries of land measured beyond the limits of towns. In these instructions it should be noted that references had to be shown from the reference tree to the corner. This method of referencing from the reference mark to the corner is the one still currently adopted today for all reference marks.

The directions required that section corners be marked with stakes two feet six inches long and driven 18 inches into the ground, with the number of the section cut or branded into the stake, or painted or marked by perforated tin or zinc. Each allotment corner within a section was also to be marked with a stake. The corners of sections and allotments were to be lockspitted. It was the 1864 directions which introduced lockspitting as we know it today.

The Regulation also outlined the form of equipment and calibration standards to be used, subject to the approval of the Surveyor General.

Of particular interest is the requirement that in marking the first surveys in any new town, sound blocks of wood two feet in length and six inches square or round (called alignment blocks) were to be sunk in the ground in the kerb line of a principal street and at a distance of not less than ten chains apart. These marks were intended to be of a more permanent nature, in that the marking at section and allotment corners would disappear during the occupation of the allotments. This requirement was repeated in 1872, but never repeated again.

The Regulations also enforced the use of linemarks (stake and lockspits). The requirements for the blazing of trees on or near boundary lines are still retained today.

The marking directions of the 1864 Regulations contain the first reference to permanent marks, to be placed along roads at prominent natural features and along other surveyed lines.

Further regulations were issued in 1872. These regulations were very similar in the marking aspect to the 1864 regulations except for a few minor changes regarding the measurements of lockspits of section corners which changed from six links in length to ten links. There is also a specification that the section corners be marked by a “split hardwood stake” specifying the type of wood to be used and these stakes may have the section number painted with black letters on a white background.

These regulations are the first to have a section titled “Directions for Survey of Roads to be Opened Under the Act 4 WILLIAM IV No. 1”. This is the first reference to actual road surveys in any of the regulations. The 1872 Regulations prohibited the use of the circumferentor unless specifically authorised.

Marking requirements under “Regulations for the Employment of Licensed Surveyors” were further modified in 1882. The 1882 marking directions imposed a penalty against a surveyor if marking was not “performed in a permanent manner, and in accordance with the following specifications....”

These regulations seem to be the origin of the modern broad arrow “on survey marks for the Government”. They also introduced the concept of intervisible permanent marks along

boundaries of country portions. Another interesting provision is on country portions in plain country, where no trees are available for referencing, one corner was to be marked by a mound of earth six feet in diameter and two feet high around the peg.

In the section for feature and other surveys there is a provision for County, Reserve and other like boundaries to be marked by clearing the line and defined by stakes and trenches as if for a country portion. These were marked by “the initial letters of the names of the Counties which shall be used for boundaries of the same placed over numerals in regular sequence for that survey”. There is also a specification for reserves whereby the Gazetted number of a reserve was inscribed under the letters “W.R.”, “P.R”, “Q.R.” and where there was no number for a reserve it was to be marked “RES”.

It should be noted that in the 1872 Regulations, the Gunter’s chain was still the standard for linear measurement although the steel riband was in general use at this stage. In the 1882 Regulations the standard changed to the riband.

Minor alterations were made to the 1882 Regulations in 1886. A regulation was added for the marking of Homestead Leases.

Further minor amendments were made in 1901. A new section was added on special marks, replicating the 1895 Circular issued by the Surveyor General. The Regulations added directions on the size of the metal plug to be used and how to fix the plug into rock. The mixture of sand to cement ratio for bottlemarks and the dimensions of galvanised iron pipes were also included in this section.

Gaining a conviction for wilful destruction of government survey marks must have been a problem at this time, as the Regulations included an expanded section on the gathering of evidence so that steps could be taken “for protection of survey marks, the mischievous destruction of which causes much inconvenience and loss of time”.

The requirement for a surveyor to carry a Gunter’s Chain was dropped in the 1901 Regulations.

The Regulations were amended again in 1914 by the addition of regulation 97, dealing with marking reference trees or rocks within 200 links of corners and reference stations.

4.2 REGULATIONS ISSUED 1864 - EXTRACTS

General

- 6 A standard needle has been adopted in this Office, with which it is desirable that all circumferentors should be made to read, and the District Surveyors have been or will be supplied with instruments adjusted to the standard, by which the instruments of other Surveyors may be adjusted.

Measurements

- 2 He will also ascertain (with the theodolite) the levels of one or more of the proposed streets on the design hereafter alluded to, and plot a section on any suitable space on the plan.
- 4 He will then prepare a design for the town, in which, so far as the ground will admit of the arrangement, streets 150 links in width should be provided, at distances of five chains and 30 links apart, in the direction of the principal traffic, and cross streets, at right angles, at distances of 10 chains apart. These distances may be modified to suit the natural features within extremes of 400 and 600 links, and 6 and 12 chains respectively. The building allotments within the sections formed by the streets will be, where the regulated distances are preserved, of two chains frontage by 250 links depth, and with a back lane entrance, parallel to the at other distances than the above, the allotments will be as nearly of that area and form as may be practicable.
- 22 In any case where the reservation of a road through a measured portion may be unavoidable, the Surveyor will survey it and mark its centre line on the ground, as well as its intersections with the boundaries of the portion; and he will shew on his plan the distance from the intersections to the nearest corners on the plan.
- 30 The size of parishes should be approximately 25 square miles, but may be allowed to vary from 15 to 35 square miles.

Roads

- 6 In order that it may be easily followed by persons desiring to examine it, and eventually by any other Surveyor who may be engaged in formally opening it, the road should be defined by the marking of trees, or fences, with the broad arrow, and where it can be done by the letter R, and by stakes or lockspits, by which persons desiring hereafter to fence the road may be able to place the fences in their proper positions. Stakes not less than 3 inches square should be inserted 18 inches into the ground at each bend of the road, and lockspits should be cut 10 links long on each side in the direction of the road. Where the road passes through Crown Lands, the marking should be in the centre of the road; where through Alienated Lands, the marking should be on one side of the road throughout, with occasional marks on the other side to shew the breadth.

Plans

- 23 The reference on plan to the marking of corners will, in the case of town allotments, be merely a statement that they have been marked in accordance with the directions for marking, excepting where a rock or tree may form a corner, when its existence may be shewn on the plan.

The reference to the marking of country portions is to be strictly in the form of the annexed table, the letter referring to the corner being of course varied as circumstances may require.

REFERENCE TO CORNERS

Corner	Bearing	From	Links	Number on Tree
A	North	Bloodwood	50	XV, XVI
B	W.4°30'S	Ironbark	17	XVII
C		No tree near		
D	E.18°15'N	Swamp Oak Rock	24	XVII Broad Arrow

APPENDIX A

Marking

List of Instruments to be provided by each Licensed Surveyor, and to be subject to the approval of Surveyor General.

- One Theodolite, not less than four inches in diameter.
- One Circumferentor, “ “ “ “ “ “
- One Chain to be kept as a standard, and never used in survey.
- Two or more chains for general use.

Directions to Be Observed in Marking Building and Suburban Allotments Within Town Boundaries

- 1 The building lines of streets, and the side lines of back entrances, are, where the land is not naturally clear, to be cleared to a width of not less than 3 feet, by the removal of all scrub and trees of a less diameter than 10 inches.
- 2 Should large trees stand in a building line, the usual horseshoe Surveyor’s mark is to be cut upon the opposite sides of the tree, in the direction of the building line, and the precise position of that line is to be indicated by a cut not less than 9 inches long in each horseshoe mark. (See Diagram A.)
- 3 Should a tree stand at the intersection of two building lines, the horseshoe marks, instead of being opposite, will, of course, be at right angles with each other, or in any other angle which the building lines may form, and the number of the section is to be cut or branded in the horseshoe, as hereafter directed with reference to marks on stakes. (Diagram B.)
- 4 The corners of sections are to be lockspitted to a depth of 9 inches, and a length of 6 links, commencing at 2 links from the corner, and should rocks occupy the position of corners, lines of equal depth with the lockspits, and numbers as hereafter directed, are to be cut (were practicable) with a pick. The corners of allotments are to be lockspitted in a similar manner, but for 4 links only in length and 6 inches in depth. (Diagram C.)
- 5 At each section corner, excepting, of course, those that are marked by trees, a stake is to be driven 18 inches into the ground (were practicable), and on a flat surface of the stake, the number of the section is to be cut or branded in Roman figures of 3 to 4 inches in height, or painted or marked by perforated tin or zinc in ordinary figures. (Diagram D.)
- 6 At each allotment corner a stake is to be driven 15 inches into the ground (were practicable), and on those on the street frontages, the numbers of allotments are to be marked as above, in figures 2 inches in height. (Diagram E.)

- 7 The branding of both section and allotment stakes may be done with a single branding iron, having a face 2 inches in length by one quarter of an inch wide. The cutting may be done with a triangular gouge having a bent handle, and should not be less than a depth of $\frac{3}{4}$ of an inch into the wood of the tree. (Diagram F.)
- 8 In making the first surveys in any new town, in addition to the above marking which will length and six inches square or in diameter, are to be sunk in the ground, three inches below the surface, in the kerb line (12 feet from the building line) of a principal street of the town, and at a distance of not less than ten chains apart, and so placed that blunt points to which they may be cut, or large nails which may be driven into them, will be precisely in the kerb lines of that street, and off two intersecting streets. These marks are intended to form a basis with which future surveys in the town may be connected. (Diagram G.)

Directions to Be Observed in Marking Boundaries of Land, Measured Beyond the Limits of Towns

- 9 All boundary lines, where the country is not naturally clear, are to be cleared to a width of not less than three feet, by the removal of all scrub and trees of a less diameter than three inches.
- 10 All trees upon boundary lines, or within two paces in thickly wooded country, and four paces in open forest country, are to be marked with the horseshoe mark which is to be cut into the wood of the tree on the opposite sides (but not directly opposite should the tree be small or weak), in the direction of the boundary line; and those trees which are actually in the line are to be marked, in addition, with smaller horseshoe marks above the others. (Diagram H.)
- 11 The corners of portions are, where a tree may stand in the corner, to be marked by four horseshoe marks, in the lines of the boundaries and their continuations; and broad arrows, not less than four inches long, are to be cut deep in the marks, on two sides where the boundaries of one portion only may meet the tree, on three sides where the boundaries of two portions may meet the tree, and on four sides where the boundaries of three or four portions may meet the tree. The horseshoe marks are invariably to face the directions in which the boundary lines run. (Diagram I.)
- 12 Should there be no tree at a corner, or on a line, the nearest large tree is to be marked by removing a portion of the bark from nearly half of the circumference of the tree on the side facing the stake, and cutting at least one inch deep into the wood of the tree the broad arrow and the parish number of all the portions adjoining at the stake. At the corner trenches are to be cut with a spade or pick, not less than ten links in length and eight inches in depth and width, but not approaching nearer than one foot to the corner stake which must be not less than two feet six inches long, and must be driven 18 inches into the ground, the general direction of the boundary will be as indicated. (Diagram J.)
- 13 In very open forest country or plain the boundaries are to be marked by lockspits of 20 link in length, at distances of ten chains apart, and with a picket or short stake in the centre of each; and the corners by trenches, as above directed, but with a larger stake, cut flat on the top, and having a broad arrow cut on it.
- 14 Rocks which may be upon a boundary line are, wherever the character of the rock will admit of it, to be marked with a pick line; and where at a corner of a portion, with a broad arrow. (Diagram K.)
- 15 Where portions being measured from part of any regular series, for which numbers can be used as portions of a parish, the numbers of the portion or portions on or near the corners of which a tree may stand, are to be cut in the wood of the tree, after the bark has been removed, from a space at least one-third of the circumference,

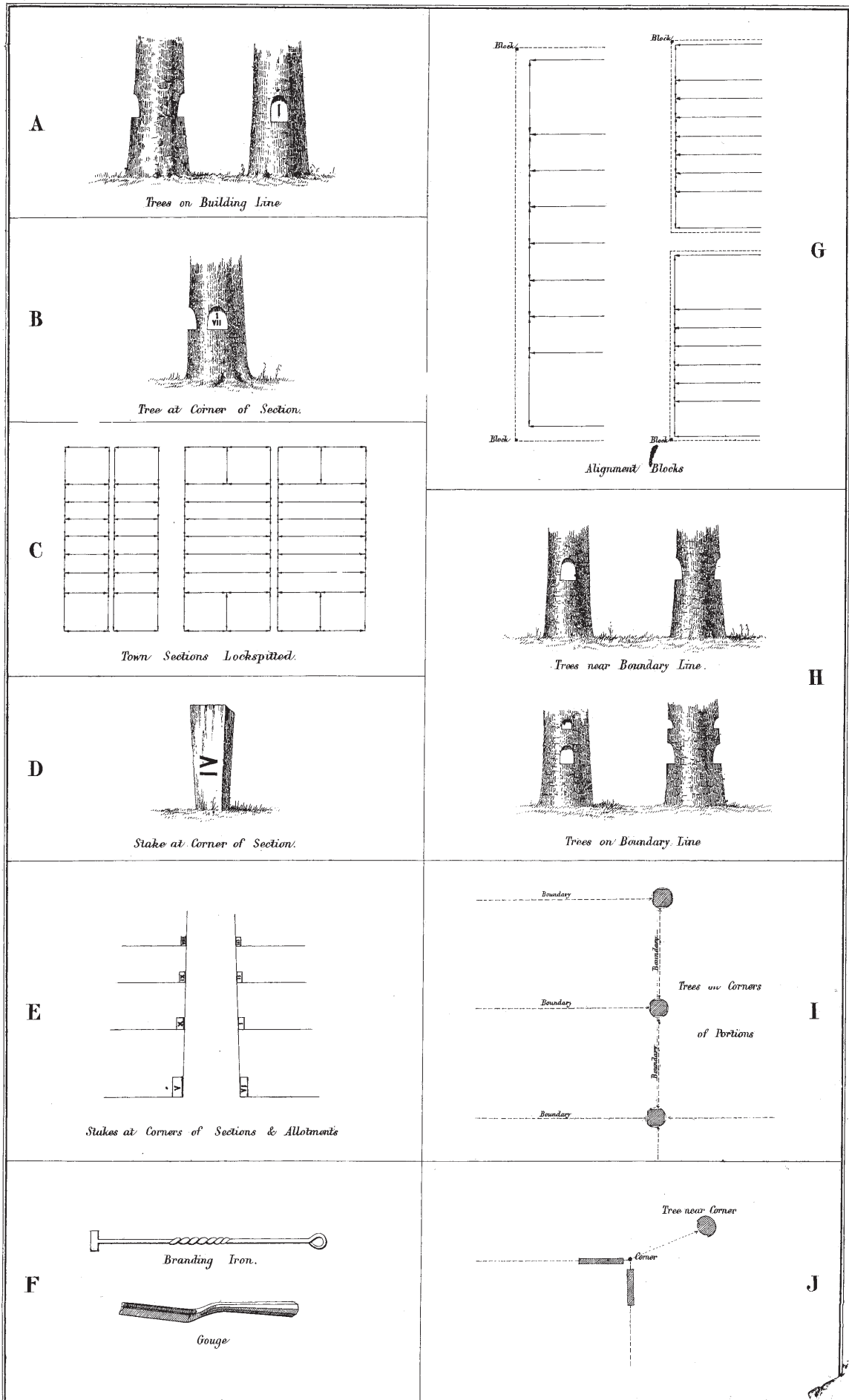
in a position facing the corner stake. In high series of numbers, where Roman figures would occupy an inconvenient space, ordinary figures may be used. Where Roman numbers extend above 100, a horizontal line over the units and tens may be substituted for the C. (Diagram L.)

- 16 Where measurements are made in isolated localities, where no parish boundaries have been proposed, and no perfect series of numbers can be adopted, or used in descriptions for deeds, it is still necessary to the identification of the lands by purchasers, or by intending purchasers, that the boundary marks of different portions should be distinguished by numbers which may be introduced in the Sale Proclamations of the lands. With this object the corners of portions in each separate locality, or on any particular creek on which surveys may be made, are to be numbered in a series, which will extend to all measurements made in that locality in each year; and to these numbers the unit number of each year is to be prefixed, as per diagram, the numbers appearing, of course, at all the corners of the portions which they represent. It is of the greatest importance that no confusion should occur in this numbering, and the Surveyor will therefore exercise the greatest care and discretion in determining the boundaries for each series. (Diagram M.)

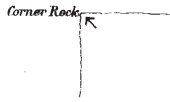
The Following Directions Will Be Acted on in Carrying Out Surveys Other Than Those of Lands for Sale

- 17 Permanent marks, somewhat similar in character to those used in the marking of corners in country portions, are to be made at points distant not more than one mile apart, and their positions, which are to be determined principally by the passing or intersection of prominent natural features, or by the probable junction of future surveys following those features, are to be shown on the plan.
- 18 The marks are to be cut one inch deep in the wood of a tree from which the bark has been removed for about one-half of its circumference, care being taken that the sap vessels are cut in order to prevent the bark again covering the tree, and in any case in which it may be necessary to use a stake also, the marking (which is to face the stake), is to be made as per diagram marked N, the letter being the next in alphabetical order, and the figures representing the last two for the year. In the absence of timber or rocks, the marks are to be cut in posts, to be placed in the centre of mounds.
- 19 In surveys of roads, where the miles are marked on trees whose exact positions are shown on the map, this system need not be fully carried out, in as much as the mile trees will be considered sufficient data wherewith to connect, when within 20 chains of any important feature; - but the terminations of all surveys, branch surveys, or plain traverses, are to be fully marked in the manner explained, to facilitate their identification, or to admit of the work being taken up in carrying on future surveys.
- 20 Where possible, surveys for the connection of isolated measurements are to follow leading features, and a departure from this instruction will, in the absence of a satisfactory explanation, lead to the return of the plan for amendment, at the cost of the Surveyor.
- 21 In selecting features to be followed in connection or feature surveys, preference is to be given, firstly, to creeks or rivers, secondly; to divisions of waters or ranges; and lastly, to roads or tracts, which, not being of a permanent character, add less to the geography of the country.

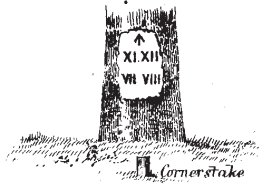
Note:-In the event of any instances of the destruction of Surveyor's marks coming under his observation, the Surveyor will furnish the Chief Constable of the Police District in which the land may be situated, with such information as will enable him to prosecute the offenders under the Act of Council, 16 Victoria, No.15.



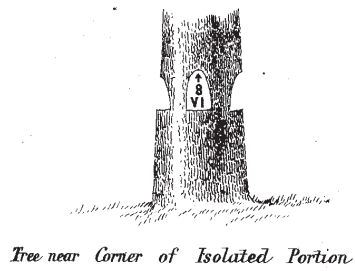
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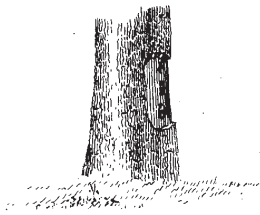
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4.3 REGULATIONS ISSUED 1872 - EXTRACTS

General

- 1 Every Licensed Surveyor to whom a portion of the Colony may be specifically assigned, shall supply himself with the surveying instruments mentioned in the list hereto appended marked A; with necessary equipment and labour; with copies of plans of lands adjacent to those which he may be instructed to measure; and with all information necessary to the carrying out of instructions.
- 5 The use of the circumferentor is prohibited except in cases where specially authorized, in writing, by the Head of the Department.

Measurements

- 40 Offsets from traverse lines to fix the position of rivers, creeks, &c., should not exceed 150 links in surveys of country portions, nor 75 links in suburban portions. In cases where it is necessary to exceed the above limits, lines should be run and shewn on the plan.

Roads

- 72 The road shall be defined on both sides by trees marked in the customary manner; and there shall be split hardwood stakes three inches square and 21 inches long, driven 18 inches into the ground, with trenches ten links in length and nine inches in depth and width at all angles, and also on the side measured, at each mile of continuous measurement; and also at every tenth chain on every measured line. The distance or miles shall be cut on the nearest tree in conspicuous figures six inches in length by one inch in width and 3/4 of an inch in depth; and, in the absence of a tree, a post four feet six inches long, and not less than 12 inches in diameter, and let two feet into the ground, shall be firmly erected, on which the figures shall be cut as before stated. The corner posts of fences along which the road passes should be marked occasionally with broad-arrow over R.

Plans

- 109 When bearings are not read from 0 degrees to 360 degrees they are in future to be read from the north and from the south to east and west, - as for instance, "S.84 E." instead of "E.6 S."
- 125 The reference to the marking of country portions is to be strictly in the form of the annexed table, the letter referring to the corner being of course varied as circumstances may require.

Reference to Corners

Corner	Bearing	From	Links	Number on Tree
A	North	Bloodwood	50	15,16
B	S.85°30'W	Ironbark	17	17
C		No near tree		
D	N.71°45'E	Swamp Oak	24	1/10
E		Rock		Broad Arrow

Directions to Be Observed in Marking Building and Suburban Allotments Within Town Boundaries

- 77 The building lines of streets, and the side lines of back entrances, are, where the land is not naturally clear, to be cleared to a width of not less than three feet, by the

- removal of all scrub and trees of a less diameter than ten inches.
- 78 The corners of sections are to be trenched to a depth of nine inches, and a length of ten links, commencing at two links from the corner; and should rocks occupy the position of corners, lines of equal length with the trenches, and numbers as hereafter directed, are to be cut. The corners of allotments are to be trenched in a similar manner. (Diagram A.)
- 79 At each section corner a split hardwood stake is to be driven 18 inches into the ground, and on a flat surface of the stake the number of the section is to be cut or branded in Roman figures of 4 inches in height, or painted with black letters on a white ground, or marked by perforated tin or zinc in ordinary figures. (Diagram B.)
- 80 At each allotment corner a stake is to be driven 12 inches into the ground, and on those on the street frontages the numbers of allotments are to be marked as above, in figures two inches in height. (Diagram C.)
- 81 The branding of both section and allotment stakes may be done with a single branding iron, having a face two inches in length by one quarter of an inch wide. The cutting may be done with a triangular gouge having a bent handle, and should not be less than a depth of $\frac{3}{4}$ of an inch into the wood of the tree. (Diagram D.)
- 82 In making the first surveys in any new town, in addition to the above marking, which will obviously disappear with the occupation of the allotments, sound blocks of wood, two feet in length and six inches square or in diameter, are to be sunk in the ground, six inches below the surface, in the kerb line (12 feet from the building-line) of a principal street of the town, and at a distance of not less than ten chains apart, and so placed that blunt points to which they may be cut, or large nails which may be driven into them, will be precisely in the kerb lines of that street, and of two intersecting streets. These marks are intended to form a basis with which future surveys in the town may be connected (Diagram E.)

Directions to Be Observed in Marking Boundaries of Land Measured Beyond the Limits of Towns

- 83 All boundary lines, where the country is not naturally clear, are to be cleared to a width of not less than three feet, by the removal of all scrub and trees of a less diameter than four inches.
- 84 All trees upon boundary lines, or within three feet in thickly wooded country, and five feet in open forest country, are to be marked with the horseshoe mark, which is to be cut into the wood of the tree on the opposite sides, in the direction of the boundary line, and those trees which are actually in the line are to be marked, in addition, with smaller horseshoe marks above the others. (Diagram F.)
- 85 The corners of portions are, where a tree may stand, on the corner, to be marked by four horseshoe marks in the lines of the boundaries and their continuations; and broad- arrows, not less than four inches long, are to be cut deep in the marks on two sides where the boundaries of one portion only may meet the tree, on three sides where the boundaries of portions may meet the tree. The horseshoe marks are invariably to face the directions in which the boundary lines run. (Diagram G.)
- 86 Should there be no tree at a corner, or on a line, the nearest large tree is to be marked by removing a portion of the bark from nearly half of the circumference of the tree on the side facing the stake, and cutting at least one inch deep into the wood of the tree the broad-arrow and the parish number (in ordinary numerals) of all the portions joining at the stake. At the corner, trenches are to be cut with a spade or pick not less than ten links in length and nine inches in depth and width, but not approaching nearer than one foot to the corner stake, which must be not less than two feet six inches long, and must be driven 18 inches into the ground; the

general direction of the boundary will be as indicated. (Diagram H.)

- 87 In very open forest country or plain the boundaries are to be marked by lockspits of 20 links in length, at distances of ten chains apart and with a picket or short stake in the centre of each; and the corners by trenches, as above directed, but with a larger stake cut flat on the top, and having a broad-arrow cut on it.
- 88 Rocks, which may be on a boundary - line are, wherever the character of the rock will admit of it, to be marked with a pick line; and where at a corner of a portion, with a broad-arrow. (Diagram I.)
- 89 Where measurements are made in isolated localities where no parish boundaries have been proposed and no perfect series of numbers can be adopted or used in descriptions for deeds, it is still necessary for the identification of the lands, that the boundary marks of different portions should be distinguished by numbers which may be introduced in the Sale Proclamations of the lands. With this object the corner trees of portions in each separate locality or on any particular creek on which surveys may be made, are to be numbered in a series which will extend to all measurements made in that locality in each year; and to these numbers the unit number of each year is to be prefixed, as per diagram the numbers appearing of course at all the corners of the portions which they represent. It is of the greatest importance that no confusion should occur in this numbering, and the Surveyor will therefore exercise care and discretion in determining the boundaries for each series. (Diagram J.)

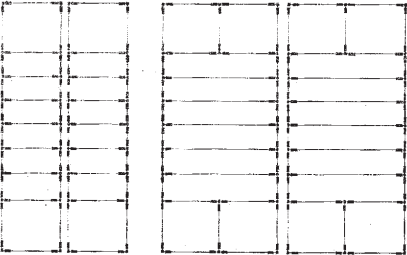
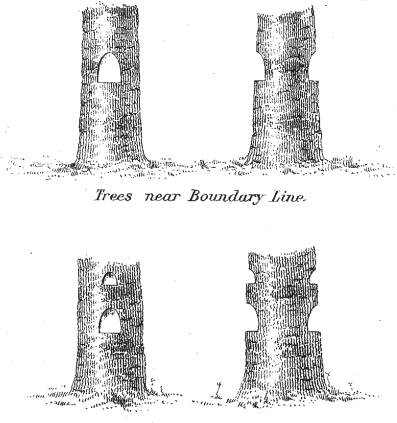
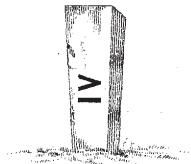
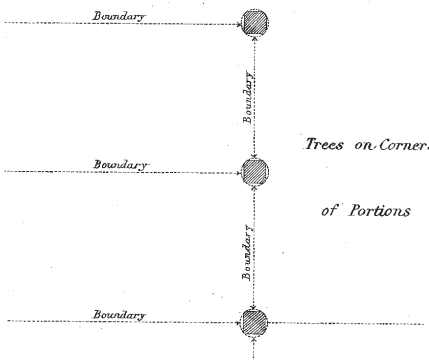
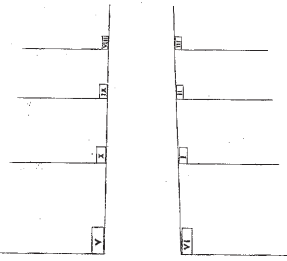
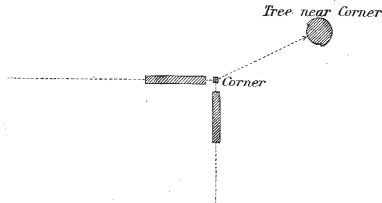


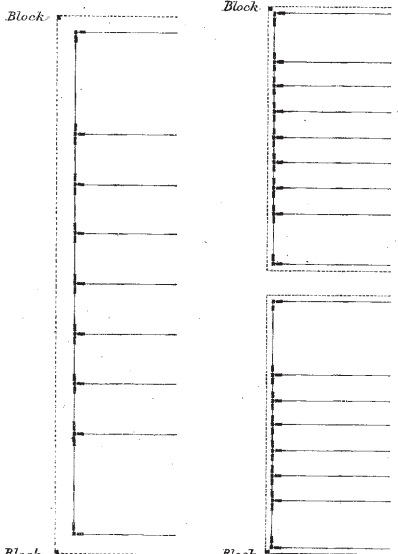
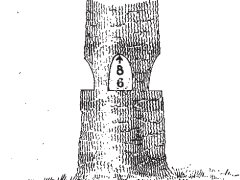
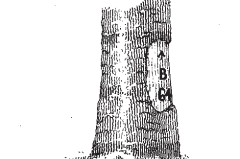
Directions to Be Observed in Surveys Other Than Those of Lands for Sale

- 90 In feature surveys, observations of either sun or star for the determination of the true meridian, shall be taken at intervals. In country not liable to local attraction these need not be closer than eight miles in longitude; in less favourable country the distance should not exceed six miles. In marking the boundaries of counties, the trees should be consequently numbered, the initial letters of the counties should appear below the broad-arrow and above the number. Full consideration should be given to the importance of the selection of healthy trees, which have also attained sufficient growth, upon which to mark. The above instructions will also apply to the survey of roads or tracks which it may be necessary to survey when no leading feature exists; and in such cases it will be necessary to accompany the survey with a report on the most suitable position for reserves from lease and conditional purchase, to secure access to water for travelling stock, - also the most desirable width for the road. In feature surveys it is desirable to obtain as much topographical information as possible; the Surveyor should therefore take bearings to determine the position of distant conspicuous mountain peaks. Should there be difficulties or obstructions, such as cliffs, it is not imperative to follow exactly the course of the feature, but the traverse should follow the summit of the range as nearly as may be consistent with accurate chainage. Offsets of more than 150 links to two chains are most objectionable; and when it is not convenient to follow a creek within the distance subsidiary traverse should be made.
- 91 Permanent marks, somewhat similar in character to those used in the marking of corners in country portions, are to be made at points distant not more than one mile apart, and their positions, which are to be determined principally by the passing or intersection of prominent natural features, or by the probable junction of future surveys following those features, are to be shown on the plan.
- 92 The marks are to be cut one inch deep in the wood of a tree from which the bark has been removed for about one-half of its circumference, care being taken that the sap vessels are cut in order to prevent the bark again covering the tree; and in any case in which it may be necessary to use a stake also, the marking (which is to face the stake), is to be made as per diagram marked K, the letter being the next in alphabetical

order and the figures representing the last two for the year. In the absence of timber or rocks the marks are to be cut in posts to be placed in the centre of mounds.

- 93 In surveys of roads, where the miles are marked on trees whose exact positions are shown on the map, this system need not be fully carried out, in as much as the mile trees will be considered sufficient data wherewith to connect when within 20 chains of any important feature; but the terminations of all surveys, branch surveys, or plain traverses, are to be fully marked in the manner explained to facilitate their identification, or to admit of the work being taken up in carrying on future surveys.
- 94 Where possible, surveys for the connection of isolated measurements are to follow leading features, and a departure from this rule will, in the absence of a satisfactory explanation, lead to the requirement of an amended survey.
- 95 In selecting features to be followed in connection, or feature surveys, preference is to be given, firstly, to creeks or rivers; secondly, to divisions of waters or ranges; and lastly, to roads or tracks, which, not being of a permanent character, add less to the geography of the country.
- 96 Except in the absence of the before mentioned natural features, roads or tracks should not be traversed for connections; and such surveys will only be paid for at the rate of 5s. per mile.
- 97 Unless under special authority, surveys for connection should not exceed two miles; but should the portion measured be more than that distance from previous surveys, a local sketch giving its position approximately, together with a traverse to the nearest prominent feature, will be sufficient for description.

Note:-In the event of any instances of the destruction of Surveyor's marks coming under his observation, the Surveyor will furnish the Senior-sergeant of Police in whose District the land may be situated, with such information as will enable him to prosecute the offenders under the Act of Council, 16 Victoria, No.15.

<p>A</p>  <p><i>Town Sections Lockspitted</i></p>	<p>F</p>  <p><i>Trees near Boundary Line.</i></p> <p><i>Trees on Boundary Line.</i></p>
<p>B</p>  <p><i>Stake at Corner of Section</i></p>	<p>G</p>  <p><i>Trees on Corners of Portions</i></p>
<p>C</p>  <p><i>Stakes at Corners of Sections & Allotments</i></p>	<p>H</p>  <p><i>Tree near Corner</i></p> <p><i>Corner</i></p>
<p>D</p>  <p><i>Branding Iron</i></p> <p><i>Gouge</i></p>	<p>I</p>  <p><i>Corner Rock</i></p>
<p>E</p>  <p><i>Alignment Blocks</i></p>	<p>J</p>  <p><i>Tree near Corner of Isolated Portion</i></p>
	<p>K</p> 

4.4 REGULATIONS ISSUED 1882 - EXTRACTS

GENERAL

Equipment 3 A Licensed Surveyor shall supply himself with the surveying instruments mentioned in the appended list (See Appendix A); with necessary equipment and labour, with copies of plans of lands adjacent to those which he may be instructed to measure, with copies of such Acts of Parliament as relate to alienation and occupation of Crown Land and survey of roads, and with all information for carrying out his instructions.

Appendix A

Instruments to be provided by a Licensed Surveyor, and to be subject to approval of the Surveyor General.

- One (1) Theodolite, not less than five inches diameter.
- Two (2) Steel Ribands, 66 feet long; one to be used for adjusting and testing the riband and chain used for measurement.
- One (1) Gunter's Chain.
- One (1) Metal Parallel Ruler, not less than 18 inches long.
- One (1) Metal Protractor, not less than six inches in diameter, or a cardboard protractor.
- One (1) Set of Chain Scales, and other necessary drawing instruments.

Azimuth to be determined

- 42 In cases where five or more portions of 40 acres or upward are measured adjacent to one another by the same Surveyor, it is desirable that the azimuth or true bearing of the lines of the survey be determined by solar or stellar observation, the particulars of which shall be recorded on the plan of one of such portions; and for this purpose tables have been prepared for the use of Surveyors.....Stations for such observations should not be nearer to each other than 2 miles; and it is not required that the meridian be thus determined without inquiry as to previous action in this respect in the same locality. (Vide Appendices E and Ea).

Swamps and lagoons - portions bordering on

- 43 Certain indefinite riparian rights being conferred by the alienation of Crown land with frontage to lagoons, swamps, and lakes, the contour of such swamps and lakes should not be treated as a boundary, but the land to be alienated should be defined by right lines.

Tidal waters -portions bordering on & High-water mark definition of

- 44 On creeks, estuaries, or waters subject to tidal influence, land, being the foreshore, cannot be alienated beyond high-water mark, unless under special conditions as prescribed by law; but where high-water mark is doubtful the boundaries of the land measured shall be right lines following approximately such high-water mark. When the conditions are favourable, and in view of probable traffic, a road may be marked approximately along high-water mark, and shall form the boundary of such portion. High-water mark shall be defined as the mean high-tide mark between high-water spring and high-water neap tides.

ROADS

Bearings to Trig. Stations

- 106 Bearings shall be carefully observed to trigonometrical stations wherever visible, and particulars noted on plan.

Magnetic Variation

- 107 The magnetic variation shall be determined as prescribed in paragraph 42.

FEATURE AND OTHER SURVEYS

Azimuth to be determined & Magnetic variation Bearing to trig. stations

- 112 In a feature survey the azimuth or true bearing of the traverse shall be determined either by solar or stellar observation, and in accordance with paragraph 42. In country not liable to local attraction stations for such observations need not be nearer than ten miles in latitude and five miles in longitude; but where local attraction is suspected the distance should not exceed five miles and two miles respectively. The magnetic north and true meridian shall be indicated on the plan. Bearings shall be carefully observed to trigonometrical stations wherever visible, and the particulars noted on the plan.

GENERAL DIRECTIONS

Destruction of Surveyors marks.

- 120 In the event of any instance of the wilful and malicious destruction of Surveyors' marks coming under the observation of a Surveyor, he shall furnish to the local Superintendent of Police such information as may enable the prosecution of the offender under the Act of Council, 16 Victoria No.15. (Appendix Bb.)

Character of marking & Penalty

- 121 All marking shall be performed in a permanent manner, and in accordance with the following specifications; and omissions, or neglect to comply therewith, or insufficient marking, will render the Surveyor liable to the imposition of a fine in the form of a reduction or discount upon the fees.

Reference trees - particulars of

- 122 Particulars of all reference trees, i.e., bearing and distance to the nearest peg of traverse or corner, and species of trees and marks thereon, shall be observed and recorded for noting on plan: and such distance shall be horizontal and from the broad-arrow to the peg.

Broad-arrow

- 123 All survey marks for the Government shall bear inscribed the broad-arrow above such other figures as may be used, excepting of course the detail marking by pegs of town and suburban allotments.

TOWN AND SUBURBAN ALLOTMENTS

Clearing boundary lines

- 124 The building lines of streets and the side lines of lanes are, where the land is not naturally open, to be cleared to a width of not less than three feet, by the removal of all scrub and trees of a less diameter than ten inches.

Section corner

- 125 Each section corner is to be marked by a split hardwood stake four inches square and 30 inches long, driven 18 inches into the ground; and by trenches cut to a depth of nine inches and a length of ten links, in the direction of the boundary-lines, and commencing at two links from the stake. On a dressed surface of the stake the section number, 4 inches in height, and in ordinary numerals, is to be cut or branded, or painted in black on a white ground. The number of the corner allotment, should also be marked two inches in height, on the section corner stake. [Vide Diagrams A and B]

Allotment corner

- 126 At each allotment corner a split hardwood stake, three inches by two inches, and 24 inches long, is to be driven 12 inches into the ground; and if on the street frontage is to be marked as above directed with the allotment numbers, in figures two inches in height. Trenches are also to be cut at the corners of allotments as directed in the foregoing paragraph [Vide Diagram C]

Rock at corner

- 127 Should rock occupy the position of a corner, a broad-arrow and dot should be cut to indicate the corner, and lines should be marked with a pick in the direction of the boundaries. The section and allotment numbers should also be cut on the rock. [Vide Diagram D.]

Numbering suburban portions

- 128 Town allotments are numbered as of the section. Suburban portions shall be marked in the same manner as country portions, unless where previously designed in sections, when they shall be marked and numbered in the same manner as town allotments.

COUNTRY PORTIONS

Clearing boundary lines

- 129 All boundary-lines, where the country is not open, are to be cleared to a width of not less than three feet by the removal of all scrub, and of a less diameter than four inches.

Trees on or near boundaries

- 130 All trees upon boundary-lines, or within three feet in thickly wooded country, and five feet in open forest country, are to be marked with the horseshoe mark, which is to be cut into the wood of the tree on the opposite sides, in the direction of the boundary-line; and those trees which are in the line are to be marked in addition with smaller horseshoe marks above the others. [Vide Diagram F]

Alignment Pegs

- 131 In alignment of boundary, split hardwood three inches by two inches, and 18 inches long, shall be inserted nine inches in the ground at intervals of not more than ten chains, with a lockspit on each side, ten links long and nine inches deep and wide, in the direction of the boundary, the object being to provide permanent marks visible one from another.

Tree at the corner

- 132 Corners of portions shall be marked thus:- When a tree may stand on the corner it shall be marked with four horseshoe marks, and the bark shall be removed from a

suitable portion of the tree, and on the surface thus exposed there shall be cut, at least 3/4 inch deep into the wood, the broad-arrow over the parish numbers (in ordinary numerals) of all the portions joining at the corner. [Vide paragraph 45.] Trenches indicating the direction of the boundary-lines shall also be cut in the manner directed in the following paragraph [Vide Diagrams G and J.]

Tree near the corner

- 133 Where there is no tree on the corner the nearest large tree shall be marked in a similar manner; and at the corner a split hardwood stake, 4 inches square and 24 inches long, shall be inserted 18 inches in the ground; and trenches, ten links in length and nine inches in depth and width, should be cut, in the direction of each of the boundary-lines meeting at the corner. [Vide Diagram H.] The particulars of bearing and distance from the peg to the tree shall be observed and noted for reference. [Vide paragraph 175.]

Corner with no tree near

- 134 Should there be no tree on or near the corner, the stake or post used to mark the corner shall be two feet six inches long and four inches square, or six inches in diameter, sound and substantial, and should bear inscribed the number of the portion.

In open plain-mound at one corner

- 135 Where country portions may be measured in plain country at distances of not less than one mile apart, to which there may be no reference trees, and to which there may be no nearer reference mark of more permanent character, one corner is to be marked by a mound of earth six feet in diameter and two feet high around the peg, the earth for which is to be dug not less than nine feet distant from such peg.

Rock on boundary; - at corner

- 136 Rocks which may be upon a boundary-line are to be marked in suitable places with a pick-line whenever the character of the rock will admit of it; and where at a corner of a portion, with a broad-arrow, and the parish number in addition. [Vide Diagram I.]

ROADS

Marking

- 137 A road shall be defined on both sides by trees marked in the customary manner [Vide paragraphs 129 to 131]; and split hardwood stakes, three inches square and 21 inches long, 18 inches in the ground, with trenches, ten links in length and nine inches in depth and width, shall be inserted at all angles, and on the side measured at intervals not exceeding ten chains, and also at each mile of continuous measurement.

Miles to be marked on tree or post

- 138 At each mile the nearest tree shall be marked, or in the absence of a tree within a reasonable distance, a post not less than four feet six long and nine inches in diameter shall be inserted two feet in the ground instead of a peg, bearing inscribed the number of miles. [Vide Diagram E.] The figures shall be not less than four inches in length and 3/4 inch in breadth and depth. The particulars of bearing and distance from the mile-peg to the marked tree shall be observed and noted for reference. [Vide paragraphs 175 and 193.]

On open plain-mound to be erected at station or mile-post

- 139 Where a road may traverse open plains without timber for more than a mile, a mound of earth six feet in diameter and two feet in height may be required to be erected around the post at the nearest station, or at such mile-post; the earth for such mound to be dug not less than nine feet distant from the post.

Corner-post of fence

- 140 When a fence is coincident with one side of a road, the corner-posts shall be marked with the broad-arrow over the letter R. [Vide Diagram E.]

FEATURE AND OTHER SURVEYS

Not specially provided for above.

Reference marks

- 141 On feature surveys and on traverses for connection more than one mile in length, permanent reference marks, similar in character to those used for marking corners of country portions, shall be made at points distant about one mile apart in suitable and conspicuous positions, and shall be indicated on the plan.

County, reserve and other boundaries

- 142 County, Reserve, and other like boundaries shall be cleared, and defined by stakes and trenches as prescribed for country portions [Vide paragraphs 129 to 131], in addition to which permanent reference marks are to be made at points distant about one mile apart in suitable and conspicuous positions. For the purpose of identification, letters and numerals are to be used in regular sequence, as follows:-

Reference marks for the county

- 143 The initial letters of the names of the counties shall be used for the boundaries of the same, placed over numerals in regular sequence for that survey. [Vide Diagram L.]

-for reserve

- 144 The Gazette number of a reserve shall be inscribed under the letters "W.R." "P.R." "Q.R." &c. [Vide Diagram M], which letters are indicative of the object of the reservation [Vide Appendix K]; and where there has been no number appropriated to a reserve the marking shall be "RES."

-for feature and connection surveys.

- 145 Reference trees of feature and connection surveys shall be marked with letters in consecutive order over the last two figures of the year. [Vide Diagram K.] The marking shall be similar to that for country portions; and the particulars of bearing and distance from the peg to the marked tree shall be observed and noted for reference. [Vide paragraphs 132, 133 and 175.]

4.5 REGULATIONS ISSUED 1886 - EXTRACTS

Equipment 3

A Licensed Surveyor shall supply himself with the surveying instruments mentioned in the appended list (See Appendix A);.....

APPENDIX A

Instruments to be provided by a Licensed Surveyor, and to be subject to approval of the Surveyor General.

- One (1) Theodolite, not less than five inches diameter.
- Two (2) Steel Ribands, 66 feet long; one to be used for adjusting and testing the riband and chain used for measurement.
- One (1) Gunter's Chain.
- One (1) Light steel riband, not less than 500 links long.
- One (1) Metal Parallel Ruler, not less than 18 inches long.
- One (1) Metal Protractor, not less than six inches in diameter, or a cardboard protractor.
- One (1) Set of Chain Scales, and other necessary drawing instruments.

Reservation of a road

- 31but where the reservation of a road through a portion may be unavoidable, the Surveyor shall survey and mark the same on both sides. [Vide paragraph 138].

Azimuth to be determined

- 37 In cases where several portions are measured adjacent to one another by the same Surveyor, the District Surveyor may require the azimuth or true bearing of the lines of the survey to be determined by solar or stellar observation, the particulars of which shall be recorded on the plan of one of such portions; and for this purpose tables have been prepared for the use of Surveyors.Stations for such observations should not be nearer to each other than two miles. (Vide Appendices E and Ea).

Tracings of plan-Check closing

- 53The accuracy of the survey of each portion should be determined by latitude and departure; and if the close is not within the following limits the particulars of error should be is not within the noted:-

Close of Survey

Close of Survey.

Table showing the limit of allowable error in links, being the sum of difference in latitude and departure, according to perimeter.
Regular Figures, being rectilineal portions of ten sides and under;

PERIMETER.	DESCRIPTION OF COUNTRY.			
	Chains.	Level.	Undulating.	Mountainous.
460 and under 650	10	15	22	
330 " 460	7	11	16	
230 " 330	5	8	12	
170 " 230	4	6	9	
120 " 170	3	4	7	
90 " 120	2	3	5	
Under 90	1	2	3	

Regular Figures, being portions of more than ten sides; and Irregular Figures, being portions with frontage to rivers, creeks, or cliffs.

PERIMETER.	DESCRIPTION OF COUNTRY.			
	Chains.	Level.	Undulating.	Mountainous.
460 and under 650	15	20	25	
330 " 460	11	15	20	
230 " 330	8	11	15	
170 " 230	6	8	11	
120 " 170	4	6	8	
90 " 120	3	4	6	
Under 90	2	3	4	

The above Table, showing limits of allowable error in survey, is to be applicable only to areas over 20 acres.

Frontages to creeks

- 81 Frontages to any river or water channel suitable for a boundary shall be traversed, but the traverse lines need not be marked, but reference marks made in accordance with Regulation 142.

Reference to corners

- 180 The reference to corners of country and suburban portions, shall be in the following tabular form, the corners being identified by letters in alphabetical order, the character being varied when necessary:-

References to corners.

Corner	Bearing	From	Distance in links	Number on tree
A	360°	Bloodwood	50	15, 16
B	256°30'	Ironbark	17	17
C	.....	No Tree Near	.....	(Stake) 17
D	71°45'	Swamp Oak	24	17
E	.....	Rock at Corner	.....	16, 17

Note.-The bearing and horizontal distance should be stated as from the broad-arrow on the tree to the corner-peg.

GENERAL DIRECTIONS

Destruction of surveyor's marks

- 109 In the event of any instance of the wilful and malicious destruction of Surveyors' marks coming under the observation of a Surveyor, he shall furnish to the local Superintendent of Police such information as may enable the prosecution of the offender under the Act of Council, 16 Victoria No.15. (Appendix Bb.)

Character of marking - Penalty

- 110 All marking shall be performed in a permanent manner, and in accordance with the following specifications; and omissions, or neglect to comply therewith, or insufficient marking, will render the Surveyor liable to the imposition of a fine in the form of a reduction or discount upon the fees.

Reference trees - particulars of

- 111 Particulars of all reference trees, i.e., bearing and distance to the nearest peg of traverse or corner, and species of trees and marks thereon, shall be observed and recorded for noting on plan, and such distance shall be horizontal and from the broad-arrow to the peg.

Broad-arrow

- 112 All survey marks for the Government shall bear inscribed the broad-arrow above such other figures as may be used, excepting of course the detail marking by pegs of town and suburban allotments.

Corner reference trees

- 113 All corner reference trees, of portion measurements, and reference trees to road and feature surveys, to be distinguished by four horseshoe marks.

TOWN AND SUBURBAN ALLOTMENTS

Clearing boundary lines

- 114 The building lines of streets and the side lines of lanes are, where the land is not naturally open, to be cleared to a width of not less than three feet, by the removal of all scrub and trees of a less diameter than ten inches.

Section corner

- 115 Each section corner is to be marked by a split hardwood stake four inches square and 24 inches long, sunk 12 inches into the ground; and by trenches cut to a depth of eight inches and a length of ten links, in the direction of the boundary-lines, and commencing at two links from the stake. On a dressed surface of the stake the section number, four inches in height, and in ordinary numerals, is to be cut or branded, or painted in black on a white ground. The number of the corner allotment, should also be marked two inches in height, on the section corner stake. [Vide Diagrams A and B]

Allotment corner

- 116 At each allotment corner a split hardwood stake, three inches by two inches, and 18 inches long, is to be sunk 12 inches into the ground; and if on the street frontage is to be marked as above directed with the allotment numbers, in figures two inches in height. Trenches are also to be cut at the corners of allotments as directed in the foregoing paragraph. [Vide Diagram C.]

Rock at corner

- 117 Should rock occupy the position of a corner, a broad-arrow and dot should be cut to indicate the corner, and lines should be marked with a pick in the direction of the boundaries. The section and allotment numbers should also be cut on the rock. [Vide Diagram D.]

Numbering- suburban portion

- 118 Town allotments are numbered as of the section. Suburban portions shall be numbered as of the parish and marked in the same manner as country portions, unless where previously designed in sections, when they shall be marked and numbered in the same manner as town allotments.

Reserves in town

- 119 A town section to be appropriated in its entirety to any public purpose shall be marked with the number of the section over "RES."

*COUNTRY PORTIONS**

**Exclusive of measurement made under the 52nd clause of the Land Act of 1884, vide section V*

Numbering

- 120 Country portions are numbered consecutively as of the parish.

Clearing boundary lines

- 121 All boundary-lines, where the country is not open, are to be cleared to a width of not less than three feet by the removal of all scrub, and trees of a less diameter than four inches.

Trees on or near boundaries

- 122 All trees upon boundary-lines, or within three feet in thickly wooded country, and five feet in open forest country, are to be marked with the horseshoe mark, which is to be cut into the wood of the tree on the opposite sides, in the direction of the boundary-line; and those trees which are in the line are to be marked in addition with smaller horseshoe marks above the others. [Vide Diagram F]

Alignment pegs

- 123 In alignment of boundary, split hardwood stakes, three inches by two inches, and 18 inches long, shall be inserted 12 inches in the ground at intervals of not more than ten chains, with a lockspit on each side, ten links long and eight inches deep and wide, in the direction of the boundary, the object being to provide permanent marks visible one from another. In certain localities, e.g., in dense bush country on the eastern watershed of the colony, alignment marks may be dispensed with, by permission of the Surveyor General, on the written recommendation of the District Surveyor.

Tree at the corner

- 124 Corners of portions shall be marked thus:- The corner shall be defined by a split hardwood stake not less than 24 inches long and three inches square or four inches in diameter, sunk 12 inches in the ground with trenches eight inches deep, if so specified by the District Surveyor, and ten links in length in direction of the boundary-lines. When a tree may stand on the corner it shall be marked with four horseshoe marks, and the bark shall be removed from a suitable portion of the tree, and on the surface thus exposed there shall be cut, at least 3/4 inch deep into the wood, the broad-arrow over the parish numbers (in ordinary numerals) of all the portions joining at the corner. [Vide Diagram J.] Trenches indicating the direction of the boundary-lines shall also be cut in the manner directed in the following paragraph [Vide Diagrams G and J.]

Tree near the corner

- 125 Where there is no tree on the corner the nearest large tree shall be marked in a similar manner; and at the corner a split hardwood stake, four inches square and 24 inches long, shall be inserted 18 inches in the ground; and trenches, ten inches in length and eight inches in depth and width, should be cut in the direction of each of the boundary-lines meeting at the corner. [Vide Diagram H.] The particulars of bearing and distance from the peg to the tree shall be observed and noted for reference. [Vide paragraph 180.]

Corner with no tree near

- 126 Should there be no tree on or near the corner, the stake or post used to mark the corner shall be two feet six inches long and four inches square, or six inches in diameter, and 18 inches in the ground, sound and substantial, and should bear inscribed the number of the portion.

In open plain-mound at one corner

- 127 Where country portions may be measured in plain country at distances of not less than one mile apart, to which there may be no reference trees, and to which there may be no nearer reference mark of more permanent character, one corner is to be marked by a mound of earth six feet in diameter and two feet high around the peg, the earth for which is to be dug not less than nine feet distant from such peg.

Rock on boundary at corner

- 128 Rocks which may be upon a boundary-line are to be marked in suitable places with a pick-line whenever the character of the rock will admit of it; and where at a corner of a portion, with a broad-arrow, and the parish number in addition. [Vide Diagram I.]

HOMESTEAD LEASES

Numbering

- 129 Homestead Leases shall be identified by the number of the Lease instead of a parish number, thus.

Trees on or near boundaries, &c.

- 130 The Regulations, Nos.121, 122 and 128, for marking and clearing the boundary lines of country portions shall also apply to Homestead Leases.

Alignment marking.

- 131 In the alignment of boundaries, posts two feet six inches in length and four inches square shall be sunk 18 inches in the ground at intervals of 80 chains, and marked with the broad-arrow, number of mile, and M underneath. Split hardwood stakes three inches by two inches and 18 inches in length shall be inserted 12 inches in the ground at intervals of ten chains, and marked with the number of the stake from the last mile or corner. In lieu of trenches, stakes similar to the foregoing shall be driven 12 inches in the ground, in the alignment of the boundaries, at distances of 20 links on each side of the mileposts.

Corner with no tree near

- 132 Where there is not any tree available for reference the corner of a Homestead Lease shall be marked thus: the corner shall be defined by a split hardwood post three feet in length and six inches square, to be inserted two feet into the ground, and marked

with broad-arrow over H.L., and the No. of the lease, or any adjoining lease or portion. Stakes similar to those described in the preceding paragraph shall be inserted at distances of 20 links from such corner-posts in the alignment of the boundaries.

Tree at the corner

- 133 When a tree may stand on the corner it shall be marked with one large horseshoe mark. The bark shall be removed from a suitable portion of the tree, and on the surface thus exposed there shall be cut at least three-quarters of an inch deep into the wood the broad-arrow over the letters H.L., and the number of the lease as provided above. Stakes in the direction of the boundaries shall be inserted at distances of about 20 links, as described in paragraph No.131. The District Surveyor may give special directions applicable to locality or class of timber, indicating the shape and size of portion of bark to be removed from corner trees.

Permanent marks to be used

- 134 At least four permanent marks should be provided for in each survey, and the points so provided for in each survey, should be shown on plan. For each a post not less in dimensions than those marking the corners will be used - and in addition thereto a glass bottle, a piece of iron gas-pipe nine inches by one inch, or an iron bolt of same size, is to be buried vertically below the foot of the post; or a square excavation may be made around the post with sides three feet in length, and a depth of not less than two feet, to be filled in with soil of a different colour, if obtainable, or earth mixed with charcoal. The selection of either of these methods of providing for permanent reference marks will be at the discretion of the District Surveyor. It is neither necessary nor desirable, as a rule, that the permanent mark be placed at the exact corner, and its site should be selected with a view to freedom from interference by fencing, but if it is necessary to adopt the actual corner the gas-pipe or bottle should be sunk not less than 3 feet six inches below the surface of the ground.

Tree near the corner

- 135 Where there is a tree near the corner, stakes similar to those used to mark each interval of a mile may be used, and the nearest tree marked as above described. The particulars as to bearing and distance of corner shall be observed and noted as for country portions.

No reference marks available

- 136 Where no trees or other suitable objects for marking as a reference are available, a mound of earth six feet in diameter, and two feet in height should be heaped around the corner-post. The earth for this purpose is to be dug at a distance of not less than nine feet from the post.

TIMBER RESERVES - BLOCK LICENSES

Timber license

- 137 Licenses are granted for cutting and removing timber from State forests and timber reserves [vide part VI of Crown Lands Act of 1884.] For directions in respect to marking the areas to which such licenses shall apply refer to Appendix N.

ROADS SURVEYED UNDER ACT IV WM IV NO.1

Marking

- 138 A road shall be defined on both sides by trees marked in the customary manner [Vide paragraph 122]; and split hardwood stakes, three inches square and 21 inches

long, 18 inches in the ground, with trenches, ten links in length and eight inches in depth and width, shall be inserted at all angles, and on the side measured at intervals not exceeding ten chains, and also at each mile of continuous measurement.

Miles to be marked on tree or post

- 139 At each mile the nearest tree shall be marked, or in the absence of a tree within a reasonable distance, a post not less than four feet six inches long and nine inches in diameter shall be inserted two feet in the ground instead of a peg, bearing inscribed the number of miles. [Vide Diagram E.] The figures shall not be less than four inches in length and 3/4 inch in breadth and depth. The particulars of bearing and distance from the mile-peg to the marked tree shall be observed and noted for reference. [Vide paragraph 180.] In cases where there is no timber at each mile a bottle shall be buried at foot of each post or stake, perfectly filled with cement largely mixed with sand.

On open plain-mound to be erected at station or mile-post

- 140 Where a road may traverse open plains without timber for more than a mile, a mound of earth six feet in diameter and two feet in height may be required to be erected around the post at the nearest station, or at such mile-post; the earth for such mound to be dug not less than nine feet distant from the post.

Corner-post of fence

- 141 When a fence is coincident with one side of a road, the corner-posts shall be marked with the broad-arrow over the letters RD. [Vide Diagram E.]

FEATURE AND OTHER SURVEYS

Not specially provided for above.

Reference marks

- 142 On feature surveys and on traverses for connection more than one mile in length permanent reference marks, similar in character to those used for marking corners of country portions, shall be made at points distant about one mile apart in suitable and conspicuous positions, and shall be indicated on the plan.

County, reserve, and other boundaries

- 143 County, reserve, and other like boundaries shall be cleared, and defined by stakes and trenches, the latter at the discretion of the District Surveyor, as prescribed for country portions [Vide paragraphs 121 to 123], in addition to which permanent reference marks are to be made at points distant about 1 mile apart in suitable and conspicuous positions. For the purpose of identification, letters and numerals are to be used in regular sequence, as follows:-

Reference marks for county

- 144 The initial letters of the names of the counties shall be used for the boundaries of the same, placed over numerals in regular sequence for that survey. [Vide Diagram L.]

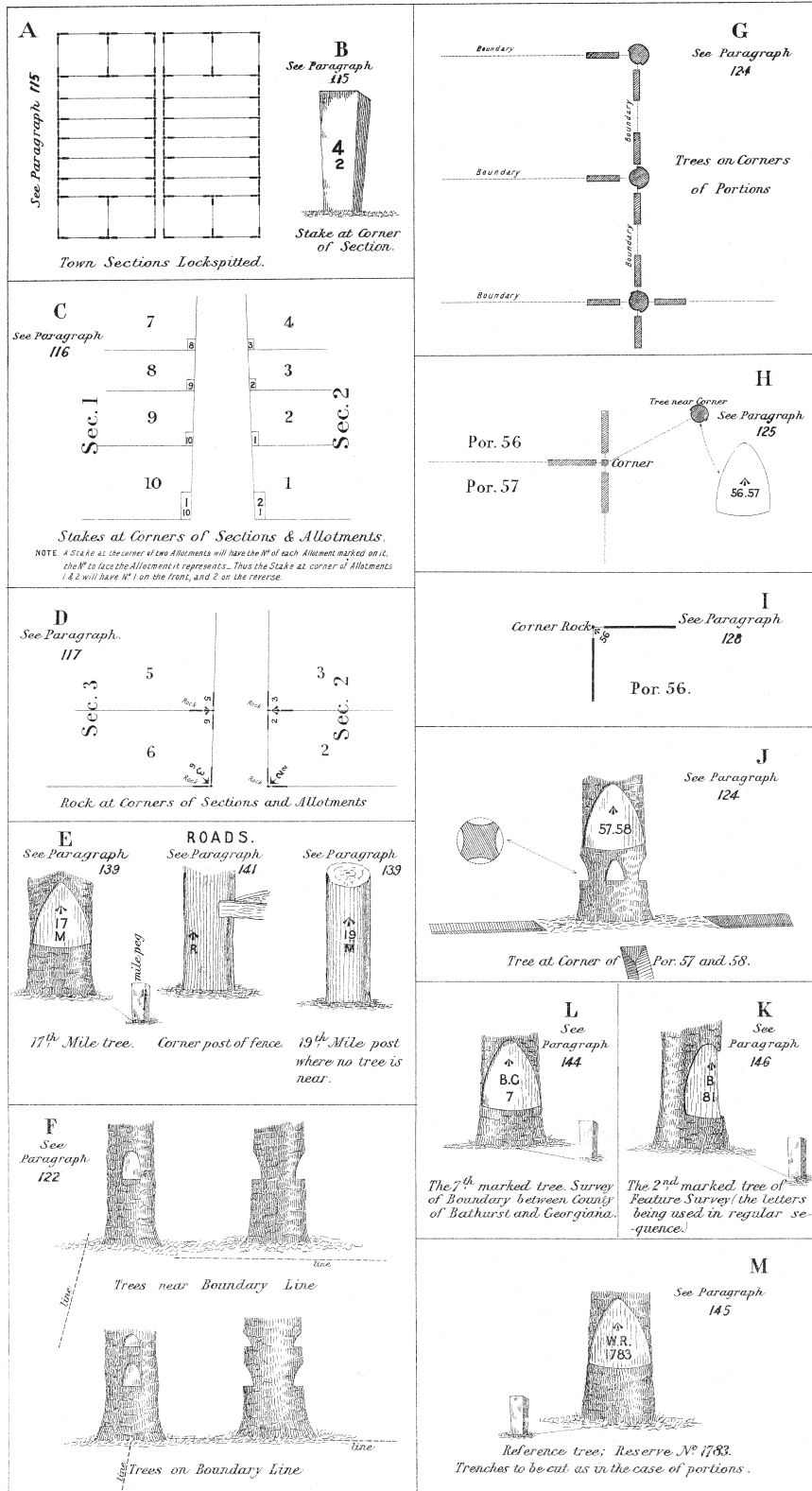
-for reserve

- 145 The Gazette number of a reserve shall be inscribed under the letters "W.R." "P.R." "Q.R." &c. [Vide Diagram M], which letters are indicative of the object of the reservation [Vide Appendix K]; and where there has been no number appropriated to a reserve the marking shall be "RES."

-for feature and connection surveys

146 Reference trees of feature and connection surveys shall be marked with letters in consecutive order over the last two figures of the year. [Vide Diagram K.] The marking shall be similar to that for country portions; and the particulars of bearing and distance from the peg to the marked tree shall be observed and noted for reference. [Vide paragraph 180.]

DIAGRAMS.



Taken at the Surveyor General's Office Sydney July 1883 (New Lick N. 85.43)

4.6 REGULATIONS ISSUED 1901 - EXTRACTS

Equipment

- 4 A Surveyor shall provide for himself the surveying instruments mentioned in Appendix A; also the necessary equipment and labour, copies of plans of adjacent surveys, Acts of Parliament, and all other information requisite for the proper performance of the service entrusted to him. A list of Acts of Parliament useful for reference is set forth in Appendix B.

APPENDIX A

Instruments to be provided by a Surveyor, and to be subject to approval.

- One (1) Theodolite, not less than five-inch plates.
Three (3) Steel bands, 66 feet long; one to be kept for adjusting and testing the riband and chain used for measurement.
One (1) Set of Light Steel bands not less than 500 links long.
One (1) Metal Parallel Ruler, not less than 15 inches long.
One (1) Metal Protractor, not less than six inches in diameter, or a protractor, not less than 12 inches diameter.
One (1) Set of Chain Scales, and all other necessary surveying and drawing instruments.
- 30 Whenever there may be a close, in the measurement of an area, or in a feature survey, or road survey, the closing angle shall be observed and noted.

Fronting watercourses

- 40 In the measurement of a portion fronting a watercourse, the boundary of the area shall be as nearly as practicable the fair limit of the channel, excluding from the area shingle beds and all lands embraced within the ordinary bed of the watercourse. When the bank at a corner is liable to erosion the corner stake should be placed on the boundary a short distance back from the bank, but in such a case the distance there from to the fair limit of the channel shall be stated.

Reservation of a road

- 47 As far as possible, roads should form boundaries of portions to be measured, i.e., an area may be modified in form so that the road in the more desirable position shall be a boundary; where the reservation of a road through a portion may be unavoidable the surveyor shall survey and mark the same on both sides, unless otherwise directed. [See paragraphs 118, 121.]

Tidal waters- portions bordering on

- 55 Land covered by tidal waters cannot be alienated below high-water mark, unless under special conditions as prescribed by law. High-water mark shall be defined as the mean high-tide mark between high-water spring and high-water neap tides. Attention is directed to Appendix E. When the conditions are favourable, a road may be provided approximately along high-water mark, to form the boundary of a portion.

Check closing and allowable error

- 67 The accuracy of the survey of each portion shall be tested by latitude and departure, and the close shall be within the following limits of allowable error, viz:- The sum of the differences of latitude and departure of the perimeter shall not exceed at the rates per mile for boundaries and the parts of boundaries crossing level country one link, for undulating country two links, and for mountainous country three links. The following directions shall apply in deciding the respective classes of country:-

“ Level”, where the slope does not exceed three degrees;

“ Undulating ”, where the slope ranges from three degrees to ten degrees;

“ Mountainous ”, where the slope exceeds ten degrees.

The abrupt banks of watercourses less than 500 links wide shall not be included in estimating the slopes. The Surveyor shall state on the approved form (paragraph 185) the class of country; and if called upon shall show data in support thereof.

Alignment of streets

- 80 Survey for alignment of streets under the Towns Police Act, 2 Victoria No.2, shall be performed in accordance with instructions set forth in Appendix F.

APPENDIX F

INSTRUCTIONS FOR ALIGNMENT OF STREETS

Preliminary Power to align streets

- 1 Under the Municipalities Act, No.23 A.D.1897, a Municipal Council shall exercise certain powers conferred upon Police Magistrates and the Surveyor General under the Towns Police Act, 2 Victoria No.2, which include the setting out and defining of carriage-ways and footways in streets and public places, commonly known as alignment.

Survey carried out by Lands Department

- 2 Alignment of streets is effected by the Lands Department on behalf of a Municipal Council by procedure under the Public Roads Act of 1897.

Widths of carriage and footways

- 3 As to widths of carriage and foot ways: in a street 66 feet broad the usual division is 42 feet for carriage-way, with a footway of 12 feet on each side. These widths may be increased or decreased according to the breadth of the street and the requirements of the Municipal Council. It occasionally happens that the sides of a street cannot be made parallel, when an adjustment of the footways generally ensues.

Particulars of grants and original subdivisions, &c, to be collected

- 4 Inquiry should be made to ascertain whether the street proposed for alignment has been dedicated to the public; and, in any case in which that has not been done, the omission should be the subject of report. Information, as complete as possible, should be collected respecting holdings abutting on the streets about to be aligned. Plans of original surveys and subsequent subdivisions should be inspected, and the descriptions in grants and deeds of conveyance of the lands affected should be pursued, in order to ascertain how the street was originally intended to be laid out, although, as pointed out herein (par.11), where the survey, as originally defined, does not accord with the documentary evidence, by metes and bearings, due weight must be bestowed to the limits defined by occupation under the original survey.

SURVEY

Preliminary traverse

- 5 By traverse measurement of the street between buildings or between fences, and

measurement along frontages, &c., the approximate positions of the kerb lines of the street to be aligned may generally be found. Preliminary traverse then follows, which it is convenient to make identical, or to coincide as nearly as possible, with the kerb lines. Care should be taken over this part of the work as the judicious choice of positions for the traverse lines is a important condition precedent to satisfactory completion of the survey.

Marking traverse stations (vide Minl. 86-2692)

- 6 It is necessary that traverse stations should be marked in a permanent manner. The surveyor is responsible for "leaving his survey so marked that it may be recovered at any future time without relying upon wooden pegs or other destructible or removable objects". A convenient and effective mark for a traverse station is of iron rod, about half an inch in diameter and 12 inches long, driven a few inches below the surface.

Method of fixing positions of buildings

- 7 Unless the street is very wide or there is continuous traffic, a traverse on one side is sufficient, as buildings of a permanent character should be fixed by radiating offsets from that line (vide Diagram D). A few rectangular offsets, sufficient to obviate the necessity for much computing, should also be noted.

To enable recovery of alignment

- 8 Attention is directed to Diagram D, which indicates radiations from points in the kerb line, two of such radiations being in line with the sides of building; thus ensuring a ready means, possible under certain circumstances, of identifying the alignment when the posts or other marks may have been destroyed. Also, on Diagrams A and D the offsets (at right angles to kerb lines) to an edifice very near the building line will enable the same object to be attained with sufficient accuracy for most purposes.

Encroachment on footway

- 9 Encroachment by structure of a permanent character on the footway should be shown on the plan by measurements relatively to the kerb line. As a general rule it is useful to determine the position of all buildings, &c., within 12 feet of the building lines; but this is a matter in which the surveyor must be guided by conditions of the structures.

Connections from traverse stations

- 10 It is requisite to note the bearing and distance from a traverse station to any alignment post or intersection of kerb lines immediately adjacent, so as to connect the two systems of lines in a satisfactory manner.

Care to be taken in determining lines of street

- 11 In determining the kerb and building lines due care should be exercised so as to avoid interference with vested interests; and, when it is surmised that the original survey of the street may perhaps have been faulty the street may sometimes be made a little narrower than was deigned rather than interfere with permanent structures, unless it is established on valid evidence that the obstructions are encroachments upon the street as originally projected. It is also sometimes desirable to make an angle in a street, although on plan of original subdivisions the street may be represented as straight, but from error in survey was not so defined on the ground.

MARKING*How alignment posts are to be placed*

- 12 The alignment is defined by posts at street corners and crossings. These should ordinarily be placed at the intersections of the kerb and building lines of each street (see Diagram A); but at places where the angle of intersection is less than 70°, the post should be fixed in the kerb line at a point at right angles to the end of the building line (see Diagram B). An alignment post indicating an angle in the kerb line should be so placed that one face shall be on one of the lines forming the angle, and the corner of the post which indicates the angle should have a broad arrow cut upon it (see Diagram C). When, on account of undulating surface of the ground, an alignment post at a street crossing cannot be seen from a post at the next street, an intermediate post should be inserted (in the kerb line) so that in every instance the kerb line can be identified from post to post.
- 13 The mode or character of marking of alignment is at discretion of the Municipal Council. Wooden posts or wrought stones are used generally.

Posts to be provided by Municipal Council

- 14 As a Municipal Council has to provide, and to have in readiness at time of survey, the posts, stones, or other forms of permanent marking of the alignment, the Surveyor is not required to proceed to survey unless the posts, &c., have been supplied; and any failure on the part of the Council in that particular should at once be reported.

Surveyor responsible for placing posts

- 15 The surveyor is responsible for the correct placing of posts, or other alignment marks, before transmitting his plan of survey of the streets aligned, which plan must bear a note stating that the alignment marks have been placed in the positions indicated thereon.

DRAWING*Paper to be used*

- 16 The best double-mounted drawing paper should be used for the plan, except in cases where it might be inconvenient for transit, when the best single-mounted may be substituted.

Scale

- 17 The plan is to be plotted on a scale of either one or two chains to an inch, according to the amount of detail to be shown. The scale should be drawn on the plan.

Colours to be used

- 18 The roadway between the kerb lines is to be tinted red (lake); other streets adjacent not aligned at the same time are to be tinted burnt sienna. The building lines are to be drawn in red, the kerb lines in blue, and the preliminary traverse and connections in purple. The positions of alignment posts are to be indicated by black squares, and the traverse stations by small triangles the same colour as the traverse.
- 19 The limits of grants are to be delineated in black lines, firm or broken according as they are certain or doubtful, and the full names of grantees are to be written, and the areas.

- 20 The names of owners and occupiers of encroachments are to be written on the plan, and full particulars are to be reported.
- 21 The relative position of the kerb line to permanent structures (especially public buildings) is to be determined by measurement, and the particulars are to be distinctly shown on the plan (see Diagram D). This affords the most reliable means of re-establishing an alignment.
- 22 Distinctive colours, either by hatching or tinting, should be used to indicate the different classes of buildings, red for brick, yellow for stone, blue for iron, and burnt sienna for wood; or the letters B, S, W, may be used to denote brick, stone, and wood. Verandahs should be tinted with very thin Indian ink.

Writing of dimensions

- 23 The lengths and bearings of the building lines are to be written along the lines in red, and wherever convenient the lengths from the original plans should be inserted, for comparison, in brown. The widths of the road and footways should be written in blue, and the amount of encroachments, if any, should be in black figures.

Street names and schedule of streets aligned

- 24 The names of the streets are to be written within their limits. A schedule giving the name of the street to be aligned, its terminals, the widths of road and footways, and remarks concerning encroachments, &c., is to be inserted on the plan.

Title

- 25 The title of the plan should set forth the number of streets to be aligned, and specify the Municipal district within which the survey is situated. It should also state that the streets are "proposed to be aligned under provisions of the Public Roads Act of 1897".
- 26 All writing on plans of alignment surveys shall be black, except where otherwise specified.

Field book

- 27 The original field notes of survey should be transmitted with the plan.

REPORT

Letter transmitting plan

- 28 The letter transmitting plan should contain general information as to the alignment survey, with particulars of any encroachments worthy of notice, mode of marking the alignment, &c.

General directions

- 94 The following directions shall apply to the marking of all boundaries and all measured areas, excepting those hereinafter specified. All marking shall be performed in a permanent manner, and in accordance with the following specifications:-

Stake. (a) All stakes shall be of hardwood, and shall be split or sawn, as may be directed by the District Surveyor. Stakes at corners, except as prescribed in paragraph 106, and at reference-stations, shall be 24 inches long, four inches by four inches, and 20 inches in the ground. Alignment and direction stakes shall be 18 inches long, not less than three inches by two inches, and 16 inches in the ground.

Posts (b) Reference and corner posts shall be of sound, durable timber, three feet six inches long, six inches square, or eight inches in diameter, and 24 inches in the ground.

In localities where hardwood cannot be obtained, such other timber may be used, and in such form as shall be approved by the District Surveyor.

Reference trees

- 95 Reference-trees shall be marked, when available, near corners and reference-stations, by removing a portion of the bark from the side of the tree facing the stake, and on the surface thus exposed inscribing a broad-arrow over the parish number or the characters distinctive of the survey. (Appendix U, diagram No.1)

Reference trees- particulars of

- 96 Particulars of all reference trees, i.e., bearing and distance to the nearest stake of traverse or corner stake, and species of trees and marks thereon, shall be observed and recorded for noting on plan, and such distance shall be horizontal, and the bearing and distance shall be from the broad-arrow to the stake.

Corner reference trees

- 97 All corner reference-trees of portion measurements shall be distinguished by four horse-shoe marks.

Post where there is no tree

- 98 Where there is no tree available for reference purposes, a post shall be used at the corner, or reference station, having inscribed thereon a broad-arrow over the distinctive letters or numbers of the reference station or corner.

Lockspits, Stones may be packed and Direction stakes

- 99 At all stakes, posts, and trees on corners, lockspits ten links in length, 1 link in depth and width, and commencing two links from the stake, post, or tree, shall be cut in the directions of the lines of the survey. Where the conditions render it desirable, in lieu of lockspits, stones may be packed in the direction of a boundary, or (excepting in town allotments) direction-stakes may be placed 20 links distant from the stake, post, or tree [See Appendix U, diagram No. 2.]

Broad-arrow

- 100 All survey marks, i.e., corner-trees, corner-posts and stakes, alignment-stakes, mile-posts, masts, or beacons (but not blazed trees along boundaries), must be marked with a broad-arrow. For town allotments or small suburban portions, and for alignment stakes, the broad-arrow mark may be punched on the peg. All broad-arrows, letters, and numbers on reference trees and posts shall be of the usual form, and not less than four inches in height and 1/2 inch in depth.

Pegs on tracks in use

- 101 When it is requisite to mark a station on a track in use for traffic, by inserting a stake or peg, care should be taken that the top shall be flush with the surface of the ground, and there shall be no lockspits
- 102 All boundary-lines, corner, alignment, reference, and terminal points shall marked and defined as follows:-

TOWN ALLOTMENTS AND SUBURBAN PORTIONS

Clearing boundary lines

- 103 The building-lines of streets and the side-lines of lanes shall be cleared to a width of not less than three feet, by the removal of all scrub and trees of a less diameter than four inches.

Trees along boundary lines

- 104 All trees along and within three feet of a boundary-line shall be marked with the horseshoe mark in the manner prescribed for country portions (paragraph 110).

Section corner

- 105 Each section corner shall be marked by a split or sawn hardwood stake (paragraph 94) and by lockspits. On a dressed surface of the stake the section number, three inches in height, and in ordinary numerals, shall be cut or branded, or painted in black on a white ground, as may be directed; the number of the allotment shall also be marked two inches in height, on the section-corner stake. [See Appendix U, diagrams Nos. 3 and 4]

Allotment corner

- 106 At each allotment corner a split or sawn hardwood stake, three inches by two inches, and 20 inches long, shall be sunk 16 inches into the ground, and shall be marked with the allotment numbers in figures two inches in height. Lockspits shall also be cut at the corners of allotments, as directed in paragraph 99 [See Appendix U, diagram No. 5.]

Rock at corner

- 107 If a corner shall be on rock, a hole shall be drilled 3/4 inch in diameter and one inch deep, and a broad-arrow shall be inscribed, and lines shall be marked with a pick in the direction of the boundaries. The section and allotment numbers shall also be cut on the rock. Where the nature of the rock renders it desirable, the broad-arrow, direction lines, and allotment numbers, may be painted. [See Appendix U, diagram No. 6]

Numbering- suburban portions

- 108 Suburban portions shall be numbered as of the parish and marked in the same manner as country portions; unless where previously designed in sections, when they shall be marked and numbered in the same manner as town allotments.

COUNTRY PORTIONS

Clearing boundary lines

- 109 All boundary-lines shall be cleared to a width of not less than three feet by the removal of all scrub and trees of a less diameter than

Trees on or near boundaries

- 110 All trees along boundary-lines, within three feet in thickly wooded country and five feet in open forest country, shall be marked with the horseshoe mark, which is to be cut into the wood of the tree on the opposite sides, in the direction of the boundary-line; and those trees which are in the line shall be marked in addition with a smaller horseshoe mark above the other. [See Appendix U, diagram No. 7.]

Alignment stakes and Reference stations

- 111 Alignment-stakes shall be inserted on the boundary at intervals of not more than ten chains, with lockspits, the object being to provide marks visible one from another; and on boundaries exceeding 120 chains in length there shall be intermediate reference-stations at intervals not exceeding 80 chains, which shall be marked for identification in alphabetical sequence. [See Appendix U, diagram No. 8.]

Tree on corner

- 112 When a tree stands on a corner it shall be marked with four horseshoe marks and the bark removed from a suitable part of the tree facing a boundary; on the surface thus exposed shall be inscribed the broad-arrow over the parish number or numbers. [See Appendix U, diagram No. 9.]

Rock on boundary or at corner

- 113 Rocks which may be upon a boundary-line shall be marked in suitable with a pick-line whenever the character of the rock will admit of it; and if a corner of a portion be on a rock it shall be marked with the parish number, and in the manner specified in paragraph 107. [See Appendix diagram No. 10.]

Re-marking of boundaries

- 114 When crown land is to be measured adjoining a previously-defined portion, the marking of the common boundary shall be renewed; where a fence has been erected on the boundary, further alignment stakes and lockspits are not needed.

*RESERVE, FEATURE, TERRITORIAL SURVEYS AND ROADS**Reserves*

- 115 For a reserve the reference-marks shall bear inscribed the usual letters significant of the purpose of the reservation, e.g. W.R., T.S.R., &c., unless directed to be numbered as a portion. [See Appendix U, diagram No. 11.]

Feature survey

- 116 At all reference points on feature surveys, special marks, as prescribed by paragraph 122, shall be inserted. At convenient places for the purpose of subsequent comparison of meridian, the District Surveyor may require a bearing and distance to be recorded to a mark on any convenient tree or post distant (say) about five chains. The mark shall be a copper tack at the apex of a broad-arrow. [See Appendix U, diagram No. 12.]

County boundaries and connections

- 117 For county boundaries, the reference-marks shall bear inscribe the initial letters of the names of the counties adjoining, over a number in due sequence, as directed. For connection surveys reference-marks shall bear inscribed letters in alphabetical sequence over the last two figures of the year. [Vide Appendix U, diagrams 13 and 14.] The marks shall be distant from each other about one mile.

Roads

- 118 A road shall be defined on both sides by trees marked in the prescribed manner; and split hardwood stakes, three inches square and 21 inches long, 18 inches in the ground, shall be inserted at all angles, and at intervals not exceeding ten chains, and also at each mile of continuous measurement; there shall be lockspits at stakes on the side measured.

Miles to be marked on tree or post

- 119 Unless directed to the contrary, at each mile the nearest tree shall be marked, or in the absence of a tree within a reasonable distance, a reference post shall be used instead of a stake, bearing inscribed the number of miles. [See Appendix U, diagram No. 15.] The particulars of bearing and distance from the marked tree to the mile-stake shall be observed and noted for reference as prescribed. [See paragraph 96.]

Corner-post or fence

- 120 When a fence is coincident with one side of a road, the corner-posts shall be marked with a broad-arrow over the letters RD. [See Appendix U, diagram No. 15.]

Reserved road

- 121 A reserved road through a portion shall be defined in the manner specified (paragraph 118), and stakes with lockspits shall be inserted at the points of intersection with the boundaries.

SPECIAL MARKS

Special marks

- 122 In addition to the marking hereinbefore prescribed, it is required that there shall be occasional special marks, which may be capable of identification when, in the course of time, the ordinary marks by stakes, lockspits, and trees, may have decayed or may have been destroyed in process of settlement.

Description of

- 123 The character of such special marking must, to some extent, depend upon surrounding conditions, e.g., in a country where there may be rocks, it would be sufficient to insert metal plugs in suitable places; where there are no rocks a quart bottle filled with a mixture of sand and cement, or a piece of galvanised-iron tube, would be suitable.

Copper plug

- 124 The metal plug for insertion in rock shall be of round copper or Muntz metal rod, not less than 3/4 inch diameter, and not less than three inches long; and there shall be a deeply-inscribed broad-arrow, four inches long, with its apex very near to the plug; and the plug should be fixed in position by melted sulphur, the top being (say) 1/2 inch below the surface of the rock.

To fix plug

- 125 To fix a plug in rock. - A hole is to be drilled somewhat deeper than the length, and about double the diameter of the plug. Melt sulphur in an iron vessel (an iron ladle with a long handle is best), and when the surface of the sulphur appears brown, add a like quantity of clean, sharp, dry sand; stir, and pour round the plug. The mixture sets quickly.

Bottle mark

- 126 For bottle marks mix clean, sharp sand and Portland cement in the proportion of 3 to 1, with sufficient water to make a good mortar; fill the bottle with same, and place it vertically, top upwards, 1 foot below the surface of the ground.

Tube mark

- 127 The galvanised-iron tube shall be of the sort ordinarily used for water supply, the rim to be not less than 1/8 inch thick, the piece to be one foot long, and to be inserted vertically, with the top one foot below the surface of the ground.

Positions of marks for road survey

- 128 In road survey it is desirable that these marks be inserted in the alignment at suitable points about half a mile apart; they shall be on the same side of the road, and distant five links from a station or an alignment-stake, and in the same direction therefrom relatively to a terminal of the survey.

For country portion

- 129 In subdivision of Crown land, the selection of positions for special marks must be left largely to the discretion of the Surveyor, who in the process of measurement will become acquainted with conditions of the ground. It may be pointed out that it would be an advantage to have intervisible points suitably placed for reference on one boundary, so as to facilitate comparison of azimuth.

For feature survey

- 130 In feature survey, the special mark shall be placed at a station where there is a reference-tree. In the marking of any survey, rock marks are to be preferred.

Mode of indicating special mark or plan

- 131 On the plan, the station or corner, or alignment-stake nearest to which the special mark is inserted, shall be indicated by two concentric circles, and amongst the notes on plan there shall be particulars

To be inserted under special conditions

- 132 Marks for the surveys mentioned in paragraphs 128 and 129 will be inserted only under specific directions from the District Surveyor.

REPORTING WILFUL DESTRUCTION OF A GOVERNMENT SURVEY MARK

Survey marks-protection of

- 133 It is desirable to report any case of wilful destruction of a survey mark, when it may come under notice, and when the circumstances admit of prosecution of the offence under the Act 16 Victoria No. 15, [See Appendix H]. The particulars required to enable successful prosecution are the full names and place of residence of the person offending; the place; the date of offence; the names of any witness and residence; the specific mark destroyed; the name of the Surveyor by whom the mark was made for purpose of Government Survey - for there must be identification of the survey mark; and the names and designation of any official in the locality to whom it might be convenient to entrust the prosecution, e.g, Senior Police Officer or Crown Lands Bailiff, &c.
- 134 It is very desirable that any well-authenticated case be made the subject of report to the District Surveyor, with a view to prosecution; steps being thus taken for protection of survey marks, the mischievous destruction of which causes much inconvenience and loss of time.

48
DIAGRAMS

Appendix "U"

<p>1</p> <p>See Paragraph 95</p> <p>Reference Tree</p> <p>Por. 56</p> <p>Corner</p> <p>Por. 57</p>	<p>6</p> <p>See Paragraph 107</p> <p>Rock at Corners of Sections and Allotments</p>	<p>10</p> <p>See Paragraph 113</p> <p>Corner Rock</p> <p>Por. 56</p>	
<p>2</p> <p>See Paragraph 99</p> <p>Marks at Corners of Portions Etc.</p>	<p>7</p> <p>See Paragraph 110</p> <p>Trees near Boundary Line</p>	<p>11</p> <p>See Paragraph 115</p> <p>Reference tree: Reserve Trenches to be cut as in the case of portions.</p>	
<p>3</p> <p>See Paragraph 105</p> <p>Town Sections Lockspitted.</p>	<p>7</p> <p>See Paragraph 110</p> <p>Trees on Boundary Line</p>	<p>12</p> <p>See Paragraph 116</p> <p>Reference point and marked tree as may be required in Feature Surveys.</p> <p>about 5 chains</p> <p>Reference Point</p>	
<p>5</p> <p>See Paragraph 106</p> <p>Stakes at Corners of Sections & Allotments</p> <p>NOTE: A Stake at the corner of two Allotments will have the No of each Allotment marked on it; the No's are the Allotment's as represented. Thus the Stake at corner of Allotments 1 & 2 will have No 1 on the front and 2 on the reverse.</p>	<p>8</p> <p>See Paragraph 111</p> <p>The 2nd marked tree on a boundary exceeding 120 chains in length.</p>	<p>13</p> <p>See Paragraph 117</p> <p>The 7th marked tree Survey of Boundary between County of Bathurst and Georgiana.</p>	<p>14</p> <p>See Paragraph 117</p> <p>The 2nd marked tree of Feature Survey (the letters being used in regular sequence.)</p>
<p>9</p> <p>See Paragraph 112</p> <p>Tree at Corner of Por. 57 and 58.</p>	<p>15 ROADS</p> <p>See Paragraph 119</p> <p>See Paragraph 120</p> <p>See Paragraph 119</p> <p>17th Mile tree.</p> <p>Corner post of fence.</p> <p>19th Mile Post where no tree is near.</p>		

Let's and Printed at the Dept of Lands, Sydney 1930
No of Let's 277 M.

4.7 REGULATIONS ISSUED 1914 - EXTRACTS

Equipment

- 4 A Surveyor shall provide for himself the surveying instruments mentioned in Appendix A; also the necessary equipment and labour, copies of plans of adjacent surveys, Acts of Parliament, and all other information requisite for the proper performance of the service entrusted to him.

APPENDIX A

Instruments to be provided by a Surveyor, and to be subject to approval.

- One (1) Theodolite, not less than five-inch plates.
- One (1) Steel or invar band 66 feet long; a steel or invar band not less than 66 feet long to be kept for adjusting and testing the chain used for measurement.
- One (1) Set of light steel bands, not less than 500 links long.
All necessary survey instruments.
All necessary drawing instruments.

Town allotments- area of Width of streets, Width of lanes ,Suburban portions-area

- 38 Town allotments shall not exceed 1/2 acre each, and on a proclaimed Gold or Mineral Field 1/4 acre. Streets shall not be less than 100 links wide, and as a general rule shall be 150 links. Lanes shall not be less than 20 feet wide, and as a general rule shall be 31 links. A suburban, portion, when measured for auction sale shall not exceed 20 acres.

Water-races to be reserved

- 51 The position of a water-race intersecting a portion shall be defined by traverse, and there shall be a reservation to a width of ten feet on each side; where the cutting exceeds ten feet in depth or a tunnel is constructed the width shall be 20 feet on each side (Regulation 47, Mining Act, 1906).

Alignment of streets

- 81 Survey for alignment of streets shall be performed in accordance with instructions set forth in Appendices D and S.

APPENDIX D

ALIGNMENT OF STREETS

Power to align streets

- 1 The setting out and defining of carriage ways and footways in streets and public places, commonly known as alignment, is carried out by Lands Department on behalf of Municipal and Shire Council's, under Sections 27 and 28, "Public Roads Act, 1902," and in accordance with the provisions of Section 95(I)(d) Local Government Act, No.56,1906.

Width of carriageways and footways

- 2 The carriageway in a street 66 feet wide shall, as a rule, be 42 feet and the footways 12 feet on each side. These may, however, be increased or decreased according to the breadth of a street, and the requirements of a Council. If the street be not parallel, the carriageway only should be left of even width, unless circumstances warrant both the carriageway and footways being so treated.

Plans and descriptions of grants and subdivisions to be perused

- 3 Full information respecting holdings abutting on the streets should be obtained—plans of original surveys and subdivisions should be inspected, and perusals made of the descriptions of grants and deeds of conveyance of adjoining lands, in order to ascertain the original intention with respect to the location of the streets. If it is found that the position of any street as defined on the ground is not in accord with such documentary evidence, such street should be located as nearly as possible in the position originally assigned to it, having due regard to the occupations adjoining it, and also to avoid unnecessary interference with vested interests. The original width should always be adhered to, unless the existence of permanent structures would fully warrant a slight diminution. The Council should satisfy the Surveyors that private subdivision streets have been dedicated to the Public.

Connection to Trig. Station

- 4 Connections should be made to a Trig. Station when practicable, and to the nearest adjacent alignment survey for comparison for azimuth. Two or three permanent marks should also be sunk into the ground in suitable places, and connection thereto shewn upon the plan.

Kerb lines

- 5 Both kerb lines are to be measured and radiations taken from alignment posts to permanent buildings, both to be shewn upon the plan (see Specimen Plan and Diagram D, Appendix S).

Encroachments

- 6 Encroachment by structures of a permanent character and fences upon the footways should be located by measurements from the kerb lines, such measurements to be shewn upon the plan in black ink. All buildings within four feet of the building lines should, if possible, be located and shewn upon the plan.

Connections at intersections of streets

- 7 Connections should be made between alignment posts at the intersections of the streets as shewn upon Diagrams A, B and D, Appendix S.

Marking of alignment surveys

- 8 The markings of the alignment should be placed at the intersection of the kerb and building lines as shewn upon Diagrams A and B, Appendix S, unless prevented by obstructions, in which latter case, such marking may be placed along the kerb line, and the distance from the intersection noted upon the plan (see also Diagram A). An angle in a kerb line should be marked as shewn upon Diagram C, Appendix S, and if the intersections of streets are not intervisible, markings may be introduced at suitable intervals, not more than ten chains apart.

Unnecessary marking

- 9 Alignment markings should not be placed at the intersection of aligned streets with those not yet aligned (see Specimen Plan, Appendix S).

Measurement and marking in curved streets

- 10 Streets necessitating alignment by surveys should be measured and marked in accordance with Diagram E, Appendix S. Full information with respect to measurement, together with calculation of curves, to be indicated upon the plan as shown in Diagram E.

Material used in marking

- 11 Wooden posts, wrought stones, cement blocks, or iron castings may be used for marking the alignment, which should be supplied by the Council, and be in readiness at time of survey.

Surveyor responsible for marking

- 12 The Surveyor should see that the necessary markings have been placed in their proper positions before transmitting his plan of survey, which fact should be reported in his letter of transmission.

Drawing of plan,. colours to be used

- 13 The plan of survey should be plotted to a scale of either one or two chains to an inch, according to the amount of information required to be shewn; plan to be neatly drawn upon the best mounted drawing paper, the writing to be in coloured inks as shewn upon Diagrams A to E, and tinted in accordance with "Specimen Plan." (Appendix S).

Tinting of buildings Schedule of streets

- 14 The various classes of buildings should be shewn upon the plan and indicated by distinctive colours, also a schedule of the streets proposed to be aligned with particulars as to terminals, width of carriageways and of footways, as well as the extent of encroachments, &c. Alignment markings to be indicated by black squares (see Specimen Plan, Appendix S).

Boundaries of grants and private subdivisions

- 15 The boundaries of grants, if correctly located, to be shewn up on the plan in firm black lines, and by broken black lines when their location is doubtful; the names of the grantees and areas also to be shewn. When building lines are identical with grant boundaries, it will be sufficient to note upon the plan the original lengths of such boundaries in black ink, for purpose of comparison. Information respecting private subdivisions to be shewn in brown lines. Owners of buildings encroaching
- 16 The names of owners and occupiers of any buildings encroaching upon the streets, together with the extent of such encroachments, should be indicated upon the plan, and full particulars with respect thereto must be stated by the surveyor in his letter of transmission.

Permanent structures

- 17 The relative position of the kerb line to permanent structures (esp buildings) to be determined by a measurement and particulars thereof shewn upon the plan.

Field notes

- 18 The field notes of survey to be transmitted with the plan.

Information regarded as necessary

- 19 The various angular and lineal measurements regarded as necessary to complete alignment surveys will be found delineated on Specimen Plan and Diagrams A to E, Appendix S, to which special attention is directed.

Appendix S.
Paragraph 81

Diagrams in illustration of
ALIGNMENT SURVEY

Diagram "A"

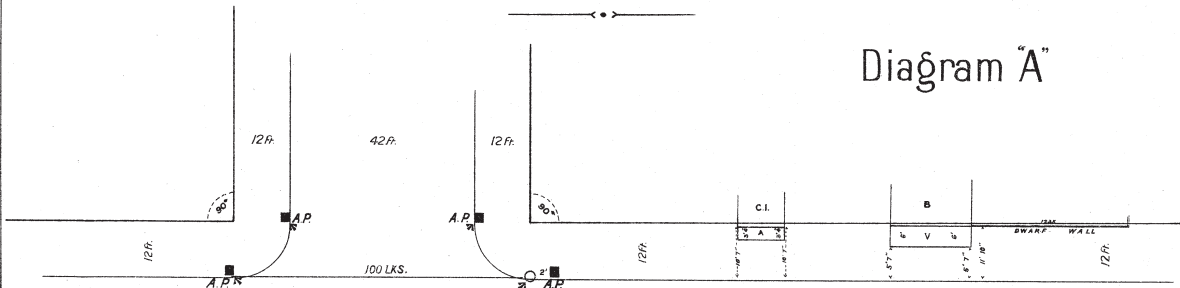


Diagram "B"

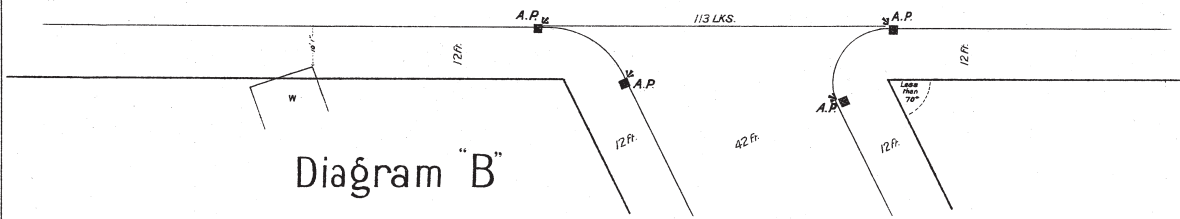


Diagram "E"

Scale .1 Chain to an Inch.

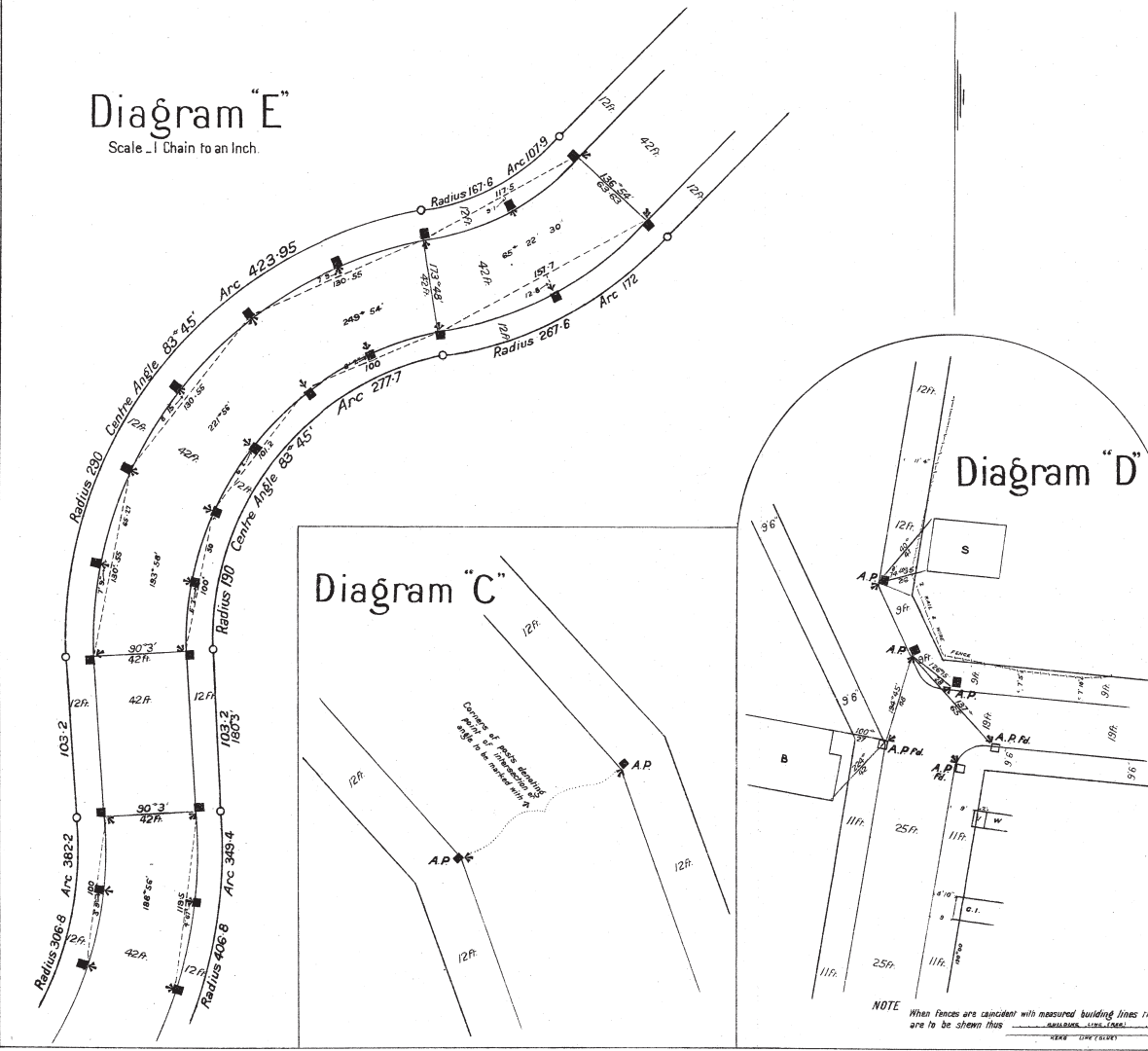
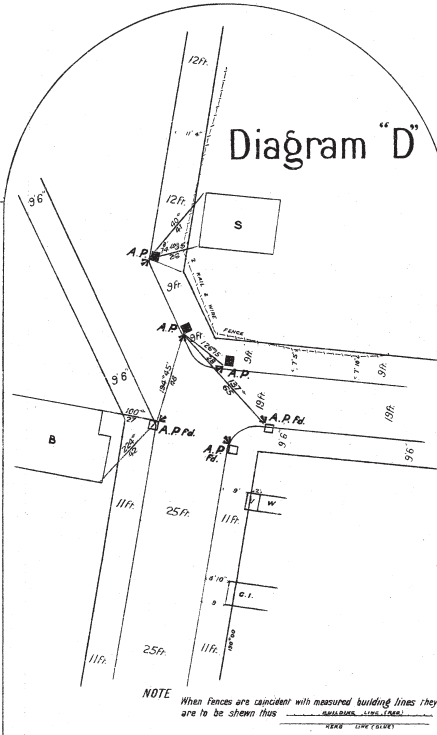


Diagram "D"



MARKING (GENERAL)*General directions*

- 96 The following directions shall apply to the marking of all boundaries and all measured areas, excepting those hereinafter specified. The District Surveyor, with the approval of the Surveyor-General, may dispense with any form of marking which is not adapted to any particular locality, and substitute any more suitable marking. All marking shall be performed in a permanent manner, and in accordance with the following specification:-

Stakes (a) All stakes shall be of sound, durable hardwood, and shall be split or sawn, as may be directed by the District Surveyor. Stakes at corners, except as prescribed in paragraph 110, and at reference stations, shall be 24 inches long, four inches by four inches, and 20 inches in the ground. Alignment and direction stakes shall be 18 inches long, not less than three inches by two inches, and 16 inches in the ground.

Posts (b) Reference and corner posts shall be of sound, durable timber, three feet six inches long, six inches square, or eight inches in diameter, and 24 inches in the ground.

Timber to be used

In localities where hardwood cannot be obtained, such other timber may be used, and in such form as shall be approved by the District Surveyor.

Reference trees or rocks

- 97 Separate reference-trees or rocks shall be marked, when available within 200 links of corners and reference stations, by removing a portion of the bark from the side of the tree facing the stake, and on the surface thus exposed or on the rock inscribing a broad-arrow over the parish number or the characters distinctive of the survey. (Appendix T, diagram No.1)

Subdivision of alienated portions

- 98 In the subdivision of an alienated measured portion for surrender, where part only is to be surrendered, the dividing line shall be marked in accordance with Regulations 113, 114 and 115, but its terminals are to be marked with stakes inscribed with a broad-arrow only and lockspits.

Reference trees - particulars of

- 99 Particulars of all reference trees or rocks, i.e., bearing and distance to the nearest stake of traverse or corner stake, and species of trees and marks thereon, shall be observed and recorded for noting on plan, and such distance shall be horizontal, and the bearing and distance shall be from the broad-arrow to the stake.

Numbers of corners to be marked

- 100 The number of corners shall as a general rule be restricted to four per portion, and placed at angles indicating the four principal changes in course. Additional corners may be marked in similar positions, not within 20 chains of another corner, but payment for such additional corners will be subject to approval of the District Surveyor.

Tree on corner

- 101 When a tree stands on a corner, the bark shall be removed from a suitable part

facing a boundary line, and on the surface thus exposed shall be inscribed a broad-arrow over the parish number or numbers; and if the tree exceeds 16 inches in diameter, it shall be marked by four horseshoe marks, two of which shall be in the alignment of the intersecting boundaries and each distinguished by a broad-arrow. (Appendix T, No. 9.)

Post where there is no corner

- 102 Where there is no tree or rock available for reference purposes, a post shall be used at the corner, or reference station, having inscribed thereon a broad-arrow over the distinctive letters or numbers of the reference station or corner.

Lockspits, Stones may be packed, Direction stakes

- 103 At all stakes, posts, and trees on corners, lockspits, ten links in length, one link in depth and width, and commencing two links from the stake, post, or tree, shall be cut in the directions of the lines of the survey. Where the conditions render it desirable, in lieu of lockspits, stones may be packed in the direction of a boundary, or thereon (excepting in town allotments) direction stakes may be placed 20 links distant from the stake, post, or tree. [See Appendix T, diagram No. 2.]

Broad-arrow

- 104 All survey marks, i.e., corner-trees, corner-posts and stakes, alignment-stakes, mile-posts, masts, or beacons (but not blazed trees along boundaries), must be marked with a broad-arrow. For town allotments or small suburban portions, and for alignment stakes, the broad-arrow mark may be punched on the peg. All broad-arrows, letters, and numbers on reference trees and posts shall be of the usual form, and not less than four inches in height and 1/2 inch in depth.

Pegs on track in use

- 105 When it is requisite to mark a station on a track in use for traffic, by inserting a stake or peg, care should be taken that the top shall be flush with the surface of the ground, and there shall be no lockspits.

- 106 All boundary lines, corner, alignment, reference, and terminal points shall be marked and defined as follows:-

TOWN ALLOTMENTS AND SUBURBAN PORTIONS

Clearing boundary lines

- 107 The building-lines of streets and the side-lines of lanes shall be cleared to a width of not less than three feet, by the removal of all scrub and trees of a less diameter than four inches.

Trees along boundary lines

- 108 All trees along and within three feet of a boundary-line shall be marked with the horseshoe mark in the manner prescribed for country portions (paragraph 114).

Section corner

- 109 Each section corner shall be marked by a split or sawn hardwood stake (paragraph 96) and by lockspits. On a dressed surface of the stake the section number, three inches in height, and in ordinary numerals, shall be cut or branded, or painted in black on a white ground, as may be directed; the number of the allotment shall also be marked two inches in height, on the section-corner stake. [See Appendix T, diagrams Nos. 3 and 4]

Allotment corner

- 110 At each allotment corner a split or sawn hardwood stake, three inches by two inches, and 20 inches long, shall be sunk 16 inches into the ground, and shall be marked with the allotment numbers in figures two inches in height. Lockspits shall also be cut at the corners of allotments, six links in length, one link in width and depth. [See Appendix T, diagram No. 5.]

Rock at corner

- 111 If a corner shall be on rock, a hole shall be drilled 3/4 inch in diameter and one inch deep, and a broad-arrow shall be inscribed, and lines shall be marked with a pick in the direction of the boundaries. The section and allotment numbers shall also be cut on the rock. Where the nature of the rock renders it desirable, the broad-arrow, direction lines, and allotment numbers, may be painted. [See Appendix T, diagram No. 6]

Numbering- suburban proportions

- 112 Suburban portions shall be numbered as of the parish and marked in the same manner as country portions; unless where previously designed in sections, when they shall be marked and numbered in the same manner as town allotments.

COUNTRY PORTIONS

Clearing boundary lines

- 113 All boundary-lines shall be cleared to a width of not less than three feet by the removal of all scrub and trees of a less diameter than four inches.

Trees on or near boundary

- 114 All trees along boundary-lines, within three feet in thickly wooded country and five feet in open forest country, shall be marked with the horseshoe mark, which is to be cut into the wood of the tree on the opposite sides, in the direction of the boundary-line; and those trees which are in the line shall be marked in addition with a smaller horseshoe mark above the other. [See Appendix T, diagram No. 7.]

Alignment stakes

- 115 Alignment stakes shall be inserted on the boundary at intervals of not more than ten chains, with lockspits, the object being to provide marks visible one from another; and on boundaries exceeding 120 chains in length there shall be intermediate reference stations at intervals not exceeding 80 chains, which shall be marked for identification in alphabetical sequence. [See Appendix T, diagram No. 8.]

Tree on corner

- 116 When a tree stands on a corner it shall be marked as provided in Regulation 101. [See Appendix T, diagram No. 9.]

Rock on boundary or at corner

- 117 Rocks which may be upon a boundary-line shall be marked in suitable places with a pick-line whenever the character of the rock will admit of it; and if a corner of a portion be on a rock, it shall be marked with the parish number, and in the manner specified in paragraph 111. [See Appendix T, diagram No. 10.]

Re-marking of boundaries

- 118 When crown land is to be measured adjoining a previously-defined portion, the marking of the common boundary shall be renewed; where a fence has been erected on the boundary, further alignment stakes and lockspits are not needed.

Obliteration of marking

The obliteration of marking of a cancelled survey shall be limited to defacement of the corners, the boundaries to be shown on plan by dotted black lines.

RESERVE, FEATURE, TERRITORIAL SURVEYS AND ROADS

Reserve

- 119 For a reserve the reference-marks shall bear inscribed the usual letters significant of the purpose of the reservation, e.g. W.R., T.S.R., &c., unless directed to be numbered as a portion. [See Appendix T, diagram No. 11.]

Feature survey

- 120 At all reference points on feature surveys, special marks, as prescribed by paragraph 126 shall be inserted. At convenient places for the purpose of subsequent comparison of meridian the District Surveyor may require a bearing and distance to be recorded to a mark on any convenient tree or post distant (say) about five chains. The mark shall be a copper tack at the apex of a broad-arrow. [See Appendix T, diagram No. 12.]

County boundaries and connections

- 121 For county boundaries, the reference-marks shall bear inscribed the initial letters of the names of the counties adjoining, over a number in due sequence, as directed. For connection surveys reference-marks shall bear inscribed letters in alphabetical sequence over the last two figures of the year. [Vide Appendix T, diagrams 13 and 14.] The marks shall be distant from each other about one mile.

Roads

- 122 A road shall be defined on both sides by trees marked in the prescribed manner; and split hardwood stakes, three inches square and 21 inches long, 18 inches in the ground, shall be inserted at all angles, and at intervals not exceeding ten chains, and also at each mile of continuous measurement; there shall be lockspits at stakes on the side measured.

Miles to be marked on tree or post

- 123 Unless directed to the contrary, at each mile the nearest tree shall be marked, or in the absence of a tree within a reasonable distance, a reference post shall be used instead of a stake, bearing inscribed letters in alphabetical sequence over the two last figures of current year. [See Appendix T, diagram No. 15.] The particulars of bearing and distance from the marked tree to the mile-stake shall be observed and noted for reference as prescribed. [See paragraph 99.]

Corner-post of fence

- 124 When a fence is coincident with one side of a road, the corner-posts shall be marked with a broad-arrow over the letters R.D. [See Appendix T, diagram No. 15.]

Reserved road

- 125 A reserved road through a portion shall be defined in the manner specified (paragraph 122), and stakes with lockspits shall be inserted at the points of intersection with the boundaries.

*SPECIAL MARKS**Special Marks*

- 126 In addition to the marking hereinbefore prescribed, it is required that there shall be occasional special marks, which may be capable of identification when, in the course of time, the ordinary marks by stakes, lockspits, and trees, may have decayed or may have been destroyed in process of settlement.

Description of

- 127 The character of such special marking must, to some extent, depend upon surrounding conditions, e.g., in a country where there may be rocks, it would be sufficient to insert metal plugs in suitable places; where there are no rocks a quart bottle filled with a mixture of sand and cement, or a piece of galvanised-iron tube would be suitable.

Copper plug

- 128 The metal plug for insertion in rock shall be of round copper or Muntz metal rod, not less than 3/4 inch diameter, and not less than three inches long; and there shall be a deeply-inscribed broad-arrow, four inches long, with its apex very near to the plug; and the plug should be fixed in position by melted sulphur, the top being (say) 1/2 inch below the surface of the rock.

To fix plug

- 129 To fix a plug in rock - A hole is to be drilled somewhat deeper than the length, and about double the diameter of the plug. Melt sulphur in an iron vessel (an iron ladle with a long handle is best), and when the surface of the sulphur appears brown, add a like quantity of clean, sharp, dry sand; stir, and pour round the plug. The mixture sets quickly.

Bottle mark

- 130 For bottle marks mix clean, sharp sand and Portland cement in the proportion of 3 to 1, with sufficient water to make a good mortar; fill the bottle with same, and place it vertically, top upwards, one foot below the surface of the ground.

Tube mark

- 131 The galvanised-iron tube shall be of the sort ordinarily used for water supply, the rim to be not less than 1/8 inch thick, the piece to be one foot long, and to be inserted vertically, with the top one foot below the surface of the ground.

Positions of marks for road survey

- 132 In road survey it is desirable that these marks be inserted in the alignment at suitable points about half a mile apart; they shall be on the same side of the road, and distant five links from a station or an alignment-stake, and in the same direction therefrom relatively to a terminal of the survey.

For country portion

- 133 In subdivision of Crown land, the selection of positions for special marks must be left largely to the discretion of the Surveyor, who in the process of measurement will become acquainted with conditions of the ground. It may be pointed out that it would be an advantage to have intervisible points suitably placed for reference on one boundary, so as to facilitate comparison of azimuth.

For feature survey

- 134 In feature survey, the special mark shall be placed at a station where there is a reference-tree. In the marking of any survey, rock marks are to be preferred.

Mode of indicating special marks on plan

- 135 On the plan, the station or corner nearest to which the special mark is inserted, shall be indicated by two concentric circles, and amongst the notes on plan there shall be particulars.

To be inserted under special directions

- 136 Marks for the surveys mentioned in paragraphs 132 and 133 will be inserted only under specific directions from the District Surveyor.

REPORTING WILFUL DESTRUCTION OF A GOVERNMENT SURVEY MARK

Survey marks- protection of

- 137 It is desirable to report any case of wilful destruction of a survey mark, when it may come under notice, and when the circumstances admit of prosecution of the offence under the Survey Marks Act, No. 56, 1902. [See Appendix F.] The particulars required to enable successful prosecution are the full names and place of residence of the person offending; the place; the date of offence; the names of any witness and residence; the specific mark destroyed; the name of the surveyor by whom the mark was made for the purpose of Government survey - for there must be identification of the survey mark; and the names and designation of any official in the locality to whom it might be convenient to entrust the prosecution, e.g, Senior Police Officer or Crown Lands Bailiff, &c.
- 138 It is very desirable that any well-authenticated case be made the subject of immediate report to the District Surveyor, with a view to prosecution; steps being thus taken for protection of survey marks, the mischievous destruction of which causes much inconvenience and loss of time.

51
DIAGRAMS

Appendix 'T'

<p>1</p> <p>See Paragraph 97</p> <p>Por. 56 Corner Por. 57</p> <p>Reference Tree 56.57</p>	<p>6</p> <p>See Paragraph 111</p> <p>Sec. 3 5 6</p> <p>Sec. 3 2 2</p> <p>Rock at Corners of Sections and Allotments</p>	<p>10</p> <p>See Paragraph 117</p> <p>Corner Rock Por. 56</p>
<p>2</p> <p>See Paragraph 103</p> <p>Boundary</p> <p>Marks at Corners of Portions Etc.</p>	<p>7</p> <p>See Paragraph 114</p> <p>Trees near Boundary Line</p>	<p>11</p> <p>See Paragraph 119</p> <p>Reference tree; Reserve Trenches to be cut as in the case of portions.</p>
<p>3</p> <p>See Paragraph 109</p> <p>Town Sections Lockspitted.</p>	<p>4</p> <p>See Paragraph 109</p> <p>Stake at Corner of Section.</p>	<p>12</p> <p>See Paragraph 120</p> <p>Reference point and marked tree as may be required in Feature Surveys.</p>
<p>5</p> <p>See Paragraph 110</p> <p>Sec. 1 7 8 9 10</p> <p>Sec. 4 3 2 1</p> <p>Stakes at Corners of Sections & Allotments</p> <p>NOTE. A Stake at the corner of two Allotments will have the N^o of each Allotment marked on it, the N^o in Red the Allotment it represents. Thus the Stake at corner of Allotments 1 & 2 will have N^o 1 on the Front, and 2 on the reverse.</p>	<p>8</p> <p>See Paragraph 115</p> <p>The 2nd marked tree on a boundary exceeding 120 chains in length.</p>	<p>13</p> <p>See Paragraph 121</p> <p>The 7th marked tree. Survey of Boundary between County of Bathurst and Georgiana.</p> <p>14</p> <p>See Paragraph 121</p> <p>The 2nd marked tree of Feature Survey (the letters being used in regular sequence.)</p>
<p>9</p> <p>See Paragraph 116</p> <p>Tree at Corner of Por. 57 and 58.</p>	<p>15</p> <p>See Paragraph 123</p> <p>See Paragraph 124</p> <p>See Paragraph 123</p> <p>ROADS</p> <p>17th Mile tree. Corner post of fence. 19th Mile Post where no tree is near.</p>	

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5 GENERAL INSTRUCTIONS TO SALARIED SURVEYORS 1884

5.1 INTRODUCTION

General instructions were issued in September 1884 to government surveyors, setting standards for the employment on contract of licensed surveyors. It covers matters such as the role of District Surveyors, allowable closures of surveys and checking of measuring equipment.

5.2 EXTRACTS FROM GENERAL INSTRUCTIONS FOR SALARIED SURVEYORS - 1884

8 General Instruments

In respect of instruments, the following are indispensable:- One 5-inch theodolite with magnetic needle, two steel ribands (66 feet), three plummets, about two to three pounds each, flag-poles, steel wires in 66-foot lengths, properly mounted with snaphooks and handles. As a general rule, it is found desirable to provide a second theodolite, so as to be prepared for instruments contingencies, such as damage or repairs; also an extra steel riband, and sometimes an aneroid barometer and thermometers.

DISTRICT SURVEYORS

Inspection of Survey, report and diagram to be supplied, minor defects may be amended.

- 40 It is important that there should be regular inspection of each Licensed Surveyor's work once a year, or more frequently if required. As a general rule it is found convenient to select a group of portions for the examination, which should take place as soon as possible after completion of the survey by the Licensed Surveyor, and which may cover from 5 to 20 miles of lineal measurement, according to circumstances. Should the general character of the work be defective, it is advisable that there be further and extended inspection, so that it may be known how far or to what extent the defective work prevails. A comprehensive report is required as to the work examined, with a diagram on tracing linen to the same scale as the plans of the work which have been supplied by the Licensed Surveyor, upon which the particulars of the original survey are to be shown in black, and the re-measurements and the result of the inspection in blue, and with such separate enlargements of parts as may be useful in illustration or explanation. A form of report or summary, which is found useful for general purposes, is hereto annexed (Appendix D); but it is to be supplemented by further particulars. It is not necessary to send a fair copy drawing of each portion inspected, a tracing suffices for the purpose; and it is to be borne in mind that the object in view is to inspect and ascertain the character of the work done and report the result as quickly as possible. Should the work be found faulty in certain respects, and there are defects which may be quickly remedied, it tends to economical administration, and is desirable that the Inspecting Surveyor should amend, recording the time so appropriated, with a view to possible surcharge of the cost, and reporting full particulars with diagram in illustration.

Limit of error allowable

- 45 The limit of error allowable is a matter demanding careful consideration, and for the guidance of surveyors and draftsmen a tabular statement, as for the close of definite areas, has been prepared (Appendix E), which, under the present system of survey, and with the appliances now available, is found, after extensive investigation, to be fair average allowance. Of course it is desirable that such error should be in excess rather than the reverse. In test examination merely of lineal measurement by itself, such as the boundary of a reserve, the limit of error allowable should be proportionate to that specified in the tabular statement as for similar country.

APPENDIX E.

Cross of SURVEY.—Table showing the limit of allowable errors in links, being the sum of difference in latitude and departure, according to perimeter.

Regular figures, being rectilinear portions of ten sides and under.

Perimeter.	Description of Country.		
Chains.	Level.	Undulating.	Mountainous.
460 and under 650	10	15	23
330 „ 460	7	11	16
230 „ 330	5	8	12
170 „ 230	4	6	9
120 „ 170	3	4	7
90 „ 120	2	3	6
Under 90	1	2	3

REGULAR Figures, being portions of more than ten sides; and Irregular Figures, being portions with frontage to Rivers, Creeks, or Cliffs.

Perimeter.	Description of Country.		
Chains.	Level.	Undulating.	Mountainous.
460 and under 650	15	20	25
330 „ 460	11	15	20
230 „ 330	8	11	15
170 „ 230	6	8	11
120 „ 170	4	6	8
90 „ 120	3	4	6
Under 90	2	3	4

The above table, showing limits of allowable error in survey, is to be applicable only to areas over 20 acres.

Similar rate of error may be allowed in lineal measurements, e.g., in examination or test survey, measurement will be considered satisfactory if found to be correct within the following limits:—In level country about 2 links per mile; in undulating country about 3 links per mile; in mountainous country about 4 links per mile.

RESERVES

Reserve for

- 71 Prominent peaks and hill tops may be reserved from sale for trigonometrical stations. The selection of such should depend on the station natural features and conformation of the country, and must be left to the discretion of the Surveyor. The area may vary from one acre to twenty acres, the object being merely to secure uninterrupted view of other trigonometrical stations, or suitable sites for stations, or suitable sites for stations, and to prevent obstruction of view by buildings, tree, &c.

MISCELLANEOUS

Standard length to be maintained for reference

- 146 In order to ensure accurate survey it is advisable that a standard length be marked in some suitable place near the District Surveyor's office, for comparing and adjusting chains and steel ribands used in the process of measurement.

Mode of standard length

- 147 For the mode of marking such standard length, see Appendix I.



Theodolite Circa 1878
10" Everest pattern made by Troughton
Simms

APPENDIX I.

MODE OF MARKING STANDARD LENGTH FOR USE IN COMPARING AND ADJUSTING
LAND CHAINS AND STEEL RIBAND.

FOR the purpose of marking a standard length for reference and for adjustment of instruments used in lineal measurement, it is desirable to select some place where the marks will be undisturbed; and it is an advantage to have the site protected to some extent, so that comparisons may be made on any opportunity and without delay in waiting for fine weather. Frequently the stone curbing of a street is the only available place; but, if selected, it should be remembered that inquiry should always be made as to any displacement before proceeding to adjust an instrument; it is preferable to use large blocks of stone laid on a foundation of brick, choosing an even surface in some place where there is little probability of disturbance, and where their use will not cause interruption; best of all is a stone pavement in front of, or a ledge upon, some public building.

A copper plug about lin. in diameter and 4in. long is used for a reference mark, and it is inserted thus in the stone: A hole somewhat larger than the plug is bored in the stone by means of a drill, and when nearly in correct position the plug is secured by melted sulphur mixed with sand, and afterwards a dot is punched on the flat top of the plug by a very fine steel punch and a line engraved through it transversely to the standard length. In certain situations a piece of crockery, or slate, or another stone may be laid on the plug to protect the mark, and the whole covered with earth.

If it is desired to mark a length of 100ft., choose a time when the temperature is fairly settled, and after fixing one plug, lay out the standard riband at the requisite tension; and ascertaining the correction for temperature, apply it by means of a scale graduated to hundredths of an inch, and proceed without delay to insert the other plug for the final and exact measurement. For example, the rate of expansion of steel subjected to heat may be estimated at eight-thousandths of an inch, '008in., for each degree of temperature (Fahrenheit) for 100ft. of steel riband; say the riband in use, having been tested at the Sydney Observatory, is known to be standard length at 24° with a certain tension, therefore the length at a temperature of say 76° is increased by '416in. or '034ft.; and then insetting '416in. with the scale, and puncturing a dot on the copper plug, a length of 100ft. is obtained sufficiently accurate for minor trigonometrical work. A nearer approximation to accuracy may be obtained by engraving a temporary mark, and then testing this length several times under varying conditions of temperature, when the mean of several trials may be taken and inset or offset according to circumstances from the temporary mark.

In this operation it is requisite to ascertain the temperature of the riband as it lies upon the surface, and the mean of the readings of three or four thermometers laid upon the steel and noted simultaneously may be accepted as satisfactory. A thermometer such as is used for medical purposes, with a piece of cardboard or paper attached for safety sake, is suitable for the purpose; or a thermometer mounted on a strip of steel similar to the riband used. Also care should be taken to apply the same tension as that used in testing the riband at the Observatory.

In adjusting other ribands to the standard so marked the tension or pull should be noted, and also the temperature.

The cement used for setting the copper plugs is of melted sulphur mixed with fine dry sand. Care should be taken to prevent the sulphur burning in the ladle.

6 DIRECTIONS FOR THE EMPLOYMENT OF SURVEYORS BY THE DEPARTMENT OF LANDS 1963

6.1 INTRODUCTION

Even though Survey Practice Regulations had been in force since 1933, special marking requirements still remained for Crown Lands. The marking requirements issued on 1 October 1963 were of a new format and contained a few amendments to the 1914 requirements.

Of interest is that the term “horse shoe marks” was replaced by “blazes” and a definitive description of the technique used to blaze a tree was added.

One of the major additions to these directions was the inclusion of the type of reference marks that were allowed to be placed. These were included in Direction 6.18 and these could be a concrete block; with a galvanised iron nail or suitable metal plug in the top of the block; a galvanised iron pipe; a galvanised iron spike; a drill hole and board arrow cut into a kerb, a brick, concrete or stone wall or other substantial structure; a drill hole cut into bedrock or natural rock with a broad arrow; a broad arrow cut into the face of a reference tree; or an existing permanent mark adopted or established under the provisions of the Survey Coordination Act, 1949.

6.2 EXTRACTS FROM SURVEY DIRECTIONS 1963

PORTIONS

- 3.2 Four major corners of each portion where available shall be marked with the number of the portion surveyed together with the numbers of all adjoining portions. The numbers shall be placed preferably on a reference tree or reference rock or marked on a tree or rock situated on the corner. In the event of suitable trees or rocks being unavailable the corner peg shall be so numbered, or, if a fence post is situated on the corner, it shall be so numbered. However, where suitable trees or rocks are situated beyond 150 links but less than 300 links from such corner they may be marked and numbered and references shown on the plan but such marks cannot be accepted as reference marks under the Survey Practice Regulations.

In addition to these requirements reference trees if available shall be marked at intervals of about one mile apart on all unmarked boundaries.

- 3.6 On unfenced boundaries, line pegs or marks shall be placed at intervals of not more than ten chains, excepting that, if any peg or mark is visible from the peg or mark next on either side of it, such intervals may extend to but not exceed 16 chains.
- 3.7 Permanent marks and reference marks shall be placed as required by the Survey Practice Regulations and Local Government Ordinance 32. Any additional marks shall be subject to approval by the District Surveyor.
- 3.8 Where any portion has frontage to a non-tidal stream, the bank of which is reasonably well defined, the bank, which is defined as the limit of the bed in Section 235A of the Crown Lands Consolidation Act, shall be fixed by offsets from an unmarked traverse. Where the bank at a corner is liable to erosion, the corner peg shall be placed on the boundary a safe distance back from the bank. In all cases where a boundary terminates on the bank of a watercourse, distances shall be measured and recorded to the bank, traverse and corner and the plan of survey noted accordingly.

ALLOTMENTS AND SECTIONS

- 4.6 Permanent and reference marks shall be placed as required by the Survey Practice Regulations and Local Government Ordinance 32, and in addition, a reference mark, preferably a galvanised iron pipe, shall be placed on the site of the intersection of major building lines where a corner at the intersection of two streets is cut off or rounded off.

PUBLIC ROADS

- 5.1 In the survey of any road under the Public Roads Act the provisions of the Public Roads Act, the Survey Practice Regulations, Ordinance 32 of the Local Government Act and these Directions must be strictly observed.
- 5.6 All topographical information (including buildings and fencing) within close proximity of the proposed road are to accurately delineated. The type and approximate age of fencing to be shown. Age groups to be approximately:-

New	-	1-10 years
Fairly new	-	11-20 years
Fairly old	-	21-30 years
Old	-	31-40 years
Very old	-	over 40 years
- 5.9 A road shall be marked on both sides by trees blazed in the prescribed manner, and hardwood pegs, three inches square and 21 inches long, shall be inserted 18 inches in the ground at all angles and at intervals prescribed by the Survey Practice Regulations, with lockspits at pegs on the side measured.

MARKING

- 6.1 Where any line or corner is required to be marked in accordance with these Directions, the points to be marked shall be firmly marked with a peg, drill hole in rock, drill hole in concrete or similar material, or a nail in fixed timber.
- 6.2 All corners and angles of an allotment shall be marked in accordance with the preceding direction. Pegs for allotment corners shall be of sound durable hardwood or white cypress pine at least 16 inches long and not less than three inches by two inches rectangular section at the top except that where an allotment peg is common to more than two allotments it shall be of size set out in Paragraph 6.3 of these Directions.
- 6.3 Pegs for portion corners or angles, alignment pegs, section corners, each terminal of a cut off corner in a section, each tangent point within a section, all road pegs and all pegs within a cemetery shall be of sound durable hardwood or white cypress pine at least 21 inches long and not less than three inches square section at the top.
- 6.4 All pegs shall be pointed for approximately two-thirds of their length and shall be placed upright in the ground point downwards so that the top is not more than 3 inches above the ground level and the surrounding earth securely rammed, except that where a peg is located on a track in use for traffic the top shall be level with the surface of the ground. A broad arrow shall be cut into one face of each peg near its top.
- 6.5 Lockspits shall be placed in the direction of each boundary line from all marked corners or angles other than at pegs on allotment corners or unmeasured sides of roads or where the corner is located on a track in use.
- 6.6 Lockspits shall consist of trenches at least four feet long, eight inches wide and six inches deep commencing one foot from the peg or may consist of packed stones of similar dimensions.
- 6.7 Where any corner or angle is marked with a drill hole broad arrow, chisel mark or nail in fixed timber, where practicable lockspits shall be cut in solid rock, concrete or fixed timber three inches long 3/4 inch wide and 1/2 inch deep commencing two inches from the corner or where the surface renders it desirable lines may be painted at least one foot long and 3/4 inch wide.

- 6.8 When a corner to be marked is situated on bed rock, concrete or similar material within 12 inches of the surface, marking shall consist of a drill hole 1/2 inch in diameter and one inch deep with a broad arrow at least four inches long directed thereto and cut into the rock or material 1/2 inch deep.
- 6.9 Where a corner to be marked is situated on fixed timber, marking shall consist of a galvanised nail with a broad arrow at least four inches long directed thereto and cut into the timber 1/2 inch deep.
- 6.10 Where a fence post is situated on a corner to be marked, it shall be marked with a broad arrow at least four inches long and 1/2 inch deep cut into the face of the post.
- 6.11 Where any tree is required to be blazed, it shall be marked with two axe cuts each at least 12 inches long situated on opposite sides of the tree in the direction of the boundary line. Each cut shall have a horizontal cut at least two inches deep at the base. The wood of the tree shall be pared down from the top to the horizontal cut. Where a tree is required to be double blazed an additional blaze at least nine inches long shall be marked above each of the other blaze marks.
- 6.12 Reference trees shall be prepared by removing a shield of bark at least three feet in length with a width at the bottom of at least one-third of the girth of the tree. This shield shall face directly towards the corner. A broad arrow at least four inches long and 1/2 inch deep shall be cut centrally in the shield approximately 12 inches below the top of the shield, and the point of the arrow shall be the reference point.
- 6.13 Numbers cut in satisfaction of Paragraph No. 3.2 of these Directions shall be four inches in length and 1/2 inch deep on reference trees, rocks and fence posts and two inches long by 1/4 inch deep on pegs.
- 6.14 An allotment peg shall be marked with the number of each allotment to which that peg is common. Such numbers to be at least 1 1/2 inches long cut 1/4 inch deep into the peg or may be painted in black on a white or yellow background on the exposed faces of the peg which shall be so placed and numbered that each allotment number will face towards the allotment to which it refers.
- 6.15 All section pegs shall be marked with the section number and allotment number. Section numbers to be at least two inches long cut 1/4 inch deep into the peg or may be painted in black on a white or yellow background on the exposed faces of the peg. In like manner, the allotment numbers shall be marked on section pegs as required in the preceding paragraph.
- 6.16 Where any allotment or section corner is marked on a rock, concrete, or fixed timber, section and allotment numbers of like dimensions to these specified in Pars. 6.14 and 6.15 of these Directions are to be cut or painted thereon.
- 6.17 Where a tree is situated on a corner or angle, a shield of bark shall be removed facing a boundary line and a broad arrow shall be marked on the shield so as to be on that boundary line. A reference shall be determined from the point of that broad arrow to the corner and the plan noted "Tree on Corner" and the reference noted in the usual manner. Normally, trees so marked should be marked with the portion number or numbers.
- 6.18 Where a reference mark is required to be placed, it shall consist of:-
- (i) A concrete block in the form of a truncated pyramid fifteen inches long, six inches square at the lower end and four inches square at the upper end with a galvanised iron nail or suitable metal plug not less than three inches long and 1/4 inch diameter inserted therein so that the head of the nail or plug shall project 1/8 inch beyond the surface of the upper end of the block. The block shall be formed of concrete made from three parts of clean sand and one part of cement or four parts of blue metal crushings, two parts of sand and one part of cement.

The block shall be reinforced longitudinally throughout by at least two 1/4 inch diameter steel rods or by galvanised wires of not less than No. 8 gauge. The block shall be firmly set upright with the top three inches below the surface.

- (ii) A mass of concrete cast in situ of the specification provided in (i) not less than six inches square throughout and 15 inches deep with a galvanised iron nail or non corrosive metal plug not less than three inches long and 1/4 inch diameter inserted therein so that the head of the nail or plug shall project 1/8 inch beyond the upper surface. The upper surface shall be 3 inches below the surface.
- (iii) A galvanised iron pipe 12 inches long and three quarters of an inch internal diameter with a rim not less than 1/8 inch thick.
- (iv) A galvanised iron spike four inches long driven into fixed timber with a broad arrow four inches long cut into the timber 1/2 inch deep and directed thereto.
- (v) A drill hole cut into a kerb, a brick, concrete or stone wall or other substantial structure at least 1/4 inch diameter and 1/2 inch deep with a broad arrow at least two inches long and directed thereto.
- (vi) A drill hole at least 1/2 inch diameter and one inch deep cut into bed rock or natural rock with a broad arrow 4 inches long and directed thereto.
- (vii) A broad arrow cut into the face of a reference tree, and
- (viii) An existing permanent mark placed, adopted or established under the provisions of the Survey Co-ordination Act, 1949.

PLANS

- 7.8 Boundaries of Portions measured and external boundaries of Sections shall be shown by heavy unbroken black lines, other boundaries of unbroken black lines. Traverse lines, connections, observed trigonometrical rays, and computed lines shall be shown by broken black lines. All angles in boundaries, reserved roads and traverse lines are to be depicted by small circles. Where permanent marks or reference marks other than 6.18(vii) are placed two concentric circles shall be shown at the angle to which they refer.
- 7.14 All bearings shall be recorded in degrees, minutes and seconds from the north clockwise. As a general rule seconds of arc are not to be recorded for lines less than 20 chains in length. Where recorded seconds are to be in multiples of 10".
- 7.17 Fractional quantities of lengths and areas should be omitted as follows:-
 - (i) in town allotments, quantities smaller than 1/4 inch,
 - (ii) in portion surveys, quantities smaller than 0.1 link where the perimeter is longer than 20 chains, 0.01 link where it is 20 chains or less,
 - (iii) in road alignment surveys, quantities smaller than 0.01 foot.

ALIGNMENT OF STREETS

- 9.12 Alignment pins used for marking the alignment shall be iron castings, open box style, 4 inches x 4 inches x 18 inches which should be supplied by the Council, and be in readiness at time of survey. These are available at the Department of Lands as also are castings 24 inches long for use in sandy soils.

7 DIRECTIONS FOR THE EMPLOYMENT OF SURVEYORS BY THE CROWN LANDS OFFICE 1981

7.1 INTRODUCTION

The marking section, entitled New South Wales Crown Lands Office Survey Directions, was similar in most respects to the 1963 Directions. In fact, there had been no major changes to marking techniques for Crown Lands since the turn of the century.

In 1990, the revised Survey Practice Regulation under the Surveyors Act 1929 incorporated marking requirements for both alienated and Crown Lands.

7.2 EXTRACTS FROM SURVEY DIRECTIONS 1981

Rural Surveys

- 3.1 Four major corners of each area where available shall be marked with the number of the lot or lots surveyed. The number shall be placed preferably on a reference tree or reference rock or marked on a tree or rock situated on the corner. In the event of suitable trees or rocks being unavailable the corner peg shall be so numbered, or, if a fence post is situated on the corner, it shall be so numbered. However, where suitable trees or rocks are situated beyond 30 m but less than 60 m from such corner they may be marked and numbered and references shown on the plan but such marks cannot be accepted as reference marks under the Survey Practice Regulations.

In addition to these requirements reference marks shall be placed at intervals of not more than 1500 m apart on all marked and unmarked boundaries.

- 3.2 All corners and angles of the boundaries measured in any lot shall be defined by pegs or marks as set out in these Directions. Angles of a traverse along a watercourse the bank of which is a boundary or along a water race or unmarked road or easement need not be so marked.
- 3.3 All scrub and trees of a less diameter than 100 mm within 400 mm of any measured lot boundary shall be cleared, unless directed otherwise by the District Surveyor.
- 3.4 All trees remaining after clearing operations within 1 m of a measured boundary shall be blazed, and if situated on any boundary they shall be double blazed, unless directed otherwise by the District Surveyor.
- 3.5 On unfenced boundaries, line pegs or marks shall be placed at intervals of not more than 200 m excepting that, if any peg or mark is visible from the peg or mark next on either side of it, such intervals may extend to but not exceed 300 m.
- 3.6 Permanent marks and reference marks shall be placed as required by the Survey Practice Regulations and Local Government Ordinance 32. Any additional marks shall be subject to approval by the District Surveyor.
- 3.7 Where any lot has frontage to a non-tidal stream, the bank of which is reasonably well defined, the bank, which is defined as the limit of the bed in Section 235A of the Crown Lands Consolidation Act, shall be fixed by offsets from an unmarked traverse. Where the bank at a corner is liable to erosion, the corner peg shall be placed on the boundary a safe distance back from the bank. In all cases where a boundary terminates on the bank of a watercourse, distances shall be measured and recorded to the bank, traverse and corner and the plan of survey noted accordingly.

- 3.8 Lots shall not be measured with frontage to cliffs, lakes, lagoons, ill-defined watercourses and swamps; boundaries bordering thereon shall be defined by marked lines.
- 3.9 Except under special conditions, as prescribed by law, a boundary cannot extend beyond mean high water. Mean high water mark definitions are set out in the Manual of the New South Wales Integrated Survey Grid.
- 3.10 Where part of a boundary or parts of boundaries are inaccessible, a connecting traverse shall be made between the extremities of the measured parts where pegs and reference marks (preferably trees or rocks) are to be placed. The unmeasured parts are to be shown by broken lines on the plan.
- 3.11 For the purpose of intercommunication or access to amenities, roads shall be provided in the most suitable positions. Unless otherwise directed, they shall not be less than 20 m no more than 60 m wide and where reasonably practicable they shall be of even width. Access must be provided to each unalienated title, but where a group of freehold titles are held in one interest, access to the group only is required.
- 3.12 As far as possible, roads should be measured along lot boundaries.
- 3.13 Roads measured within lots shall be known as reserved roads. Unless otherwise directed they are to be measured on one side and both sides are to be marked as required by Paragraph 5.7 of these Directions. Where reserved roads meet a boundary the distance along that boundary to the measured side of the reserved road shall be recorded on the plan together with the distance across the road.
- 3.14 The position of a water race or legally constructed drain intersecting a lot shall be defined by traverses, unless it can be accurately defined from the boundaries of the lot. There shall be reservation to a width 3 m from each side of the centre line of the race; where the cutting exceeds 3 m in depth or a tunnel is constructed, the width shall be 6 m from each side of the centre line.
- 3.15 In any survey of a lot or group of lots which exceeds 2500 ha, or where so directed, one series of astronomical observations for azimuth shall be taken.
- 3.16 Where in any survey of a lot or group of lots, any part is situated 10 km distant in a direct line from any other part, astronomical observations for azimuth shall be taken near those extremities.
- 3.17 A series of astronomical observations for azimuth shall consist of not less than three complete sets and no set shall differ by more than 30 seconds from the adopted mean.
- 3.18 No boundary which has been previously determined and is sufficiently marked for fencing purposes shall be re-surveyed if an angular and linear close within the prescribed limits can be obtained, provided that the cost of essential comparisons of azimuth is less than the cost of re-survey.
- 3.19 A comparison of azimuth shall consist of a survey for azimuth purposes only between two or more marks found on a boundary. This survey is distinct from a connection along a boundary to a corner which in itself forms a terminal of a line of azimuth.
- 3.20 All lots surveyed shall be connected to some previously recorded survey unless otherwise directed. The azimuth of the survey connected with shall be observed and noted on plan.
- 3.21 No surveyed lot of unalienated land shall be subdivided or encroached upon without

specific instructions or approvals to that effect.

- 3.22 In the subdivision of a measured Jot, connections along boundaries are required from the extremities of the subdividing line to the nearest points established in the former survey. One subdivided area shall close to the requirements of the Survey Practice Regulations. The residue area shall be by compilation and where difficulties arise in compilation, the residue area shall not be surveyed unless so instructed by the District Surveyor.
- 3.23 In all surveys within view of trigonometrical stations bearings shall be observed thereto and the particulars recorded on the plan. A connection to a trigonometrical station shall be traversed if so directed in the instruction, unless found to be impracticable or very difficult.
- 3.24 Wherever practicable, connections shall be measured to corners of lots or measured parcels on the opposite side of frontage streams and to lots within 100 m of the lot being measured and separated therefrom by vacant Crown lands.
- 3.25 When instructions call for survey of a specific area, there shall be no change in the area measured.
- 3.26 Any desirable modification in the form of measurement shall be reported to the District Surveyor, accompanied by applicant's written consent; but any modification effected without the District Surveyor's approval will be at the risk of the Surveyor.
- 3.27 Any landward boundary of a reserve or road along a watercourse or foreshore, which is presently shown by an irregular line or any boundary defined by a former irregular feature shall in any re definition be shown by right lines, circular curves or any combination thereof defining, as close as possible, the original location

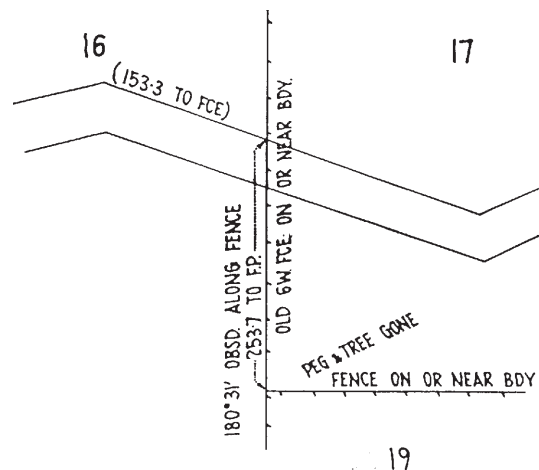
Urban Surveys

- 4.1 All parcels will be marked as consecutive numbered lots in each plan of survey, regardless of the number of sheets on the plan.
- 4.2 Unless instructed to the contrary, the area of any urban lot shall not be less than the minimum area specified for the locality by the Local City, Municipal or Shire Council.
- 4.3 Unless instructed to the contrary, the frontage of any urban lot shall not be less than the minimum frontage specified by the Local City, Municipal or Shire Council.
- 4.4 Sufficient clearing shall be undertaken to enable the identification of each boundary line between pegs placed.
- 4.5 Permanent and reference marks shall be placed as required by the Survey Practice Regulations and Local Government Ordinance 32, and in addition, a reference mark, preferably a galvanised iron pipe, shall be placed on the site of the intersection of major building lines where a corner at the intersection of two streets is cut off or rounded off.



Public Roads

- 5.1 In the survey of any road under the Public Roads Act the provisions of the Public Roads Act, the Survey Practice Regulations, Ordinance 32 of the Local Government Act and these Directions must be strictly observed.
- 5.2 Where the proposed road traverses freehold titles or Crown tenures each terminal of the proposed road must be connected to a defined survey point and a comparison of azimuth determined. Where the proposed road traverses vacant Crown lands it must be connected to a registered survey and if practicable a comparison of azimuth determined.

- 5.3 (i) Where the proposed road intersects title boundaries between separate ownerships or the boundaries of Crown tenures those boundaries shall be carefully re-established and the intersections of the sides of the proposed road and those boundaries shall be defined by survey and marked. The bearings of such boundaries shall be determined and measurements shown to defined survey points on those boundaries.
- (ii) Provided that, where the terminals of the proposed road have been accurately connected to former registered surveys and all internal titles and unnecessary roads can be accurately plotted in relationship to the proposed road, the requirements of this Direction may be dispensed with if such connections involve undue expense.
- (iii) Provided also that where a fence has been erected on or near a boundary between different ownerships or of Crown tenures and the intersection is not defined as provided in the first paragraph of this Direction, the distance along the proposed road traverse to that fence shall be noted and a bearing observed and noted along the line of that fence. Fences shall not be adopted as boundaries unless sufficient investigation is made to establish that presumption. Unless boundaries are properly redefined cuts on fencing shall be noted vide the adjacent diagram. Distances to corner fence posts on or near title corners to be shown where practicable.



- 5.4 Where the proposed road provides for resumptions along the frontage of an existing title or Crown tenure all cuts shall be determined on the ground where readily practicable but, where insufficient marks are found and the old surveys can be accurately plotted in relationship to the proposed road, this requirement may be dispensed with, excepting that in the case of a Crown tenure sufficient computed connections must be provided to permit the compilation of a plan of the residue area.
- 5.5 Where an intersection with the boundary between separate ownership or of a Crown tenure has not been defined as set out in the first paragraph of Direction 5.3 reference marks shall be placed to permit of ready re-establishment of the proposed road at that point. Without limiting discretion it will generally be preferable to place these reference marks at each end of the road traverse line which crosses that boundary.
- 5.6 New roads shall be measured of uniform width wherever possible. Small areas of unnecessary roads shall not be closed except in special circumstances.
- 5.7 A road shall be marked on both sides by trees blazed in the prescribed manner, and hardwood pegs, not less than 75 mm square and at least 500 mm long, shall be inserted 450 mm in the ground at all angles and at intervals prescribed by the Survey Practice Regulations, with lockspits at pegs on the side measured.

- 5.8 Where an angle of a new road is defined by the centre of a fence post, it shall be marked  and plan noted  FPRD
RD
- 5.9 Reference trees marked “RD” may be placed, in addition to markings required by the Survey Practice Regulations, at terminals of the proposed road and at intervals of about 1500 m throughout.
- 5.10 The survey requirements of the Department of Main Roads for intersections or junctions with Main Roads or Trunk Roads shall be carefully adhered to and it shall be the responsibility of the measuring Surveyor to obtain the concurrence of the Divisional Engineer of that Department unless such has been provided for in the instructions for survey
- 5.11 Severed land shall be identified by survey and sufficient information supplied to enable its metes and bounds to be determined.
- 5.12 All easements, rights of way, etc. apparent on the ground shall be accurately defined in relation to the boundaries of the proposed road and such information shall be shown on the plan.

Nature and Position of marks

- 6.1 Where any line or corner is required to be marked in accordance with these Directions, the points to be marked shall be firmly marked with a peg, drill hole in rock, drill hole in concrete or similar material, or a nail in fixed timber, or as otherwise required by the Survey Practice Regulations.
- 6.2 A broad arrow shall be cut into one face of each survey peg near its top.
- 6.3 Pegs on corners or angles of surveys, alignment pegs, each terminal of a cut off corner of an urban lot, each tangent point within an urban lot, all road pegs and all pegs within a cemetery shall be of sound durable hardwood or white cypress pine.
- 6.4 In surveys of lots of 4000 square metres or more all pegs shall be at least 530 mm long and not less than 75 mm square section at the top end.
- 6.5 In surveys of lots less than 4000 square metres all pegs shall be at least 400 mm long and not less than 75 mm by 35 mm at the top end.
- 6.6 Lockspits shall be placed in the direction of each boundary line from all marked corners or angles other than at pegs on the corners of lots of less than 1000 square metres or unmeasured sides of roads or where the corner is located on a track in use.
- 6.7 Lockspits shall consist of trenches 1 m long, 200 mm wide and 150 mm deep commencing 300 mm from the peg or may consist of packed stones of similar dimensions.
- 6.8 Where any corner or angle is marked with a drill hole broad arrow, chisel mark or nail in fixed timber, where practicable wings shall be cut in solid rock, concrete or fixed timber 80 mm long 20 mm wide and not less than 15 mm deep commencing 50 mm from the corner or where the surface renders it desirable lines may be painted at least 300 mm long and 20 mm wide.
- 6.9 Where a corner to be marked is situated on bed rock, concrete or similar material within 300 mm of the surface, marking shall consist of a drill hole not less than 10 mm in diameter and 30 mm deep with a broad arrow at least 80 mm long directed thereto and cut into the rock or material 15 mm deep.

- 6.10 Where a corner to be marked is situated on fixed timber, marking shall consist of a galvanised nail with a broad arrow at least 80 mm long directed thereto and cut into the timber 15 mm deep.
- 6.11 Where a fence post is situated on a corner to be marked, it shall be marked with a broad arrow at least 80 mm long and 15 mm deep cut into the face of the post.
- 6.12 Where any tree is required to be blazed, it shall be marked with two cuts each at least 300 mm long situated on opposite sides of the tree in the direction of the boundary line. Each cut shall have a horizontal cut at least 50 mm deep at the base. The wood of the tree shall be pared down from the top to the horizontal cut. Where a tree is required to be double blazed an additional blaze at least 200 mm long shall be marked above each of the other blaze marks.
- 6.13 Reference trees shall be prepared by removing a shield of bark at least 1 m in length with a width at the bottom of at least one-third of the girth of the tree. This shield shall face directly towards the corner. A broad arrow at least 100 mm long and 15 mm deep shall be cut centrally in the shield approximately 300 mm below the top of the shield, and the point of the arrow shall be the reference point.
- 6.14 Numbers cut in satisfaction of Paragraph No. 3.1 of these Directions shall be 100 mm in length and 15 mm deep on reference trees, rocks and fence posts and 50 mm long by 6 mm deep on pegs.
- 6.15 An urban lot peg shall be marked with the number of each lot to which that peg is common. Such numbers to be at least 40 mm long cut 6 mm deep into the peg or may be painted in black on a white or yellow background on the exposed faces of the peg which shall be so placed and numbered that each lot number will face towards the lot to which it refers.
- 6.16 Where any urban lot corner is marked on a rock, concrete, or fixed timber, numbers of like dimensions to those specified in Paragraph 6.15 of these Directions are to be cut or painted thereon.
- 6.17 Where a tree is situated on a corner or angle, a shield of bark shall be removed facing a boundary line and a broad arrow shall be marked on the shield so as to be on that boundary line. A reference shall be determined from the point of that broad arrow to the corner and the plan noted "Tree on Corner" and the reference noted in the usual manner. Normally, trees so marked should be marked with the lot number or numbers.
- 6.18 Where a reference mark is required to be placed, it shall consist of any one of the following:

(i) A concrete block in the form of a truncated pyramid 400 mm long, 150 mm square at the lower end and 100 mm square at the upper end with a galvanised iron nail or suitable metal plug not less than 80 mm long and 5 mm diameter inserted therein so that the head of the nail or plug shall project 3 mm beyond the surface of the upper end of the block. The block shall be formed of concrete made from three parts of clean sand and one part of cement or four parts of blue metal crushings, two parts of sand and one part of cement.

The block shall be reinforced longitudinally throughout by at least two 5 mm diameter steel rods or by galvanised wires of not less than No. 8 gauge. The block shall be firmly set upright with the top 75 mm below the surface.

(ii) A mass of concrete cast in situ of the specification provided in (i) not less than 150 mm square throughout and 400 mm deep with a galvanised iron nail or non corrosive metal plug not less than 80 mm long and 5 mm diameter inserted therein so that the head of the nail or plug shall project 3 mm beyond the upper surface.

The upper surface shall be 75 mm below the surface.

(iii) A galvanised iron pipe 300 mm long and 20 mm internal diameter with a rim not less than 3 mm thick.

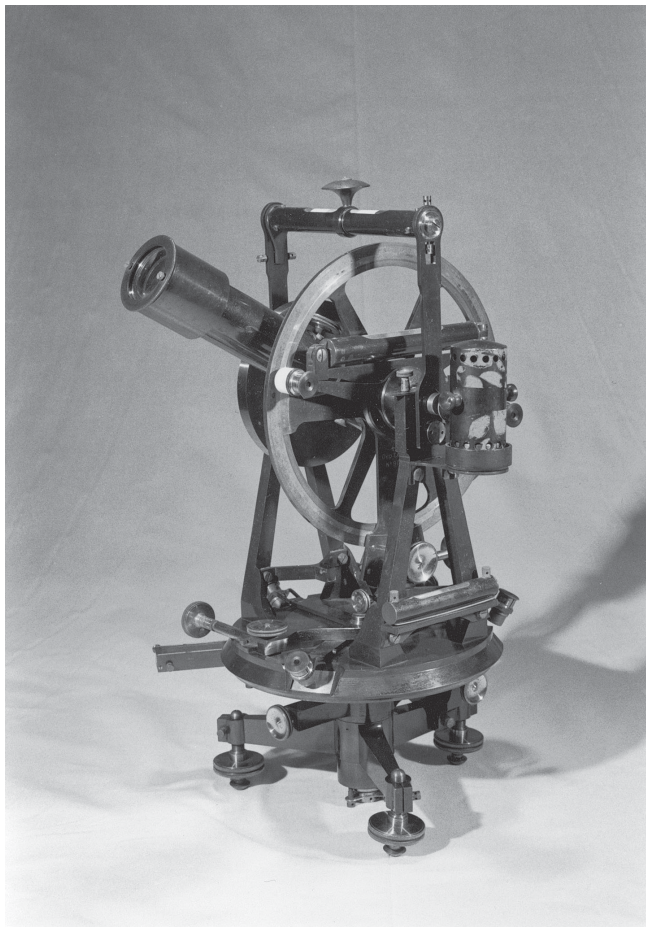
(iv) A galvanised iron spike 100 mm long driven into fixed timber with a broad arrow 80 mm long cut into the timber 15 mm deep and directed thereto.

(v) A drill hole cut into a kerb, a brick, concrete or stone wall or other substantial structure at least 6 mm diameter and 10 mm deep with a broad arrow at least 80 mm long and directed thereto.

(vi) A drill hole at least 10 mm diameter and 30 mm deep cut into bed rock or natural rock with a broad arrow 80 mm long and directed thereto.

(vii) A broad arrow cut into the face of a reference tree,

(viii) An existing permanent mark placed, adopted or established under the provisions of the Survey Coordination Act, 1949.



Theodolite Circa 1880
8" Altazimuth with stride level
kerosene reading lamp made by
Troughton and Simms

8 REGISTRAR GENERAL'S DEPARTMENT INSTRUCTIONS ISSUED IN 1915 TO SURVEYORS LICENSED UNDER THE PROVISIONS OF THE REAL PROPERTY ACT, 1900

8.1 INTRODUCTION

Circulars and Directions issued by the Surveyor General, as described in Chapters 3 to 7, had been directed at Crown surveys. They were intended to set standards for Crown surveyors and private surveyors contracted by the Crown.

The Real Property Act 1862 was enacted in response to increasing numbers of transactions in private land. It also instituted the Torrens system of state guaranteed titles and a central title register.

However, it was not until 1915 that the Registrar General issued "Instructions to Surveyors Specially Licensed Under the Real Property Act, 1900". Up until then it had been the surveyor's responsibility to maintain a standard of professional conduct and skill in marking surveys under the Real Property Act.

There were, however, very loose instructions issued during those years but no complete code of regulations existed in 1900, although they had been under consideration for some time by the Registrar General. These earlier instructions are alluded to in a discussion by Mr D M Maitland on a paper by Mr F J Gregson (1893) when he states; "Only a few years ago it was by no means uncommon for subdivisions of private land under the Real Property Act to be made on paper and the plans deposited in the Land Titles Office without the portions being marked on the ground at all, or perhaps only marked in the most perfunctory and temporary manner. Regulations were, however issued by the Registrar General not many years ago defining distinctly the size of stakes etc., that must be used in that class of work."

In 1899 the Institution of Surveyors made recommendations to the Registrar General as follows: "That a regulation be issued directing surveyors to leave permanent marks in connection with all Real Property Act surveys." Further representations were made but as the proposed new Surveyor's Act and Regulations were under consideration, the Registrar General declined to take any action until the issue of the 1915 Instructions.

A Surveyors Act had been mooted since 1886. However, it was not until 1929 that the Act was finally enacted, and not until 1933 that Survey Practice Regulations were instituted under that Act. The 1915 Instructions were therefore a bridge between the general requirements and the enacting of legal marking requirements for surveys over private land.

The marking section of the Instructions dealt mainly with subdivisions, as these along with Primary Applications to bring Old System Title land under the Real Property Act, were the two main sources of work for the specially licensed surveyors. The marking was divided into sections dealing with subdivisions of lots of one acre, between one and five acre lots and larger than five acre lots. The main differences were the size of the pegs that were to be used for the corners and the large lots were also required to have line marks at intervals of not more than ten chains apart, also with trenches cut in the direction of the boundary as if for corners.

The Instructions also required that where "it may be undesirable or impracticable to mark in the manner above described any boundary of such land, the marking may be omitted. But in lieu thereof two or more special marks, as the case may require, should be placed in carefully selected positions for reference purposes...". The types and placement of special marks were then spelt out. It should be noted that the appendix diagram in these regulations showed that the reference bearings and distances were to be from the corner to the special mark.

There are parallels in the 1915 Instructions with the concurrent 1914 Regulation for the Employment of Licensed Surveyors issued by the Surveyor General for Crown surveys. However minor differences occur, right down to differing peg and stake sizes and nature of special marks. Note that at this time it was normal practice to provide a reference from the tree or special mark to the corner on Crown surveys.

8.2 EXTRACTS FROM INSTRUCTIONS TO SURVEYORS - 1915

COMPUTATIONS

Fractional quantities in linear and angular measurements

- 80 In plans of lands in the City of Sydney and other cities in this State, also in towns and villages and suburban areas, it is desirable to avoid, as far as possible, the introduction of fractions of less than 1/8 inch. In plans of country lands fractions of less than 1/10 of a link should be omitted. Fractional parts of seconds of arc should also be omitted.

Statement of area in plans

- 81 As a registered proprietor is entitled to an exact statement of the area of his land, no definite rule is laid down as to what is required to be done in this respect. This must be left to the discretion of the surveyor acting in the interests of the registered proprietor.
In the comparison of the area stated in the plan with that obtained by computation in this Department, an allowance at the rate of 1/4 perch per acre will be made in cases of disagreement where the parcels or lots are irregular in form.

Offset areas to be separately noted

- 82 In the case of land having frontage to flowing, tidal, or other waters, the offset areas should be separately noted in the plan. In certain cases a sketch showing the actual offsets may be asked for.

Mathematical check of surveys, limit of allowable error

- 83 The accuracy of surveys shall be tested by latitude and departure, and the close shall be within the following limits, of error, viz:- the sum of the differences of latitude and departure of the perimeter should not exceed -

In Town and suburban lands one inch up to ten chains and over that length at the rate of one inch per ten chains of perimeter.

In Country lands Level and undulating country one link per mile of perimeter.
Hilly country 1 1/2 links per mile of perimeter.
Mountainous country two links per mile of perimeter.

In order to permit of the proper allowance being made it is advisable that a brief description of the country be given in plans. For the purpose of this instruction country should be classified as stated hereunder:-

“Level and undulating” where the slopes range up to 10 degrees.

“Hilly” where the slopes range from 10 to 20 degrees.

“Mountainous” where the slopes exceed 20 degrees.

MARKING

- 84 In subdivisions in which the lots are one acre or under in area, the marking shall be made in the following manner:-

(a) Each section corner shall be marked by a hardwood peg, painted white, not less than 20 in. by 3 in. by 3 in., sunk at least 16 inches into the ground. Section and lot numbers to be marked thereon, and trenches 3 ft. long by 8 in. wide by 6 in. deep, commencing at one foot from the peg, shall be dug in the direction of the boundary

lines.

(b) Each lot corner shall be marked by a hardwood peg, painted white, not less than 16 in. by 3 in. by 1 1/2 in., sunk at least 12 inches into the ground. Pegs on street frontages to be marked with the lot numbers.

- 85 In subdivisions in which the lots are more than one acre but not more than five acres in area, the marking shall be made in the following manner:

Each corner shall be marked by a hardwood peg, painted white, not less than 18 in. by 3 in. by 2 in., sunk 14 inches into the ground. The lot numbers shall be marked thereon, and at lot corners and at angles on road frontages, trenches 3 ft. long by 8 in. wide by 6 in. deep, commencing at one foot from the peg, shall be dug in the direction of the boundary lines.

- 86 In subdivisions in which the lots are more than five acres in area, the marking shall be made in the following manner:-

(a) Each corner shall be marked by a hardwood peg, painted white, not less than 20 in. by 3 in. by 3 in., sunk 16 inches into the ground. The lot numbers shall be marked thereon, and trenches 3 ft. long by 8 in. wide by 6 in. deep, commencing at one foot from the peg, shall be dug in the direction of the boundary lines.

(b) Line or tally pegs shall be 18 in. by 3 in. by 2 in., sunk 14 inches in the ground at intervals not exceeding 10 chains, and trenches shall be dug as at corners.

- 87 Where corners are in rock, they shall be marked by a hole drilled to a depth of not less than one in., and tenches, which shall not be less than six in. long, one in. wide, and 1/2 in. deep, shall be cut in the rock in the direction of the boundary lines. The section and lot numbers shall also be cut in the rock.

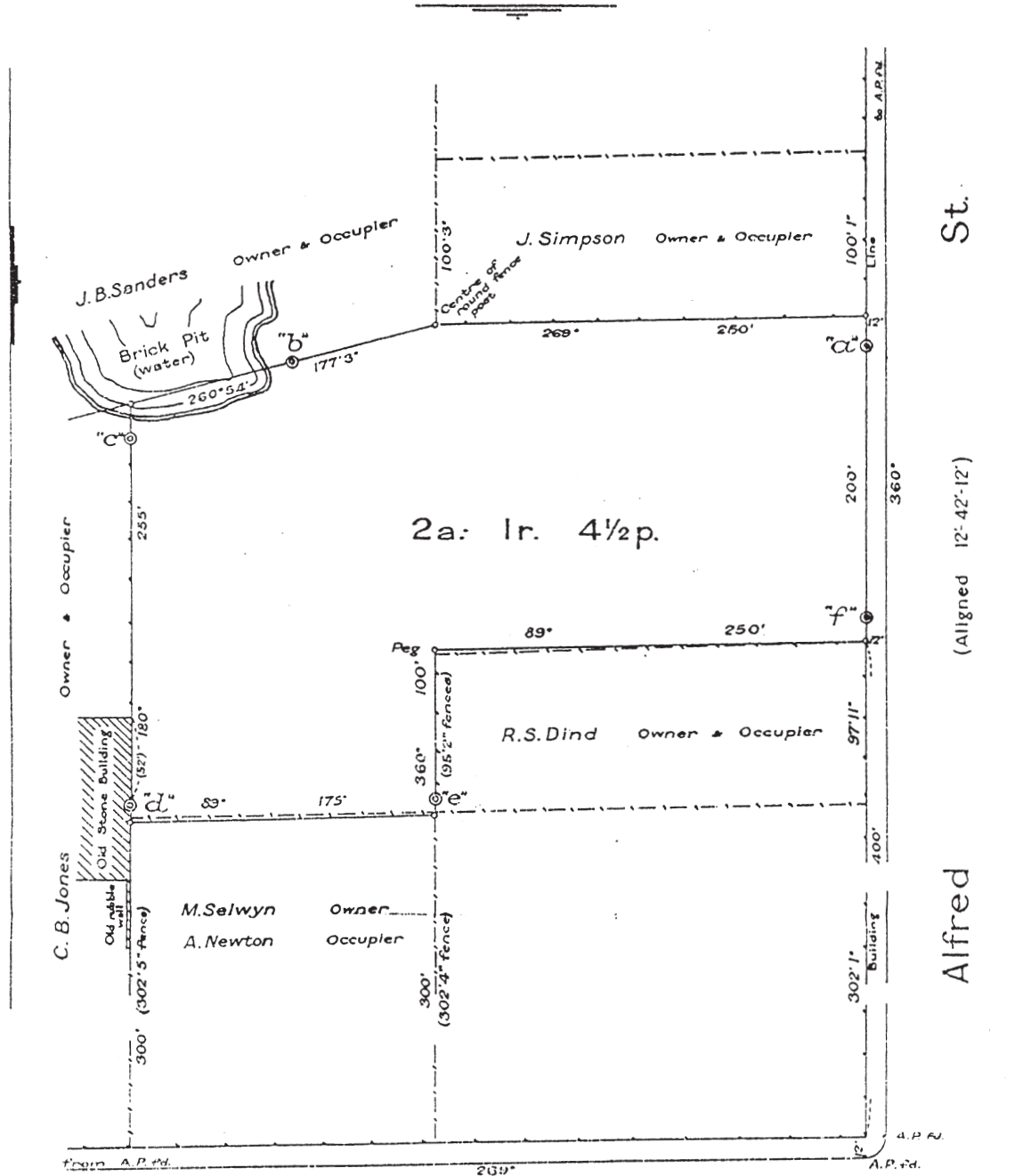
- 88 (a) In all other surveys for the purposes of the Real Property Act the marking shall be in accordance with that prescribed for subdivision surveys.

(b) Except that where in an application survey a doubt may exist as to the position of a boundary of the land, the subject of the application, or for other reasons it may be undesirable or impracticable to mark in the manner above prescribed any boundary of such land, the marking may be omitted. But in lieu thereof two or more special marks, as the case may require, should be placed in carefully selected positions for reference purposes, preferably on boundaries adjoining the unmarked boundary or boundaries. In a case where the marking of all the boundaries is omitted at least four (4) "special marks" should be adopted.

(c) The marks may be copper nails in substantial pegs sunk level with the surface, gas-pipes 1 foot x 1 inch, the tops of which should be not less than six inches below the surface of the ground, or other suitable marks which may be made, provided owners do not object, on substantial buildings, walls, etc. The nature of the marks and their positions should be stated in the plan, and they should be noted as "special marks." (See Appendix M.)

SKETCH

illustrating "special marking"—Primary Application Surveys.



2a: 1r. 4 1/2 p.

Harrow (Aligned 12° 42' 12") Road

Special Marks

a	Nail in peg at ground level	180°	15ft. from	Corner
b	Gas pipe 6in. under ground	260° 54'	80 -	angle
c	" " " "	180°	20 -	Corner
d	Mark --- on wall	360°	10 -	"
e	Nail in peg at ground level	360°	15 -	"
f	Gas pipe 6in. under ground	360°	15 -	"

9 SURVEY PRACTICE REGULATIONS 1933

9.1 REGULATIONS PROMULGATED IN 1933

The Surveyors Act 1929 required that all persons wishing to practice as a surveyor and carry out boundary surveys had to be registered under the Act. The Act also set up a Board of Surveyors which was responsible for administering the Act and Regulations. The Act also did away with the old system of issuing separate licences to surveyors to conduct surveys under the Real Property Act, Mining Act and for Crown Surveys. Registration under the 1929 Surveyors Act empowered a surveyor to carry out surveys under the provisions of those Acts. It also ensured a high standard of conduct and a uniformity of surveys.

The Survey Practice Regulations 1933, under the Surveyors Act 1929 were first published in the New South Wales Government Gazette of 12 May 1933. Regulation 2 reads;

“These regulations shall apply to every survey made after the commencement of these Regulations”.

Under the Survey Practice Regulations 1933, reference marks were required to be placed for most types of surveys. However, although the type of marks used as reference marks did not alter, the reference bearing and distance was to be indicated on plans of survey as being from the reference mark to the corner.

Very few changes were made to the Regulations until major revisions in 1990. In the original 1933 regulations there is a definition of a permanent mark but not a reference mark. The permanent mark was defined as;

“`Permanent mark’ means a permanent mark placed in accordance with the provisions of Ordinance 32 under the Local Government Act, .”

These will be discussed in later chapters. The reference mark definition was inserted into the regulations by the Government Gazette dated 19 June 1964. This reads;

“`Reference mark’ means a survey mark of a durable nature placed or situated near and connected by measurement to a corner, angle or tangent point of any survey”.

This was later altered by Gazette on 20 December 1968 such that “or a survey mark referred to in Regulations 61 and 62 or Regulations 67 and 68” was added to the end of the definition. These Regulations related to surveys for sites of easements made under the Pipelines Act 1967 and Surveys for sites of Easements for Water Supply Pipelines to be acquired by the Department of Public Works which was also added in the same Gazette.

Where a survey was made for the purpose of bringing the land under the provisions of the Real Property Act 1900 (ie. a primary application), the surveyor in the original regulations was required to place marks of the nature prescribed in Regulation 36 at or adjacent to all corners and angles. He was also required to place at least one reference mark for each separate area of less than 20 acres surveyed or at least two marks if over 20 acres and show on the plan the nature and positions of all marks and their connections to corners or angles in the survey. This was repealed in 1964.

It is also interesting to note that in 1933, Regulation 17 read;

“Where a surveyor marks a city or suburban survey he shall firmly mark each accessible corner thereof (including corners of each parcel of land in a subdivision) with a peg or mark of the nature prescribed in Regulation 36 hereof”.

The Survey Practice Regulations were first amended in 1933 where Regulation 17 had a proviso that if the corner was not accessible then an additional reference mark was to be placed adjacent to the corner, remote from the reference marks, in lieu of marking the corner and place other reference marks within 150 links of every unmarked corner. In 1964, Regulation

17 was amended to read;

“Provided that where it is not practicable to place such peg or mark or where existing structures would render such peg or mark of little value for fencing or building purposes such peg or mark need not be placed for a specific corner if a reference mark is situated or placed within 100 feet of that corner. Provided further that in a country survey where a fence post is on a corner a reference mark need not be placed unless otherwise required in these regulations”.

The Survey Practice Regulations of 1933 made a provision for directly connecting the permanent mark to the survey. Regulation 5(2) of the regulations reads;

“Where in these Regulations a surveyor is required to place a reference mark or replace an alignment or permanent mark the requirement shall include the connection by measurement of the mark to the survey made by him”.

The nature and position of marks section of the original regulations stated that any corner or line of any portion that needed to be marked, could be marked by peg, drill hole in rock, concrete or other similar material, a chisel mark or nail in fixed timber or by some other suitable means. The pegs were to be at least 16 inches long and not less than three inches by 1 1/2 inches at the top.

The reference marks have turned out to be important marks because of the very great possibility of losing corner marks to fencing and other activities. The type of reference marks allowed were listed in Regulation 37.

In 1964, another type of reference mark was added to those already allowed, this was an existing permanent mark placed, adopted or established under the provisions of the Survey Coordination Act, 1949.

Also where a reference mark is placed in a roadway it was to be:

- (1) In the adjacent kerb where such is of a nature not likely to be disturbed or
- (2) Not more than 18 inches from the alignment or road boundary. In 1964 this regulation was amended to read
- (3) At a suitable distance from the existing or proposed alignment or road boundary; that distance shall be determined at the discretion of the surveyor, provided that the line between adjacent marks shall be made parallel to such alignment or road boundary, as far as practicable.

There regulations also required that lockspits placed were to be trenches at least 1.2m long, 0.3m wide and 0.2m deep and to start 0.4m from the corner peg or mark and in the direction of the boundary of the land surveyed. This also allowed stones to be packed in the direction of the boundary in lieu of trenches. This is the same requirement that had been in use from the earliest regulations. Regulation 39 also stated;

“As lockspits are valuable means of assisting in the relocation of boundaries, their use in all country surveys is recommended”.

Regulation 40 deals with the use of the broad arrow survey mark which was declared the Government mark in the Survey Marks Act of 1902. The mark became protected under this Act whereby a ten pound fine was issued for any unauthorised use of the broad arrow mark or for the defacement or destruction of the mark.

In 1933 a new regulation 24A was published in Gazette No. 71 of 12 May 1933. This new regulation related to making a survey for the resumption or dedication of any area under the provisions of any Act other than the Local Government Act of 1919 in connection with the opening and deviation of any public road. It required that the survey be marked as required by Ordinance 32 of the Local Government Act and to show the nature and position of the reference marks placed in accordance with the regulation on the plan of survey.

9.2 SUBSEQUENT AMENDMENTS

In 1964, a more detailed Regulation 36 was added to the Regulations. This dealt with the types of pegs that could be used to mark corners. In surveys of lots of less than one acre all pegs were to be of sound hardwood or white cypress pine at least 16 inches long and three by 1 1/2 inch section at the top. In lots of more than one acre the pegs had to be 21 inches long and three by three inches at the tops. The pegs had to be pointed for about two thirds of their length and when placed were not to stick up more than three inches above the ground. Also where the corner was marked by a drill hole, chisel mark or galvanised iron nail in timber, wings had to be cut in solid rock, concrete or fixed timber that were three inches long, 3/4 inch wide and 1/2 inch deep.

In December 1968, new regulations were added to the Survey Practice Regulations which dealt with surveys for sites of easements under the Pipelines Act, 1967. Under Regulation 61 the surveyor was required to, when carrying out a survey of the site of an easement under the Pipelines Act to;

- (b) place a survey mark at or within 100 feet of each extremity of and each bend in the site,
- (c) place survey marks throughout the entire length of the site at intervals no greater distance than 1 mile,
- (d) place each mark in a position least likely to be disturbed.
- (e) place all marks as far as practicable on the same side of the site.

Also each survey mark placed in accordance with the above regulation was to be of the type prescribed in Clause 9(a) of Ordinance 32 under the Local Government Act or where rock was at the surface the mark was to be a concrete block with the base firmly cemented three inches into the rock. This will be discussed in the chapter titled Local Government Act 1919 - Ordinance 32. This section also required that a surveyor who placed a survey mark in accordance with Regulation 61 was to indicate that survey mark on the ground by a visible marker, except where rock precludes the placing of such a marker. The visible marker must be a concrete block, six feet long, four by three inches in section stamped with the impression "Marker - Pipelines Act" and be set upright two feet into the ground and the impression facing the survey mark which must be between three and six feet from the mark. The aim was to make it easier for the surveyor to locate the survey mark.

Another regulation added at the same time is Regulation 67 which was for where a surveyor makes a survey of the site of an easement for a water supply pipeline which has been constructed by or on behalf of the Minister for Public Works as Constructing Authority under the Public Works Act, 1912. Under this regulation the surveyor must place survey marks the same as for surveys under the Pipelines Act. Those survey marks had to be of a nature described in Regulation 37 and also wherever practicable be related by survey to any substantial monument of brick or stone or corner tree within 300 feet of the mark.

In 1972, amendments were made to the Regulations for metrification. In June 1986, an amendment was made to Regulation 12 which dealt with the surveyor connecting isolated surveys to the State Control Survey. This included the number of permanent marks to be placed, adopted or established under the provisions of the Survey Coordination Act, 1949 when carrying out a survey. This regulation will be fully discussed in the chapter titled Survey Coordination Act.

The Regulations were completely revised and rewritten as the Survey Practice Regulation 1990, which came into force on 1 September 1990.

10 LOCAL GOVERNMENT ACT 1919 - ORDINANCE 32

10.1 ORDINANCE PROMULGATED IN 1922

A freeholder at common law could dispose of any portion of his property without regard to its size and shape. He was also not obliged to provide access beyond a bare minimum. This led 19th century subdividers in popular areas to cut up land into small parcels and provide the narrowest of streets.

Some control of streets in New South Wales was introduced by Reids Act 1881 which was later re-enacted as the Width of Streets and Lanes Act, 1902. This legislation prohibited persons from laying out new streets less than 66 feet wide and new lanes less than 20 feet wide. Subdividers under Torrens title, although free to follow their own design of lots and streets were since 1863, required before the commencement of the Local Government Act to deposit a plan with the Registrar General showing roads and streets. The lots had to be marked with numbers and symbols and the plan certified by a surveyor specially licensed under the Real Property Act.

The Local Government Act of 1906 gave local councils some measure of control over the opening of new roads by private subdividers. The Local Government Act of 1919 replaced the 1906 Act and gave wider powers to local councils. This included Ordinance 32 of the Act dealing with the placing of permanent marks in new roads formed by the subdivision of land. Ordinance 32 was proclaimed in the Government Gazette of 25 June 1920 and was repealed and reproclaimed in the Gazette of 11 August 1922.

The 1922 Ordinance applied to all local government areas but did not extend to areas of land owned by the Crown. The Ordinance was later changed to apply to all areas other than that part of the City of Sydney constituted immediately before 1 January 1959, but still did not apply to land owned by the Crown. The Ordinance states in clause 5(a);

“In a public road proposed to be opened through or abutting on land subdivided or laid out or intended to be subdivided or laid out into building sites anyone of which is less than five acres in area, permanent survey marks shall be placed in positions as prescribed hereunder, and the intervals between such marks shall not be greater than 15 chains”.

The Ordinance proceeds to describe the positions these permanent marks were to be placed in, these being;

- (1) *where a triangle is cut off the corner of the intersection of two roads, the mark should be placed opposite to one end of the base line of the triangle and 42" (3'6") from the alignment.*
- (2) *where the corner is rounded off the mark was to be placed opposite the tangent point 42" rectangularly from the alignment.*
- (3) *where the corner is not cut or rounded off the mark was placed at the point of meeting of lines parallel to and 42" from the alignment.*

A permanent mark was also required to be placed at each angle of a proposed road at the intersection of lines parallel to and 42" from the alignment and also opposite to each tangent point of a curve and 42" rectangularly from the tangent line of the curve. The Ordinance also required that:

“All permanent marks in a proposed road shall be placed on the same side of such road, and there shall be at least two marks in a proposed road, one at each end thereof”.

Clause 7 of the Ordinance states;

“The position of every permanent survey mark placed in a proposed public road shall be

clearly shown by circles in the plan lodged in the Registrar Generals Department and the letters "P.M." and notation "concrete block", "iron rod", "iron pipe", "plug in rock" as the case may require shall be written alongside each circle".

It should be noted that no bearing and distance to the corner was required. All plans that were lodged at the Registrar Generals Department between 1920 and 1933 show only "P.M.". The Ordinance then continued to describe the types of marks to be used as permanent marks. These could be concrete blocks, either pre-cast and placed in the position required or formed in-situ. The ordinance described in detail the dimensions of the concrete block in all different situations, for example, in sandy soil the block had to be 20 inches long, base six inches square and the top four inches square. The concrete blocks were also required to have a circular hardwood plug four inches long and half an inch in diameter in the centre of the top so it was flush with the top of the block.

The Ordinance allowed for the case where rock is present at the required position. Here a metal plug half inch in diameter was to be set into and permanently secured in rock. Also in clause 11, the ordinance allows for roads not included in clause 5(a) which was stated earlier. The permanent marks could also be solid iron rods or galvanised iron pipes, one inch in diameter and fifteen inches long driven into solid earth so the rods were flush with the surface. The pipes were also required to be filled with cement after being driven into the ground.

It should be noted that the permanent marks, placed under the 1922 Ordinance were not placed to define corners but, like alignment marks only to define the road boundary. This can be seen from clause 18 of the Ordinance whereby;

"Permanent survey marks placed in any road in accordance with this Ordinance shall form the basis of the marking of the alignment of the road under this or any other Act; and the alignment of the road shall be determined by reference to such marks".

Prior to 1933, a meeting of service authorities was held and the various sections of the footpath allocated to different services, such as gas, water and electric light poles. Survey marks were allocated the two foot strip from the road boundary.

10.2 AMENDMENTS IN 1933

In 1933, Ordinance 32 was amended so that all permanent marks were to be placed in the same positions as the original ordinance but eighteen inches (1'6") rectangularly from the road boundary and not 42" (3'6") as previously. The same notation was required on plans, that is, each permanent mark was shown on a plan by a circle with the letters P.M. placed alongside and the nature of the mark and its rectangular distance from the alignment was now recorded. No bearing to the corner was needed. However, the P.M.G. began placing its telephone cables underground and adopted its overriding powers to place the cables in the two foot strip reserved for survey marks.

The types of marks were amended so that the concrete block was to be a truncated pyramid fifteen inches long, six inches square at the top and four inches square at the bottom with a galvanised iron nail or other suitable metal plug three inches long and 1/4 of an inch in diameter inserted in the top of the block. This was the same dimensions for all soil types, not as it was in the original ordinance.

There was no provision in Ordinance 32 of 1922 or 1933 to place types of marks other than those prescribed or to vary their distance from the road boundary. However, the Survey Practice Regulations of 1933 made provisions for directly connecting the permanent mark to the survey. Regulation 5(2) of the regulations states:

“When a surveyor is required to place a reference mark or replace an alignment or permanent mark the requirement shall include the connection by measurement of the mark to the survey by him”.

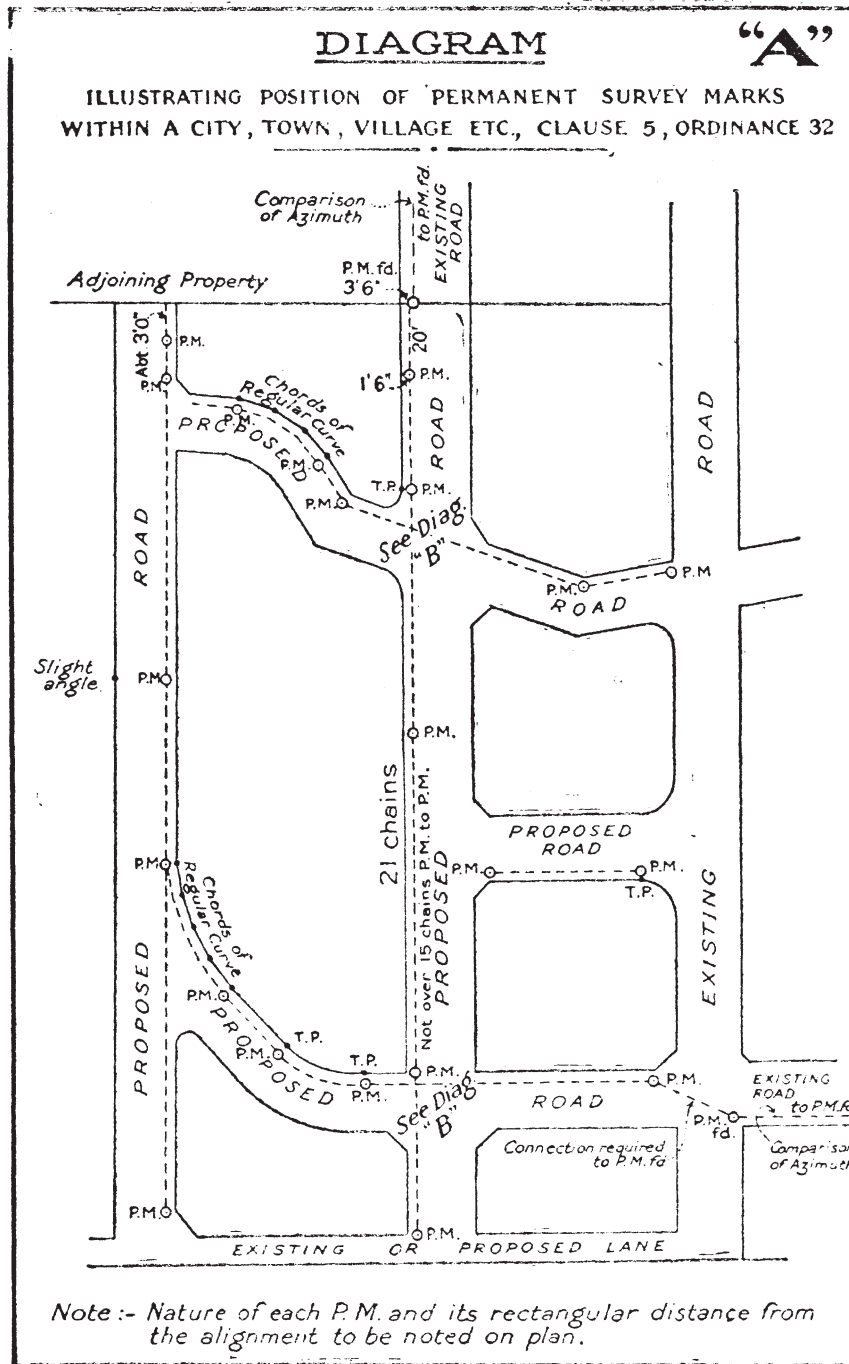
Regulation 24 also states:

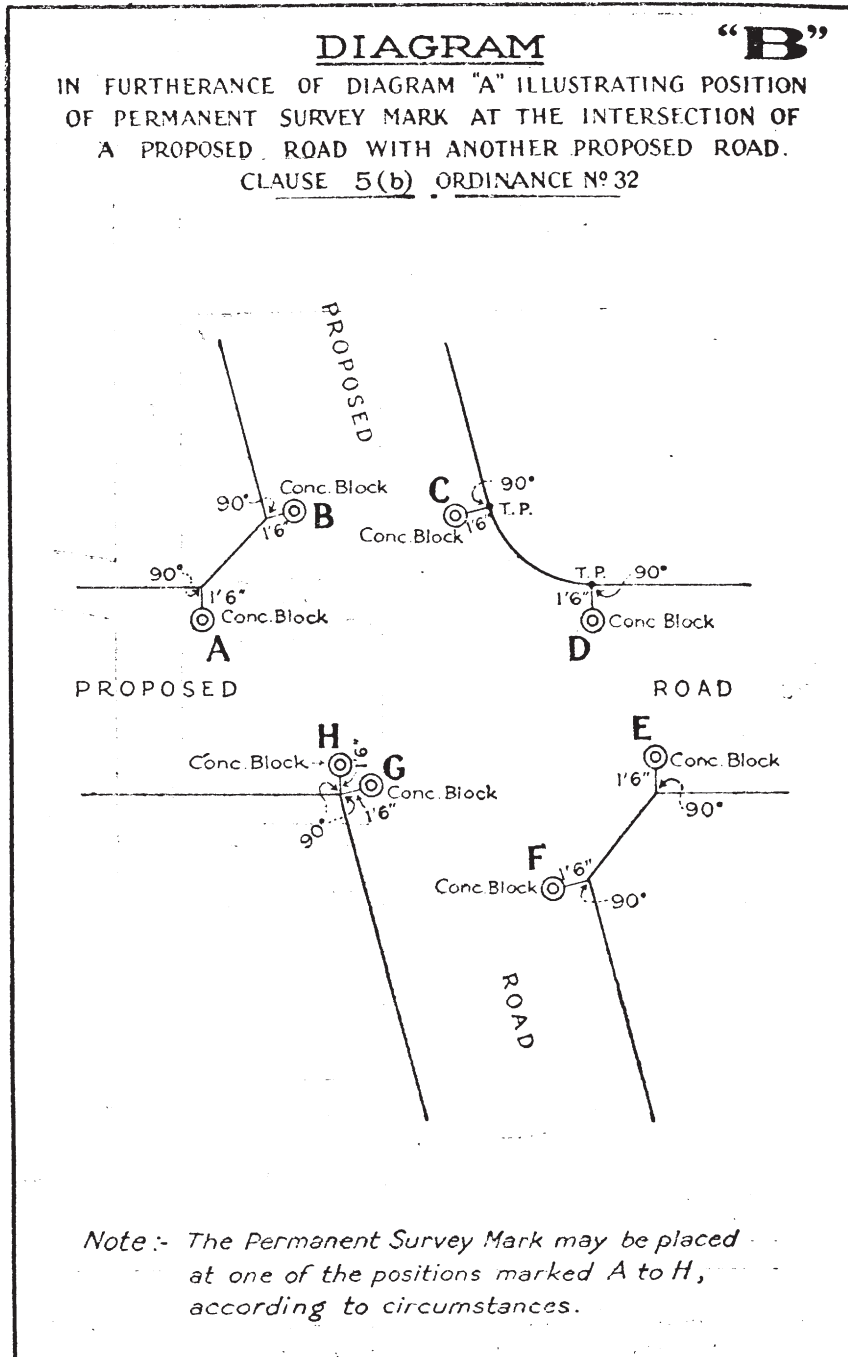
“Where a surveyor makes a survey for the purpose of the opening of a new public road or for the purpose of subdividing land in such a manner as to provide for the opening of a public road under the Local Government Act, 1919, he shall place permanent marks of the nature and in the positions prescribed by Ordinance 32 made under that Act, and shall show the nature and location thereof in the plan of survey”.

Regulation 56 also reads:

“A surveyor shall indicate on the plan of survey ... the nature of any permanent or reference mark placed by him or tree or object or monument with the essential measurements therefrom to the nearest corner, angle or line mark”.

The above regulations covered the permanent marks placed under Ordinance 32 from 1933 to 1964. Diagrams A and B show examples of placement of permanent marks.





10.3 AMENDMENTS IN 1964

The Ordinance was further amended in the Government Gazette dated 30 October 1964. The major amendment at this time was the position of where marks were allowed to be placed. This allowed for more flexibility and allowed for marks to be placed in more suitable positions. This can be seen from clause 5(g) whereby:

“A permanent survey mark placed in accordance with this clause shall be placed in the proposed road or existing road not more than 25 feet from the point to which it refers ... where practicable a permanent survey mark shall be placed on the half angle line subtended by adjoining boundaries on the prolongation of a boundary or so that a right angle is subtended between the road alignment and the permanent survey mark at the points to which the mark refers. Where practicable a permanent mark shall be placed at a suitable distance or road boundary so that the mark is not likely to be disturbed by existing or proposed services and so that the line between adjacent permanent survey marks for any boundary shall be parallel to that boundary.”

Clause 5(h) also states:

“The bearing and distance from a permanent survey mark to the point to which it refers shall be clearly stated on the plan of survey”.

and clause 7 continues:

“On any plan lodged in the office of the Registrar General in accordance with the Act the position of each permanent mark shall be shown by circles with the letters “P.M.” placed alongside thereof and the nature of the mark and the bearing and distance from the mark to the point to which it refers shall be clearly recorded on the plan”.

Amendments also allowed for more flexibility in the types of marks that could be used as permanent marks. Clause 9 allows permanent marks to be

- (1) a concrete block with a galvanised iron nail or other suitable metal plug
- (2) a mass of concrete cast in situ not less than six inches square and 15 inches deep with a nail or non corrosive metal plug as in (1), or
- (3) two drill holes and wings in the adjacent kerbs where the kerbs are concrete cast insitu, or
- (4) where solid rock is present, a hard non corrosive metal plug should be securely set into the rock, or
- (5) a galvanised iron spike or solid galvanised iron rod, or
- (6) a galvanised iron pipe with the top end filled with cement after being placed in the ground.

Under the Survey Practice Regulations the bearing and distance from any reference or permanent mark was to be from the mark to the point to which it refers.

These amendments to the ordinance dated 30 October 1964 were the last amendments made until the revision of the Regulations, introduced as the Survey Practice Regulation 1990. The new Regulation subsumed the marking requirements of the Ordinance. However, it was not until 1994 that marking requirements were removed from the Ordinance, being replaced with a cross reference to the Regulation.



Drummond Trigonometrical Station - Original rock cairn.
In this photo the pole and disks have been repaired and the rock repiled.



Concrete Pillar - these trigonometrical stations were introduced in the 1970's to replace the rock cairn. Here a set of 64 prisms and a Wild T2 theodolite are being used for simultaneous reciprocal vertical observations prior to EDM measurement.

11 SURVEY COORDINATION ACT 1949

Since World War II, the four eastern states of Australia have introduced legislation for the coordination of surveys within their borders. Hallmann (1973) says that in the New South Wales legislation, the Survey Coordination Act, 1949, the term coordination has been applied to its provisions in a double sense. The first sense being coordination of effort by public authorities who by communicating and cooperating through the Surveyor General and by pooling their plans in a Central Plan Office would considerably reduce the wastage of public money through needless repetition and overlapping of their surveys and mapping within the same areas. In the other sense, it required the connection of boundary and other surveys to the state triangulation network, whenever sufficient standard marks were established or placed within a local area to warrant its gazettal as a Proclaimed Survey Area.

Under the Survey Coordination Act, 1949, the Surveyor General could require any public authority when carrying out a survey, not being a survey as defined under the Surveyors Act, to place permanent marks as prescribed by the Act and connect to the State Control Survey. Also under section 11 of the Act, the Surveyor General may cause to be carried out in any area, covered by the state triangulation system, such surveys as he considers necessary for the establishment of permanent marks for the convenient connection of local or general surveys. Section 11 also continues:

“After the publication of any proclamation every survey made for any purpose under any Act of any area which is wholly or partly within or contiguous to the proclaimed survey area, shall be connected, as prescribed to at least two placed, adopted or established permanent marks”.

Section 14 also allows the Surveyor General to adopt any particular reference marks or other survey marks, or any class of reference marks or other survey marks placed or established, whether before or after the commencement of the Act, as permanent marks for the purpose of the Act by publication of a notice in the Government Gazette.

Also any permanent mark required to be placed or established under the Act may be placed in the following positions,

- (a) upon any unoccupied Crown Land
- (b) upon any land vested in or under the care and management of any public authority
- (c) upon any road, street, pathway, lane or thoroughfare
- (d) with the consent of the holder or occupier thereof upon any land held under any tenure from the Crown.

The Survey Coordination Regulations under the Survey Coordination Act, 1949 came into existence after the publication in the Government Gazette of 22 June 1951 and later amended in Gazettes of 4 February 1955, 2 September 1960, 3 November 1967 and 8 February 1980 although none of these were major changes to the original regulations. The Regulations were remade in substantially the same form in 1994.

These Regulations detailed a Proper Officer of a Public Authority to keep a Register of Plans and these plans were to be furnished to the Surveyor General. Also included in these regulations were the type of permanent marks that could be used. This was described in Regulation 16, whereby:

“The standard permanent mark to be placed in accordance with the provisions of the Act, shall be a pin of non corrosive metal firmly set vertically in concrete of good quality and protected by an iron cover box in accordance with the dimensions and specifications set out in Appendix B. The concrete shall be constructed and laid in situ by pouring into a hole the sides of which shall not be smoothed and the bottom of which shall be enlarged”.

It was also required that the proper officer of a public authority should after the placing of any permanent mark by that authority, lodge with the Surveyor General a sketch plan indicating the type of such mark and position of the mark. Appendix B referred to in Regulation 16 was amended in the Government Gazette of 8 February 1980 for the purpose of metric conversions.

Regulation 12 of the Survey Practice Regulations, 1933 was amended in November 1986. The amendment reads:

“If land being surveyed by a surveyor is not connected by apparently reliable survey with a permanent mark placed, adopted or established under the provisions of the Survey Coordination Act, 1949, the surveyor shall -

- (a) *if reasonably practicable, connect the survey being made to such a mark*
 - (i) *by direct measurement, or*
 - (ii) *where the mark is within reasonable access of the land being surveyed by a distance not exceeding the greatest linear dimension of the land, by well conditioned bearings.*
- (b) *if reasonably practicable, compare the azimuth of the survey with that of the State Control Survey”.*

This continued on to describe the number of permanent marks that had to be placed when marking a survey, if he can not connect onto existing marks as above. The surveyor was required to place,

- (i) One permanent mark - 1 to 10 parcels
- (ii) Two permanent marks - 11 to 50 parcels
- (iii) Three permanent marks - 51 to 100 parcels
- (iv) Four permanent marks - 101 to 150 parcels
- (v) For more than 150 parcels five permanent marks plus one for each 50 parcels in excess of 150.

Regulation 12(3) also continued to read:

“A permanent mark shall be located so as to be suitable for taking azimuth of the survey and for redefinition of the survey and shall be of such a type and shall be so placed as to comply with the requirements made under the Survey Coordination Act, 1949, for a permanent mark under that Act”.

The amendments to the Survey Practice Regulations, while being beneficial in helping to establish a firm link between the state control network and cadastral surveys had a number of deficiencies. These deficiencies included the lack of a requirement to use established permanent marks in the network for azimuth determination (connecting from the network rather than to it). Also the placement of only one permanent mark did not contribute any real benefit to the network, nor the ability to use these permanent marks for azimuth purposes in later surveys.

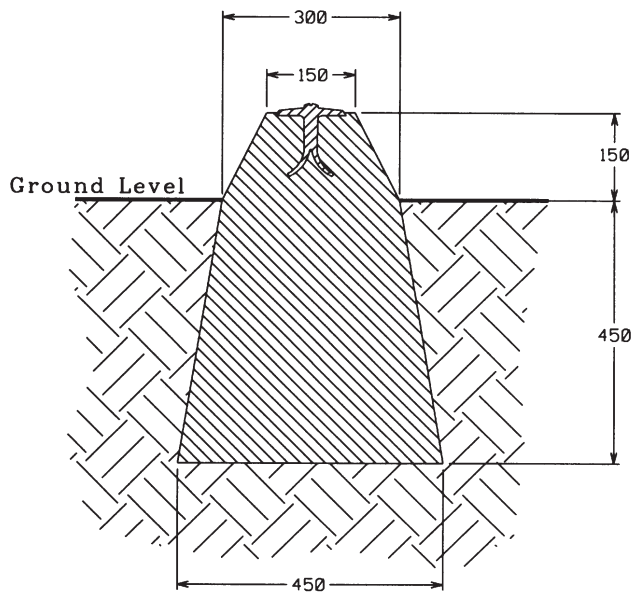
Another deficiency was that some surveyors placed permanent marks when existing marks were nearby, therefore creating superfluous marks.

These deficiencies were addressed in the Survey Practice Regulation 1990 and further amendments in 1994.

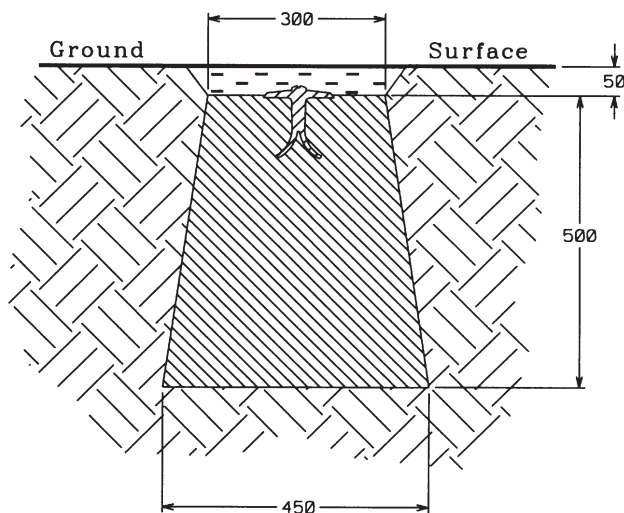
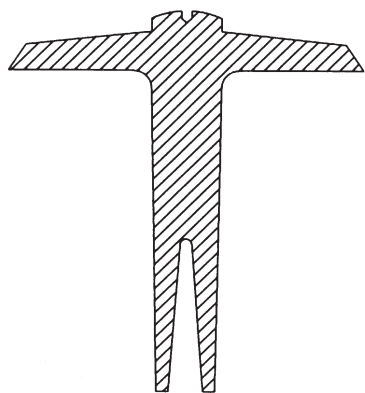
Specifications for the marks allowed under the Survey Co-ordination Act are shown in the accompanying diagrams.

PERMANENT MARK TYPE 1
 (State Survey Mark)
 AS APPROVED BY THE SURVEYOR GENERAL
 IN TERMS OF THE
 SURVEY CO-ORDINATION REGULATION, 1993

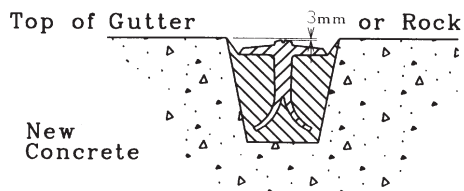
Gazetted 1st September, 1993.



Ground Level SSM (Rural Areas only)



Sub-Surface SSM



SSM in Gutter or Rock

NOTE:- Where an existing Structure or Solid Rock is unavailable the mark is to be placed in the top of a concrete block and cast in situ, having a volume of at least 0.07 cubic metres, and shaped as shown above.

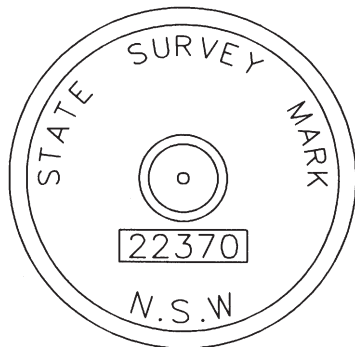
PERMANENT MARK TYPE 2 & 3

(State Survey Mark)

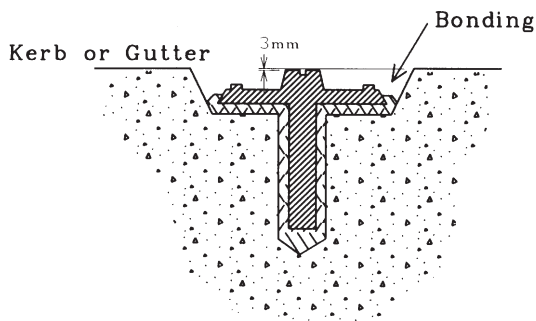
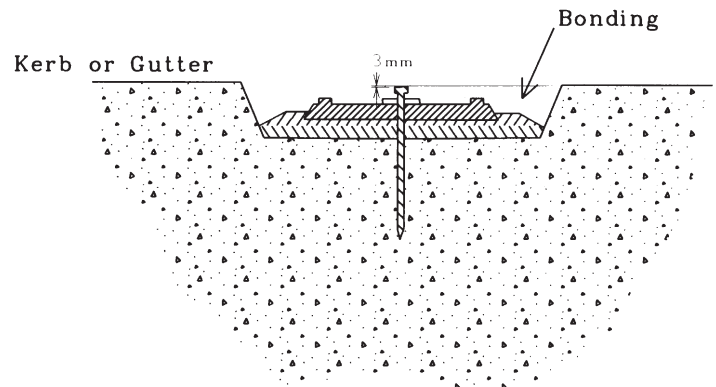
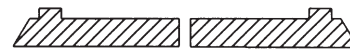
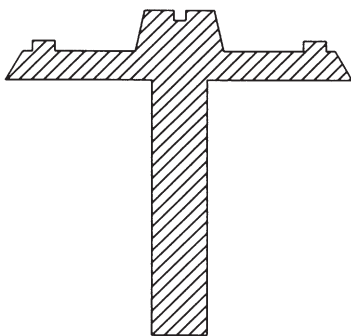
AS APPROVED BY THE SURVEYOR GENERAL
IN TERMS OF THE
SURVEY CO-ORDINATION REGULATION, 1993

Gazetted 1st September, 1993

TYPE 2



TYPE 3



Fixation is by a power driven stainless steel nail & brass washer of minimum length 40mm, with plate bonded to concrete with a suitable epoxy-resin compound.

Note:-

Where an existing structure (kerb & gutter or solid rock) is available, these marks may be used in lieu of the larger SSM.

Fixation is by drilling and bonding with a suitable epoxy-resin compound.

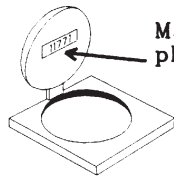
PERMANENT MARK TYPE 4 & 5

(Urban Type)

AS APPROVED BY THE SURVEYOR GENERAL
IN TERMS OF THE
SURVEY CO-ORDINATION REGULATION 1993

Special Supplement, 1st September 1993

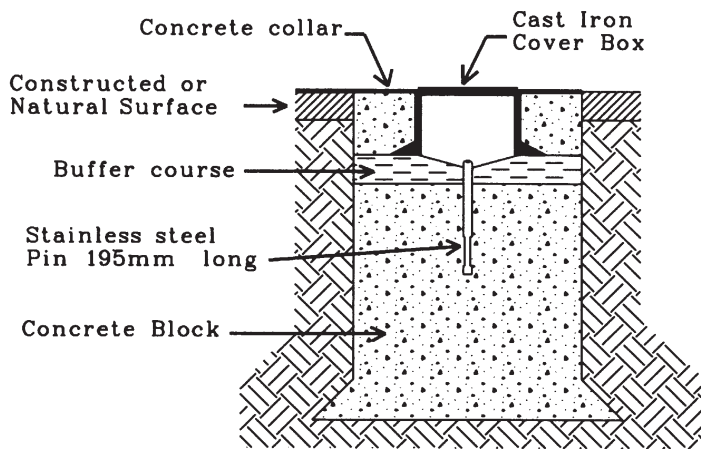
TYPE 4



Mark number on brass plate inside lid of cover box.



PERMANENT MARK



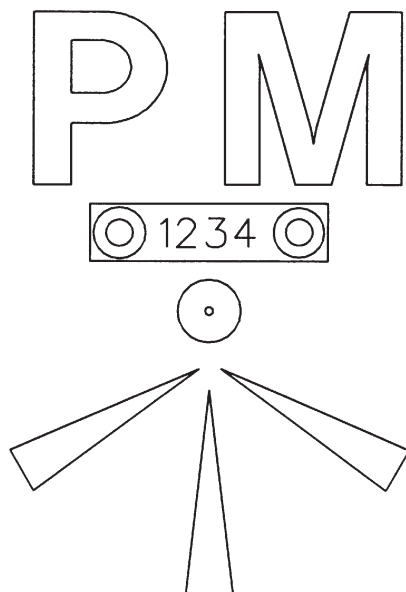
Minimum size of concrete 460mm deep by 380mm square enlarged at the bottom. Where solid rock is met with, depth may be varied.

In localities where ground is unstable the dimensions must be increased.

The stainless steel pin is to protrude 50mm above the surface of the concrete block.

The buffer layer course is to be a 50mm layer of crushed brick, gravel or coarse sand.

TYPE 5 IN ROCK



PERMANENT MARK IN ROCK

The pin and the plate is to be fixed by grouting with 3:1 sand-cement mixture, or with epoxy resin mixed to the manufacturers specifications.

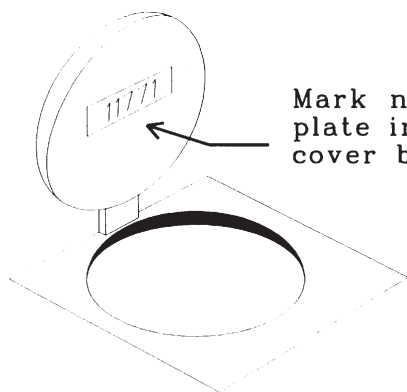
The letters P.M. and the Broad Arrow should be 100mm long and at least 10mm deep cut into the rock.

The top of the pin should project at least 5mm above the surface and the number plate should be fitted into a recess so that the top of the plate is at least 2mm below the surface of the rock.

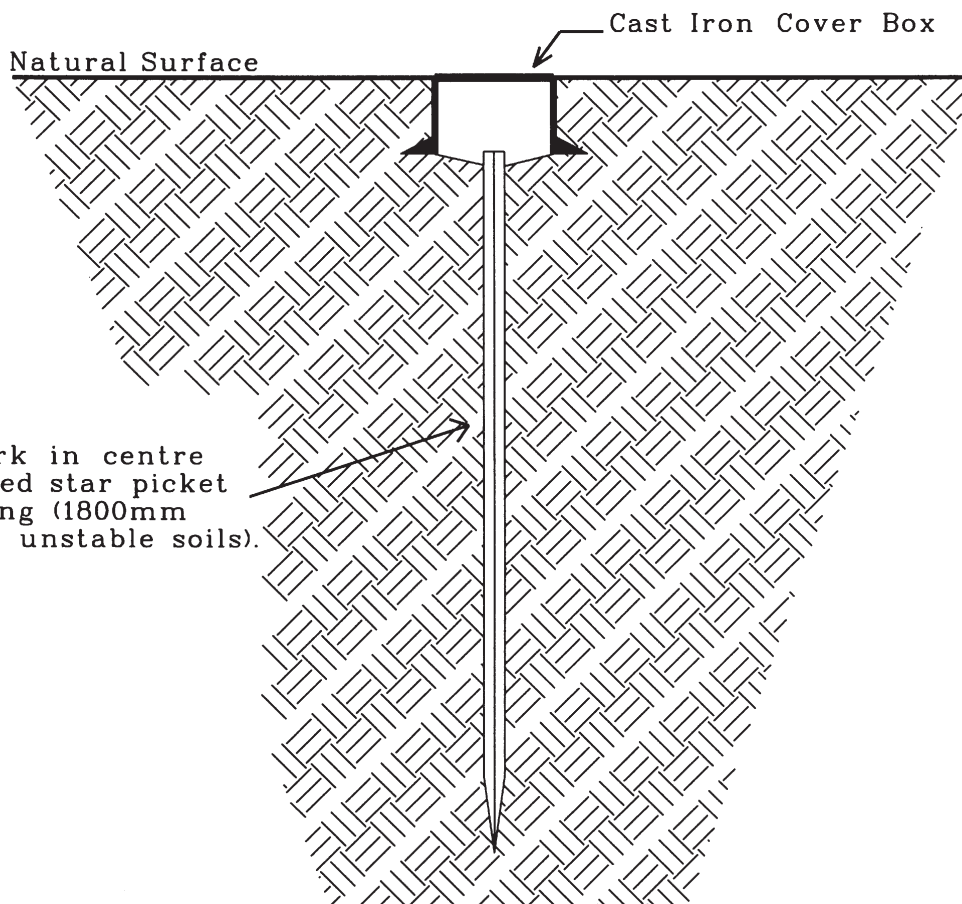
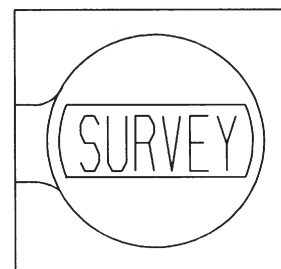
PERMANENT MARK TYPE 6

(Non Urban Type)
Galvanised Star Picket

Gazetted 1st September 1993.



Mark number on brass plate inside lid of cover box.



Punch mark in centre of galvanised star picket 900mm long (1800mm in black & unstable soils).

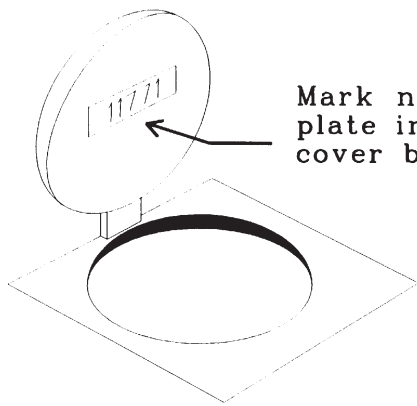
NOTE:- The above are minimum specifications it is preferable that a concrete collar be added.

PERMANENT MARK TYPE 7

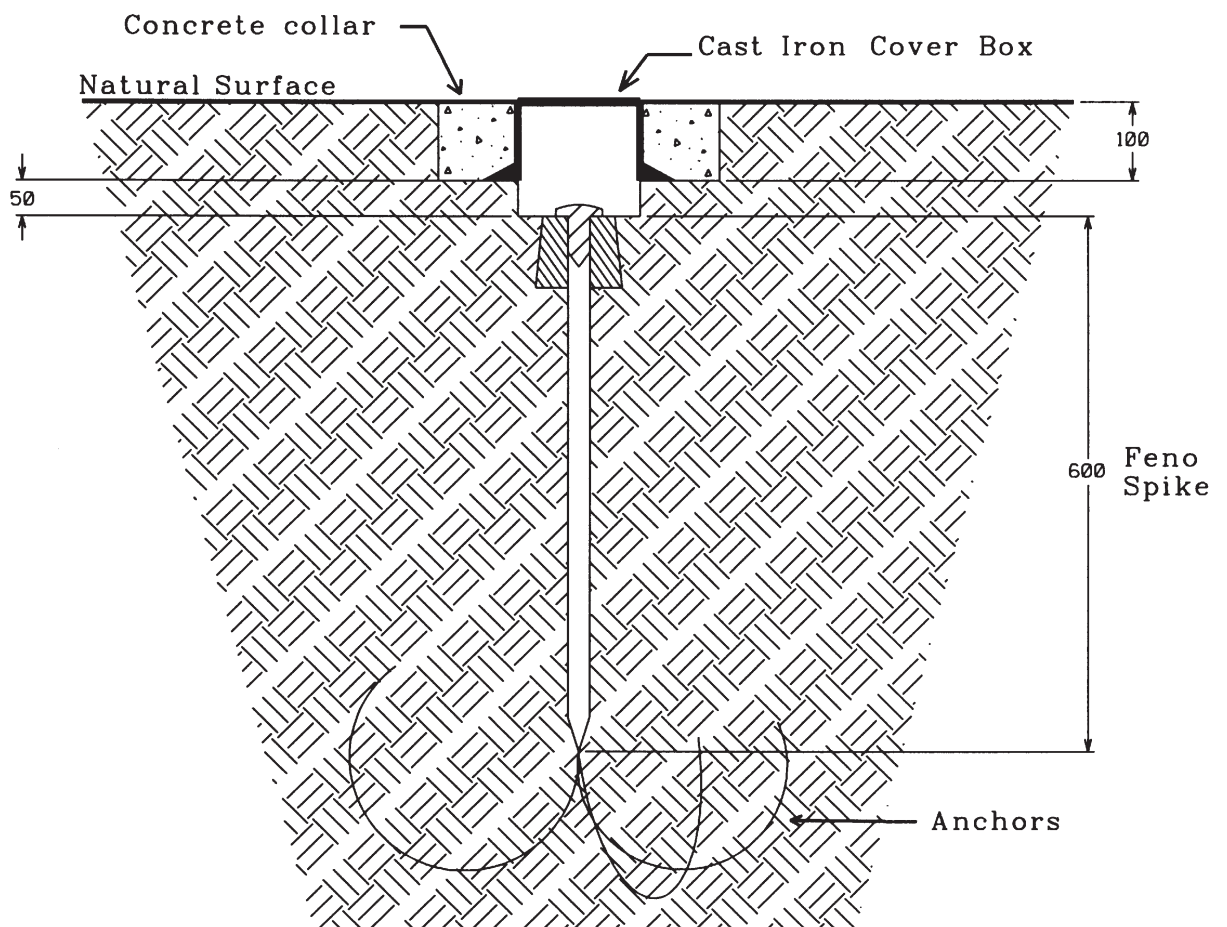
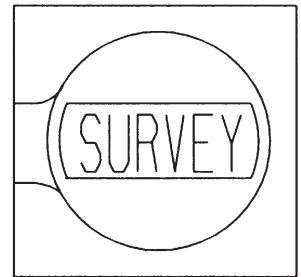
(Feno Spike With Cover Box)

Suitable for firm soil types.

Gazetted 1st September 1993.



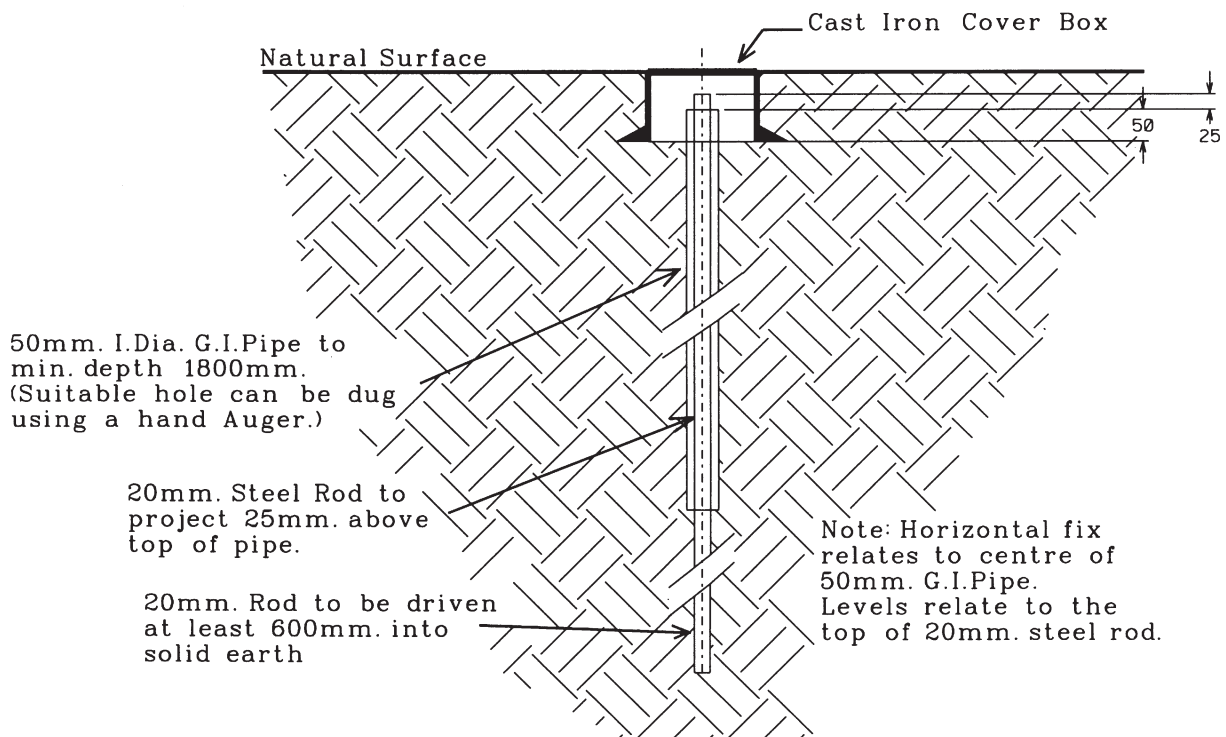
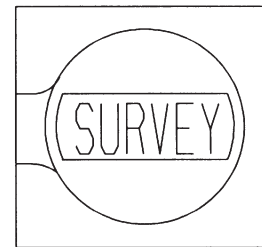
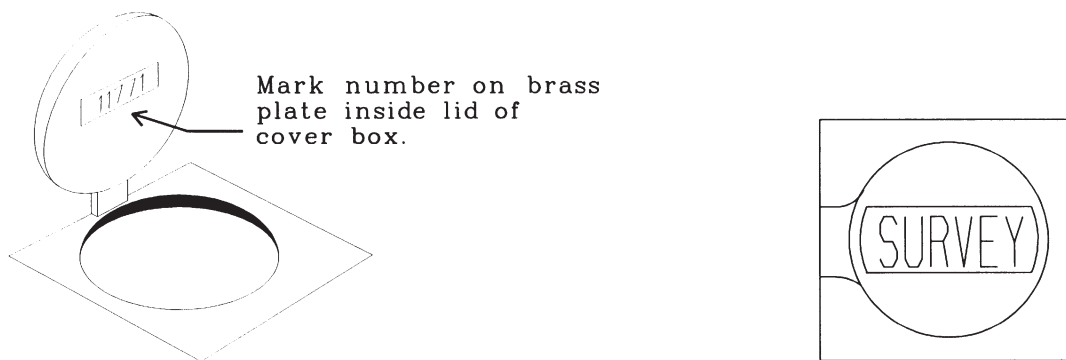
Mark number on brass plate inside lid of cover box.



PERMANENT MARK TYPE 8

(D.W.R. "C-TYPE" Mark)

Gazetted 1st September, 1993.



12 SURVEY PRACTICE REGULATION 1990

12.1 INTRODUCTION

The Regulation that came into force on 1 September 1990 replaced the Survey Practice Regulations 1933, as amended.

The new Regulation sought to encompass all survey practice issues into one instrument. It made redundant specific instructions on the carrying out of surveys over Crown Land and the marking requirements under Ordinance 32.

The Regulation also made clearer the need to use, and if necessary extend the survey control network of permanent marks, thus embodying some key principles of survey integration. Revisions which came into force on 1 October 1994 provided further clarification of methods to be used in connections between the network and cadastral surveys, and more emphasis on using existing permanent marks rather than placing more (redundant) marks. A key requirement was to make clear that at least two permanent marks were to be used, or if not available, placed in each survey.

12.2 EXTRACTS FROM SURVEY PRACTICE REGULATION 1990 (AS AMENDED 1 OCTOBER 1994)

Surveyor to record survey marks

8. (1) A surveyor must indicate on the plan of survey:
 - (a) the nature of any survey mark, object or monument found by the surveyor, or placed by the surveyor if not a peg; and
 - (b) the essential measurements from any reference mark, permanent mark, object or monument to the nearest corner, angle or line mark.
- (2) If reference marks are placed or found at depths of more than 80 mm below the natural surface of the ground, the surveyor will indicate such depths on the plan.
- (3) If reference marks are found, the surveyor will note on the plan the origin of these marks by reference to the number of the plan on which the marks first occur.

PART 4 - DATUM LINE

Procedure for adopting datum line

30. (1) A surveyor must, before adopting a line as the datum line of a survey, specially determine the position of the marks defining that line.
- (2) The bearing used for the orientation must:
 - (a) be adopted from the plane grid bearing derived from the ISG co-ordinates of 2 established permanent marks if the survey is:
 - (i) within or contiguous to a survey area proclaimed under section 11 (2) of the Survey Co-ordination Act 1949; or
 - (ii) within 300 metres of established permanent marks for a city or suburban survey, or 1,000 metres of established permanent marks for a country survey; and
 - (b) be verified by angular and (if practicable) distance connection to at least one other established permanent mark.

- (3) If the comparison of the connections under subclause (2) reveal differences exceeding 20mm + 100 ppm, the surveyor must show on the plan of survey all the observed and calculated bearings and distances and:
 - (a) include an additional connection to at least one other established permanent mark; or
 - (b) forward a report of the survey to the Surveyor General.
- (4) If subclause (2) does not apply to the survey, the bearing used for the orientation must be taken from a survey for which a plan or description is filed or recorded at a government department or public authority, or from astronomical observations or satellite observations. The surveyor must state the origin of the orientation on the plan of survey.
- (5) If the Surveyor General is of the opinion that any requirement under subclause (2) is not practicable or necessary in relation to a survey, the Surveyor General may in writing exempt the surveyor conducting the survey from complying with the requirement. A surveyor who obtains an exemption under this subclause must record the exemption number on the plan of survey.

PART 5 - MONUMENTS AND REFERENCE MARKS

Connection of survey to State Control Survey

33. (1) A survey for any purpose (resulting in a plan lodged on public record):
- (a) which is within or contiguous to a survey area proclaimed under section 11 (2) of the Survey Co-ordination Act 1949 must connect by direct measurement, regardless of distance, from 2 or more established marks; or
 - (b) which is not within or contiguous to such a survey area must connect 2 or more existing permanent marks by direct measurement if the 2 marks are within:
 - (i) 300 metres for a city or suburban survey; or
 - (ii) 1,000 metres for a country survey.

However, if there are established permanent marks within the distances specified, connection must be made from those marks in preference to non-established permanent marks which may be closer to the survey.

- (2) If the permanent marks to be connected under subclause (1) are established marks, ISG orientation must be adopted in accordance with clause 30 (2).
- (3) In a survey which redefines or creates parcels of land:
 - (a) the surveyor must connect or place and connect by direct measurement no less than the following number of permanent marks in relation to the number of parcels:
 - (i) 1-10 parcels 2 marks;
 - (ii) 11-20 parcels 3 marks;
 - (iii) 21-40 parcels 4 marks;
 - (iv) 41-60 parcels 5 marks;
 - (v) 61-80 parcels 6 marks,
and 1 additional permanent mark for every additional 20 parcels or part of 20 parcels; and

- (b) the permanent marks connected in accordance with subclause (1) may be included in the total number of marks required by this subclause, provided they are significant to the definition or redefinition of the survey.
- (4) A survey that redefines a road frontage or that is conducted for the purposes of creating a road under any Act must have 2 or more permanent marks connected, or placed and connected, by direct measurement for each interval of approximately:
 - (a) 1,000 metres for a city or suburban survey; or (b) 2,000 metres for a country survey.
- (5) A survey for the purposes of creating any easement must have 2 or more permanent marks connected, or placed and connected, by direct measurement for each interval of approximately:
 - (a) 2,000 metres for a city or suburban survey; or (b) 4,000 metres for a country survey.
- (6) Direct measurements between all permanent marks found or placed, and connections to the survey, must be proved by closed survey and shown on the plan of survey.
- (7) If 2 of the permanent marks connected in accordance with subclause (1)(a) or (b)(i) have accurate AHD values, the locality sketch plan of each additional permanent mark placed in accordance with this clause must show:
 - (a) the value related to AHD for the mark derived by closed height differences to a precision of 0.018 km metres or better (where “km” is the length of section in kilometres); and
 - (b) the AHD value, and the nature and source of the 2 permanent marks connected.
- (8) A permanent mark referred to in this clause must:
 - (a) be so located as to be suitable for an orientation of the survey and for re-definition of the survey; and
 - (b) be so located at road junctions, intersections, angles or crests of hills as to be visible without obstruction between other permanent marks and suitable for subsequent inclusion in the State Control Survey; and
 - (c) be identified in location by a sketch plan which meets approved standards and which is forwarded to the Surveyor General as soon as practicable after placement of the permanent mark.
- (9) If the Surveyor General is of the opinion that any requirement under this clause is not practicable or necessary in relation to a survey, the Surveyor General may in writing exempt the surveyor conducting the survey from complying with the requirement. A surveyor who obtains an exemption under this subclause must record the exemption number on the plan of survey.

Placement of pegs or marks

- 34 (1) If a surveyor makes any survey other than a survey of a kind referred to in clause 28 or 29, the surveyor must when possible firmly mark each corner (including corners of each parcel of land in a subdivision) with a peg or mark of the type prescribed by clause 42.

- (2) If it is not practicable to place such a peg or mark, a reference mark must be placed in accordance with clause 44.
- (3) In a country survey, if a fence post is on a corner to which a reference mark has been placed in accordance with clause 44, no further marking of the corner is required.

Placement of new reference marks

- 35 If a surveyor makes a city or suburban survey for the purpose of a disposition of land or an interest in land, an acquisition or resumption of land under the authority of any Act, a subdivision of land or a redefinition of parcels of an existing subdivision, a primary application or a cancellation or redefinition of a certificate of title under the provisions of the Real Property Act 1900, the surveyor must:
- (a) connect by measurement from, or place and connect to, a reference mark within 30 metres of each extremity of the boundary of the land where it abuts on a road; and
 - (b) place reference marks at intervals of not less than 30 metres and not more than 100 metres throughout the length of the frontage of the survey; and
 - (c) place at least 2 reference marks where land does not front a road; and
 - (d) connect from, or place and connect to, permanent marks as prescribed by clause 33.

Procedure for country surveys

- 36 (1) In a country survey, the surveyor must:
- (a) mark definitely and durably all lines which form or are to form the boundaries between parcels held by different owners and between parcels held by the same owner in different rights:
 - (i) with a peg or mark of the type prescribed by clause 42, together with lockspits cut on unfenced boundaries in the direction of the boundary from each corner and angle or, if an obstacle exists at a corner or angle, by a suitable reference mark near that corner or angle; and
 - (ii) on unfenced boundaries, with pegs and lockspits or marks of the type prescribed by clause 42 placed at intervals of not more than 200 metres, or, if each peg or mark is visible from the peg or mark next on either side of it, at intervals of not more than 300 metres, and ensure that on unfenced boundaries each line is reasonably cleared and all trees with a trunk diameter greater than 100mm remaining after clearing operations within 500mm of a measured unfenced boundary are blazed and, if situated on any boundary, that they are double blazed, unless physical or environmental circumstances dictate otherwise; and
 - (b)
 - (i) if the land surveyed is not being subdivided, place 2 reference marks in selected positions suitable for redefinition of the survey; and
 - (ii) if the land surveyed is being subdivided into separate parcels or comprises separate parcels of an existing subdivision which are being redefined or are the subject of a primary application or an application

for cancellation or correction of a certificate of title under the Real Property Act 1900, connect or place and connect 2 reference marks in respect of each parcel of 4 hectares or more and one reference mark in respect of each parcel of less than 4 hectares so that the total number of marks connected or placed in the survey equals twice the number of parcels of 4 hectares or more plus the number of parcels of less than 4 hectares; and

- (iii) if a boundary (other than a road frontage) exceeds 2 400 metres, place additional reference marks at intervals of not more than 1 500 metres; and
 - (iv) if a boundary required to be marked is a road frontage, place reference marks at intervals of not more than 1 200 metres along the boundary and one reference mark at each extremity of the boundary; and
- (c) connect from, or place and connect to, permanent marks in accordance with clause 33.
- (2) Nothing in this clause prevents the use of lockspits in any survey if the surveyor considers it desirable that lockspits should be used.
- (3) Subclause (1) does not apply to a surveyor making a survey referred to in clause 18.

Placement of reference marks for roads

- 37 (1) If a surveyor makes a survey for the purpose of the creation, redefinition or widening of any road under any Act, the surveyor must place reference marks of the type prescribed by clause 43 in the positions prescribed by this clause and must show the type and location of the reference marks in the plan of the survey.
- (2) A reference mark must be placed at a suitable distance, not exceeding 30 metres, from the point to which it refers so that the mark is not likely to be disturbed by existing or proposed services.
- (3) Subclause deleted
- (4) If the survey is a city or suburban survey, reference marks must be placed:
- (a) at the junction or intersection of roads:
 - (i) where a triangle is cut off from the corner formed by the intersection of the road boundaries, so as to refer to either end or both ends of the base line of the triangle; or
 - (ii) where the corner is rounded off, so as to refer to either or both tangent points; or
 - (iii) where the corner is not cut off or rounded off, so as to refer to the point of intersection of the road boundaries; and
 - (b) so as to refer to each end, each angle and each tangent point and to the terminals of a series of chords or a regular curve in a road, provided that a reference mark need not be placed within 30 metres of another reference mark and that there is not more than 300 metres between reference marks; and
 - (c) in a road, as far as is practicable on the same side of the road, and, if roads are variable in width, connections are to be made to both sides of the road.

- (5) If the survey is a country survey, reference marks must be placed so as to refer to each end of the road, to each junction or intersection of any roads and in pairs suitable for orientation purposes throughout the whole length of the road in selected positions so that the maximum distance between any 2 successive reference marks does not exceed 1 200 metres.
- (6) The surveyor must connect from, or place and connect to, permanent marks in accordance with clause 33.
- (7) Subclause deleted
- (8) If any road being created joins or intersects an existing road and reference marks have been placed in the latter road in accordance with this clause or any instrument made under any Act, those marks must be connected by survey with the reference marks placed in the road being created and the orientation of one series of reference marks must be compared with the orientation of the other series of reference marks and the comparison shown on the plan.
- (9) Subject to subclause (10), a reference mark placed in accordance with the provisions of subclauses (1) and (2) must consist of marks as prescribed by clause 43, unless the mark to be placed is of the type prescribed by clause 43 (1) (d), that is, 2 drill holes are to be placed in the adjacent kerbs if the kerbs are made of concrete, cast in situ and not likely to be disturbed. If there is a cut off or rounded off corner, one such reference mark must be placed relative to each end of the base line of the cut off or each tangent point. If the corner is not cut or rounded off, the reference marks must be placed in the kerb of each road.
- (10) Subclause (9) does not preclude the use of other suitable reference marks if the reference marks meet at least the specifications of subclause (9) and have been approved by the Surveyor General in writing.
- (11) If the road the subject of a survey under this clause has not been constructed, a surveyor may defer the placement of reference marks required by this clause. In such a case, the surveyor must deposit with the Surveyor General an amount equivalent to 2 penalty units for each reference mark deferred. On completion of construction, the surveyor must place the reference marks deferred and have their nature and position noted on the plan and inform the Surveyor General that the survey has been carried out in compliance with this Regulation. If the Surveyor General is satisfied that the survey has been satisfactorily completed, the deposit must be returned to the surveyor less an administrative charge not exceeding 15% of the amount deposited.
- (12) A surveyor may defer the placement of reference marks as provided in subclause (11) for a period not exceeding:
 - (a) 6 months from the completion of the survey; or
 - (b) 28 days from completion of construction, whichever is the earlier.

Marking of surveys

- 42 (1) The surveyed boundaries of land must be marked in accordance with the principle that the boundaries are to be readily and unambiguously discernible on the ground.
- (2) In the case of a survey required to be marked in accordance with this Regulation, the points to be marked must be firmly marked with a peg or drill hole in rock or concrete or other similar material or with a chisel mark or nail in fixed timber, or must be otherwise suitably marked.

- (3) In surveys of lots of:
 - (a) 4000 square metres or more, all pegs must be of sound durable hardwood or white cypress pine at least 530 mm long and not less than 75 mm by 75 mm nominal section at the top end; or
 - (b) Less than 4000 square metres, all pegs must be of sound durable hardwood or white cypress pine at least 350 mm long and not less than 75 mm by 35 mm nominal section at the top end.
- (4) All pegs must be pointed for approximately two-thirds of their length.
- (5) The centre of the top of all pegs must represent the survey point except that, if conditions prevent the correct centring of pegs, a non-corrosive tack or nail must be placed to represent the survey point.
- (6) All pegs are to be placed upright in the ground point downwards so that the top is not more than 80mm above the ground level and the surrounding earth must be securely compacted.
- (7) If a peg projecting above the surface of the ground could be considered to be hazardous or inconvenient to the public the peg may, at the discretion of the surveyor, be placed flush with the surface of the ground and that fact must be noted on the survey plan.
- (8) If the depth of the soil is insufficient to permit the conventional placement of a peg, the peg must be driven to the point of refusal and a cairn of rocks must be built around the peg above the surface of the soil. If sound rock is available under the peg, a drill hole or spike or other suitable mark and wing must be placed in the rock beneath the peg.
- (9) If lockspits are required to be used, the lockspits must consist of trenches one metre long, 200mm wide and 150mm deep dug in the direction of the boundary lines and commencing 300mm from each corner or angle, or may consist of stones packed to similar or greater dimensions.
- (10) If the class of soil renders trenches ineffective, direction stakes 50mm by 30mm by 300mm may be placed 4 metres distant from and directed to the corner or angle instead of trenches.
- (11) If any corner or angle is marked with a drill hole or chisel mark or galvanised iron nail in fixed timber, where practicable wings must be cut in solid rock or concrete or fixed timber 80mm long, 20mm wide and not less than 10mm deep commencing 50mm from and directed to the corner or, if the surface renders it desirable, lines at least 300mm long and 20mm wide may be painted on the surface.
- (12) If drill holes, chisel marks or similar marks are to be placed in an ornamental wall or path or similar structure, the size of the mark placed may be reduced at the discretion of the surveyor in order that undue damage is not occasioned to the wall, path or other structure being marked, but only if at all times the marking is readily and unambiguously discernible.

Requirements relating to reference marks

- 43 (1) If a surveyor is required to place reference marks in accordance with this Regulation, the reference marks must consist of:

- (a) a reinforced concrete block in the form of a truncated pyramid 400mm long, 150mm square at the lower end and 100mm square at the upper end with a galvanised nail or other suitable metal peg or plug not less than 80mm long inserted in the block; or
 - (b) a galvanised iron pipe not less than 300mm long and 20mm internal diameter with a rim of not less than 3mm; or
 - (c) a galvanised iron spike 100mm long driven into fixed timber with a wing 80mm long cut into the timber and directed to the spike; or
 - (d) a drill hole cut into a kerb or other substantial structure not less than 6mm in diameter and not less than 10mm deep with a wing 80mm long and directed to the drill hole; or
 - (e) a drill hole not less than 10mm in diameter and 30mm deep cut into bedrock with a wing 80mm long directed to the drill hole where bedrock exists within 300mm of the natural surface of the ground; or
 - (f) a wing 80mm long or, subject to clause 45, a broad arrow cut into the sound wood of a suitable tree, facing directly towards the corner and at a convenient height above ground level, the point of the wing or arrow being the reference point; or
 - (g) an approved mark of a durable character or a specific point on a permanent or substantial structure; or
 - (h) a permanent mark of such a type and so placed as to comply with the requirements of the Survey Co-ordination Act 1949 in relation to a permanent mark placed under that Act.
- (2) The marks referred to in subclause (1) (a) and (b) must be placed vertically with the upper surface of the marks at least 80mm below the natural surface of the ground or, if placed on a boundary on which netting fencing is likely to be erected, sufficiently deep to permit the erection to the fence without disturbance of the mark.

Placement of reference marks

- 44 (1) If this Regulation requires reference marks to be placed, the surveyor must place the reference marks adjacent to a corner, angle or line mark in selected positions designed to preserve the reference marks from disturbance except that, when a tree or monument is used, the tree or monument should be not more than 30 metres from the corner, angle or line mark to which the tree or monument is connected.
- (2) If a reference mark is placed in a roadway, it must be placed either:
- (a) in the adjacent kerb, if the kerb is not likely to be disturbed; or
 - (b) at a suitable distance from the existing or proposed alignment or road boundary.
- (3) The distance referred to in subclause (2) (b) must be determined at the discretion of the surveyor having regard to the existence of any water, lighting or other service for which provision is or has to be made, except that the line between adjacent marks must be made parallel to the alignment or road boundary, as far as practicable.

13 SURVEYORS (PRACTICE) REGULATION 1996

The regulations were rewritten as required by the guidelines in the Subordinate Legislation Act 1989. There were many changes made to clarify the wording of numerous clauses of the previous Regulation. However, marking requirements changed very little. The only significant change was the dropping of the requirement to place permanent marks for easement-only surveys under 200m in length, even if there were no existing permanent marks within 300m in city areas and 1000m in rural areas.

14 SURVEYOR-GENERAL'S DIRECTIONS FOR SURVEY PRACTICE 1993

The Surveyor-General restarted issuing Directions in 1993 due to changing practices introduced in 1990 and 1994 through the Survey Practice Regulation. The Directions are a collection of procedures and standards, which act to clarify and supplement the Regulation with up-to-date information. The Directions, and any updates and amendments, are supplied directly to all Registered Surveyors and Candidates

Unlike the Directions issued under earlier Surveyors General, the current documents are not restricted to surveys of Crown Land. Topics covered by the directions to date are: -

1. Approved Permanent Marks
2. Preparation of Locality Sketch Plans
3. Control for Cadastral Surveys
4. Using the Survey Control Information Management System (SCIMS)
5. Verification of Distance Measuring Equipment
6. Procedures when Water is a Boundary
7. Applications relating to the Surveyors (Practice) Regulation 1996
Includes
 1. Guidelines for the deferment of survey marking
 2. Use of Survey Control Marks on Railway Land
 3. Forestry Rights Surveys
 4. Standards for Aquaculture Leases
8. Mining Survey Directions
9. GPS for Cadastral Surveys
10. Surveys of Crown Lands

New Directions are issued as required. Existing Directions are continually updated to reflect changes in survey practice or changes in legislation.

APPENDIX A EXTRACTS FROM "THE SURVEYOR" AND "AUSTRALIAN SURVEYOR"

THE AUSTRALIAN SURVEYOR June 1965

SURVEY PRACTICE IN THE "EARLY DAYS"

The following "Extracts from a letter from Mr. Surveyor Larmer to Mr. Surveyor Bullock in reply to certain questions as to the former practice of Surveyors in this Colony" (New South Wales) is of interest as revealing the methods of marking and standards of accuracy in vogue in the early days of settlement. A rather derogatory reference is made to the work of Mr. Surveyor Hoddle, the gentleman who is reputed to have laid out the City of Melbourne.

Braidwood,
June 5th,

“. . . when marking out large portions of land in this and adjoining counties, that I not only blazed trees in line, but in a thinly timbered country those ten or fifteen links away. On many portions marked out by old Mr. R. Hoddle, I found many errors, but where the trees were conspicuously blazed, I did not feel myself authorized to correct them, or to destroy and make new ones of my own.

Broad-arrows were not used until a long time after my arrival in the Colony in 1829.

Green stakes were used invariably in the bush at corners.

Corner trees were deeply blazed on four sides but not numbered.

When surveying grants or Applications to purchase adjoining old measured portions, I never neglected to remark old lines. When I arrived in the Colony, I was instructed to survey the country from the Old South Head Road to Botany Bay and the Lighthouse at South Head; I was afterwards employed in Sydney and Harbour.

Mr. David Duncombe, our then Chief Clerk . . . and Mr. H. Halloran . . . desired me on no occasion to measure too little in the country in particular, and advised me in a rough country to allow 1 chain to a mile, and half a link to a chain in all town allotments to allow of a fence between two portions. (Sgd.) James Larmer."

The above "extracts" were forwarded by the District Surveyor to Mr. Surveyor Wansbrough for his information on 20th September, 1883.

It is of interest to recall that the Mr. Surveyor Wansbrough referred to was the father of Mr. H. E. Wansbrough, of the Department of Lands, N.S.W., who retired from the position of District Surveyor, Cootamundra, only last year.

—R.V.B.

CORRESPONDENCE

To The Editors of the Surveyor

Sirs, — I have read with great interest Mr. Truscott's excellent paper on Survey Marks. It is a very useful addition towards the recording of the practice in the marking of old surveys, and will, I hope, induce others to place their experience also on record. Within the dates dealt with by Mr. Truscott, the horse-shoe notch was no doubt largely in use. The original practice was to belt the tree, then to mark two sides, and then the notching—the broad-arrow in the notch being made exclusively for Government surveys in 1853, by Act 16 Vic. No. 15. Sir Thomas Mitchell stated in his evidence (Additional Appendix to Inquiry into the Surveyor General's Department, Q.5) that "in practice its (the broad-arrow) employment being tedious, it is limited to principal points." Questions 13 and 135 also refer to the subject. The subject of lock-spits at angles was also broached in this and succeeding inquiries, the evidence being that it was but little used.

In the period in question, 1830-1850, the system of contract surveying was tried, and that led to the adoption of survey by licensed surveyors, and though these were mostly retrenched staff surveyors, the marking at first was frequently insufficient, owing to the want of proper inspection, which led to a circular being issued in 1853 describing the marks to be used.

It would be interesting to know whether any of the original plough-marks used for marking surveys lines on the Bathurst plains have been detected by surveyors.

OCT. 5, 1895

THE SURVEYOR

Mr. W. D. CAMPBELL forwards the following, for the publication of which he has received the approval of the Chief Surveyor. We are pleased to know that a "Working Standard" is now available at the Lands' Office. What is still further required is that this standard shall be made the legal standard for land measurement in New South Wales :—

"When the present building of the Lands' Department was erected, provision was made for a 66ft. and 100ft. standard measure in the basement on the Loftus-street side, with a trough depression in the corridor floor, and trachyte blocks fitted with brass-covering plates inserted at proper places. By instructions of the Chief Surveyor, these plates have now been scribed with the proper lengths, by Mr. J. Brooks, Trigonometrical Surveyor, and these will serve as working standards. It is intended that there shall be a more exact definition of length for scientific purposes, with a suitable apparatus for comparing standards, which will be placed in proper receptacles underneath the brass covering plates before mentioned."

I am, Sirs,

Yours, & c.,

W.D. CAMPBELL

24th November, 1894.

Early Regulations for the Survey and Marking
of Crown Land in New South Wales

July 9, 1894

THE SURVEYOR

LINEAL STANDARD

We understand that the marking of the standard in one of the corridors of the Land Office, for the use of surveyors and others, is to be effected shortly, and that the newly-completed “Comparator” mentioned in the last Annual Report of the Lands Department is to be utilised for marking off standard wires for several country towns. It is a work that has been urgently required for many years, as the standard laid down in the Observatory grounds is known to be not entirely accurate.

While on this question of standards, we would call attention to a notice *Government Gazette* for the 19th June—that “on the 22nd August there will be offered for sale a parcel of land at the junction of Pitt and George-streets with a frontage of 122ft.51/2 in. to George-street and 145ft. 13/4in. to Pitt street. Before a title for this 145ft. 13/4in. can be given the pertinent question needing a reply is: What standard was used to determine the length of this frontage to the quarter of an inch? Was it the Trig. Standard, the Observatory Standard, or the length of the chain as made by the manufacturer? Certainly it was not the only legal standard New South Wales possesses under 16 Vic.,No.34—viz.,the bar locked up in the Treasury.

This question of standards has never yet been raised in any dispute over the position of allotment boundaries settled in our Courts. But the day may not be far distant when it will be raised, and the advent of that day will be hastened by the Crown sale of such minute quantities as quarter inches. When it is raised, and settled, as it can only be settled by an appeal to our legal standard, the confusion that must arise regarding the ownership of insufficiently marked allotments will seriously affect the value of much real property in Sydney and its suburbs, and hamper many transfers of re-subdivisions of allotments. This is simple instance of the necessity for a *legal standard* for *land measurements*, such as are shortly to have—accurate, convenient and protected.

" Early Regulations for the Survey Markings of Crown Lands in New South Wales"
by I.P. Williamson (extract)

Abstract

Existing literature on early survey regulations and practice in New South Wales is reviewed. At the present time the earliest format of regulations known to exist for the survey and marking of Crown Land in New South Wales are dated 1854. Regulations governing the practise of licensed surveyors, dated 10th April 1848 and Instructions for marking Crown Land by Government Surveyors, dated 9th July 1853, are introduced. Instructions for the Interior Surveyor of South Australia, dated 1840, are discussed.

Introduction

An understanding of the methods used to carry out and mark early surveys is fundamental knowledge for the cadastral surveyor. This assists him to competently carry out his professional duties, particularly regarding the redefinition of old boundaries. Most investigations into the history of our survey system, have concentrated on the first sixty or seventy years after the colonisation of New South Wales. The interest in these investigations has mainly been directed to the methods and equipment used to carry out boundary surveys, the associated accuracy of these surveys, the methods of marking the surveyed boundaries on the ground and the regulations governing the carrying out of surveys. Virtually all research has been concerned with surveys carried out for the alienation of Crown Lands in rural areas. Little attention has been given to the survey methods used for private subdivisions during this period. This is understandable since the majority of survey effort was directed to making land available for settlement in the early years of the colony.

Most of the comments on early survey methods in New South Wales are equally applicable to Victoria and Queensland and even Tasmania since Victoria and Queensland did not become separate colonies until 1851 and 1859 respectively and because many of the early Tasmanian surveyors came directly from New South Wales. Therefore from a historical point of view, investigations into early surveys in New South Wales are particularly interesting

Existing Research

The best descriptions of the early survey system in New South Wales are without doubt the reports of two investigations into the Surveyor General's Department in 1855 and 1858. The first is the report of a Royal Commission appointed to inquire into the Surveyor-General's Department (Legislative Council of New South Wales, 1856) and the second is the report of the Select Committee on the Management of the Survey Department (Legislative Assembly of New South Wales, 1859). The role of the Select Committee was primarily to report on whether the Survey Department had introduced the recommendations of the Royal Commission.

The Australian Surveyor, December, 1982, Vol. 31, No. 4

APPENDIX B

HISTORY OF THE STATE CONTROL SURVEY

Rapidity of the early establishment of settlement in New South Wales from 1788 caused haphazard occupation of land and issue of titles. In 1820 Commissioner Bigge found that “through lapse of control and sheer neglect the survey and land branches of the Government had been allowed to run down into a state of chaos”.

This situation still existed when Sir Thomas (then Major) Mitchell was appointed Deputy Surveyor General in 1827. He found that settlement was being retarded as farms could not be granted because of a lack of description of the localities. Surveyor General Oxley had determined not to allow anyone to attempt anything approaching a general survey on a trigonometrical basis. Governor Darling, however, recognised the advantages of such a survey and instructions were issued in early 1828 for Mitchell and three others to devote their attention to the performance of a trigonometrical survey.

His work resulted in the publication in 1835 of the “Map of the Nineteen Counties” in three sheets. Nine hundred plans entered into the formation of the map, drawn to a scale of eight inches to a degree, covering an area of 38 000 square miles.

Mitchell’s mode of operation was to observe single rounds of angles with a seven-inch theodolite, from favourable positions, the distant objects being generally the summits of hills. Some of the hills were visited afterwards and their summits cleared with the exception of a single tree to serve as an object for future observations. This put Mitchell’s survey more in the form of a reconnaissance survey, but it was the first attempt to effect a survey of a trigonometrical nature on an extensive scale.

Governments continued to recognise the value of reliable control networks to an orderly system of land development, records and titles.

An article appeared in the New South Wales Magazine - August 1833. In it reference was made to the importance of a proper system of survey to enable the “satisfactory accomplishment of three distinct items of primary importance; viz the location of grants, the division of territory, and the construction of permanent public works, roads, bridges, canals, etc. “ It went on to describe, in detail, the extent of Major Mitchell’s general survey on trigonometrical principles.

In 1854 recognising the need for an accurate detail map of Sydney the City Commissioners arranged for a trigonometrical control survey of the city. The bases and marks of this survey have since disappeared.

Commissioners appointed in 1855 to inquire into the Surveyor General’s Department recommended - “Points to serve as trig stations should be selected and permanently, as well conspicuously marked ... A base line should be measured, every practical precaution being taken to ensure correctness ... From this base a system of triangulation might gradually be extended. Observations should be reduced and the necessary corrections applied, according to the most approved methods — other base lines also being measured to test the accuracy of the triangulation as it extends.”

In 1859, the District Surveyor at Albury, Mr P J Adams initiated a triangulation to facilitate the construction of accurate County Maps of the Albury District. This triangulation included several stations which were later remarked and included in the State Network.

In 1865 the first attempt to commence a “pure” trigonometrical survey was undertaken as it was recognised that the compilation of maps required for administrative and other purposes could not otherwise be attempted.

In 1869, Mr Smalley (Government Astronomer) reported that Lake George had been chosen as a site for the first baseline. Work commenced in 1870 on the base measurement and after some difficulties was finally completed in 1874. During the following years the triangulation chain was extended northward and westward until in 1880 a base of verification for the Lake

George Base was measured at Richmond. The combined errors of measurement of the bases and the intervening triangulation produced an apparent discrepancy of 1 - 2/3rd inches in the length of the Lake George Base.

It is of interest that in 1872 Surveyor Woolrych made field measurements with a steel tape chain made of well tempered crinoline wire about 1/4 inch wide, which appears to be the first recorded use of a steel band for survey measurements.

The triangulation of the State was undertaken in a thorough manner from 1873 to 1916 when it was abandoned as a war economy.* Approximately one third of the State had been covered, and 2 700 stations marked.

From 1916 till 1936 little work was effected on the trig network although two base lines were measured, Bourke Base 1927 and Richmond Base (remeasured) in the same year.

From 1936 the Australian Army Survey Corps carried out further trig work and laid the foundation for the emergency one inch to a mile mapping of the coastal areas of the State which was carried out mainly during the war years 1939-45.

Work on the trigonometrical survey by the then Department of Lands was virtually abandoned until 1946. The Second World War highlighted weaknesses in Australian mapping while post war development needs such as mapping, planning, services and infrastructures all required provision of a reliable survey control framework as a basis for development and maintenance system. Establishment of the Trigonometrical Division of a newly created "Central Mapping Authority" was announced that year. This organisation has subsequently become the "Land Information Centre". It had again been recognised by Government that a reliable state wide system of survey is critical to orderly development of information and title systems within New South Wales.

To empower the Surveyor General with authority to achieve such a system the Survey Coordination Act 1949 was introduced in New South Wales following the introduction of similar legislation in Victoria.

The primary objective of the Survey Coordination Act is to provide a State wide survey control network by rigid traverse between permanently marked control monuments. This is achieved by:

- (a) Inputs by the Surveyor General's staff
- (b) Coordination and inputs of survey work by all public authorities.

The Act was not effectively implemented at that time because of lack of finance, resources and the need to proceed with post war developments of a higher priority.

Work however did proceed slowly on survey of primary survey control (geodetic) networks for the States mapping and for provision of some initial networks of breakdown control.

Since 1949 primary triangulation extensions and measurements within the trig network has been made - from Condobolin Base northeast to Somerton Base (1957-58), Cockrow T.S. to Euther T.S. (1959), Wambelong - Mt Foster - Bourke network (1960) and in 1965 an extension from Cobar southwest to a point on the Ivanhoe/Wilcannia road 45 miles north of Ivanhoe for the purpose of providing a terminal for an extensive tellurometer traverse.

In 1982 there were 1170 stations with fixed values at a pre-determined relative accuracy, 1235 stations of the 4865 "Geodetic" Stations being permanently marked with concrete pillars. To complement the "Geodetic" network a series of triangulation stations had been progressively marked and adopted, these totalled about 1392, included in these stations were spires, towers (TV and radio) and other structures, 436 being permanently marked with concrete pillars.

In 1974 a Commission of Inquiry was established under Justice J W Overall to assess a proposal to broaden the existing Survey Coordination Act and encompass the operations of the

private sector. The concepts and cost/benefits of survey coordination were again endorsed and a draft Act and Regulation was subsequently prepared - the "Integrated Surveys Bill 1978". After much public and professional debate, the bill was not enacted.

In June 1986 minor amendments of significant impact were made to the Survey Practice Regulations to provide for the first time extension of Survey Control by the private sector when carrying out subdivision surveys. Subsequently, in 1986 a series of major reviews on survey practice in New South Wales were initiated by the Surveyor General Mr D Grant. One was the "Review of Survey Control in New South Wales". The conclusions reached again reaffirmed the substantial benefits of the New South Wales survey control net. One other result from these reviews was a totally redrafted Survey Practice Regulation 1990. This regulation has resulted in massive inputs to and extension of the New South Wales control survey network from both the public and private sectors.

In 1990 the New South Wales Government made funds available over four years to accelerate extension of the network. This led to provision of framework control in areas throughout the State identified for urban development in the foreseeable future. The rate of proclamation of survey areas was also escalated.

In 1995, the Commonwealth Government made funds available under the New Work Opportunities Program to provide training and work for 100 long term unemployed people, to assist in the auditing and measurement of survey control marks in urban areas throughout New South Wales. Matching funds were provided by the New South Wales Government, in the form of experienced survey staff, facilities and equipment. The aim of the project was to provide a network in urban areas of the state with a minimum spacing of 600m.

The Surveyors (Practice) Regulation 1996 was released with only minor changes to the previous regulation. The consequence of the Regulation was that private and public surveyors were placing many State Control marks and showing connections between them and existing coordinated marks. A concerted effort was made by the Surveyor-General's Department to use these observations, presented on deposited plans, to coordinate new marks. This effort has provided "established" coordinates for over 8000 permanent marks to date. This initiative is continuing.

During the period 1995-2000, NSW will be implementing a new national coordinate system based on the Geocentric Datum of Australia (GDA).

GDA is defined by an international reference frame and uses an ellipsoid which is coincident with the earth's centre of mass, hence the term, geocentric. The introduction of GDA brings all Australian States back to one common datum which is directly compatible with satellite positioning systems. It is intended that GDA will become the standard for transfer of spatial data between all local, national and international applications.

In 1994, precise GPS derived coordinates were computed for some 86 sites across the country, forming the Australian National Network (ANN). Using the ANN as fixed control, a subsequent readjustment of Australia's geodetic networks was undertaken producing more than 3000 "GDA94" coordinates in New South Wales. GDA94 values for the remaining 170,000 marks in the survey control network will be computed by readjustment where possible, or transformed if the original observations are not available.

The introduction of the GDA will also see the end of the ISG. In line with all other States in Australia, the MGA will be adopted for all surveys as the coordinate system based on the GDA datum. AHD will still remain as the datum for heights.

*Note: Information to 1916 has been drawn directly from Mr J McLean's 1967 paper "A Short History of Trigonometrical Survey in New South Wales".

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