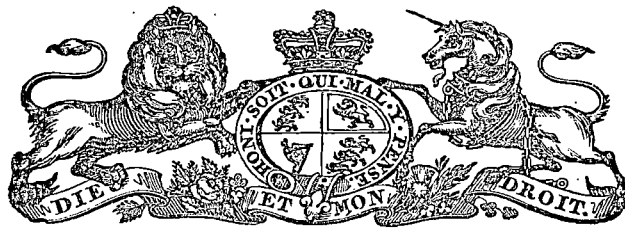


(No. 63.)



1883.

---

T A S M A N I A.

LEGISLATIVE COUNCIL.

---

**SURVEY SYSTEM OF TASMANIA :**

**REPORT BY A. BLACK, ESQ., ASSISTANT SURVEYOR-  
GENERAL, VICTORIA.**

---

Laid upon the Table by Mr. Moore, and ordered by the Council to be printed,  
July 24, 1883.



*REPORT on the Survey System of Tasmania, by ALEXANDER BLACK, Esq.,  
Assistant Surveyor-General of Victoria.*

SIR,

Melbourne, 31st May, 1883.

IN compliance with the request conveyed in your letter of the 17th March last, I have the honor to submit the following Report.

In order to make myself thoroughly acquainted with the system of Surveying as practised in Tasmania, I have spent some time in the Colony inquiring into the working of the Survey Branch of the Head Office, and visiting several districts to acquire a general knowledge of the character of the country; and having, through the courtesy of Mr. Sprent, the Deputy Commissioner of Lands, and the other gentlemen whom I had the opportunity of meeting, obtained all necessary information, I am now in a position to lay before you my views on the several questions which you have done me the honor to submit to me.

With a view to placing the subject of my inquiry in as clear a light as possible, I think it will be convenient to begin by briefly sketching the present constitution of the Survey Branch, and the method of conducting the business; then proceed to point out what appear to me to be the defects of the system; and conclude by suggesting such alterations as I consider necessary to secure accuracy and efficiency.

Present constitution of the Survey Branch.

As at present constituted the Office Staff consists of the Hon. the Minister of Lands and Works for the time being, who performs the functions of Surveyor-General; the Deputy Commissioner of Crown Lands, a Chief Draughtsman, seven or eight Draughtsmen, including one or two juniors, and one Lithographer.

Office Staff.

For many years past, prior to the recent appointment of Mr. Sprent as Deputy Commissioner, there was not an Officer in the Office Staff who had any practical knowledge of field work; and it was, and is still, the practice to accept and adopt the plans of the District Surveyors without examination or check, provided no serious errors are disclosed in plotting; little or nothing being done towards the preparation of maps beyond the construction of rough diagrams on a small scale to serve as index plans showing where settlement was taking place. Nothing whatever seems to have been done till quite recently, for a very long period, to improve the general Map of the Colony.

The field work is performed by contract, or rather, I should say, by a staff of Surveyors, officially designated District Surveyors, at scheduled prices. These gentlemen are appointed during good behaviour, and are entrusted with all surveys within their respective districts, including Mining and sometimes Engineering surveys—receiving instructions from the branch or department requiring the service.

Field Staff—District Surveyors.

Beyond a general understanding as to the form of allotments, and the manner of marking boundaries, there does not appear to be any regulation for their guidance. They are presumed to use the theodolite and imperial chain, but the manner in which the instrument is to be used is not prescribed; and lines are not only started by the needle, but it is not unusual in heavily timbered country to continue them from tree to tree by independent readings of the compass; an instrumental closure of the angles is not insisted upon. There is no common standard unit of measurement for testing and adjusting chains. This method of working does not of course admit of the plans being checked mathematically, and the style of drawing seems to be left to individual taste,—there is no standard of excellence. There has been no inspection of field work for many years. The department is dependent on the District Surveyors for information and advice on professional questions.

When required, Assistant Surveyors are appointed by the Commissioner. An Assistant works under the District Surveyor's instructions, and is paid by him; the usual mode of payment being a per-centage of the fees he himself receives for the work done by the Assistant.

Assistant Surveyors.

**Defects of the  
present Survey  
System.**

It will be sufficiently apparent from the facts which I have briefly noted above, that the system in practice is very defective. There is a want of the professional control and supervision at head quarters which is essential where uniformity of practice, and strict attention to details, has to be maintained; also a total absence of effectual check on the work either in the field or office; while the practice of initiating detached surveys and running boundaries by means of the magnetic bearing without some general system of check is totally at variance with good practice, and is bound to give rise to serious difficulties.

**Magnetic  
bearings.**

The facilities afforded by the adoption of the magnetic bearing in setting out and describing boundaries were so manifest that in the earlier stages of settlement in the Australian Colonies magnetic instruments came to be almost exclusively used by Surveyors in all the Colonies; and while settlement was sparse, and land plentiful and of comparatively little value, the errors and uncertainties incidental to the system were not felt or appreciated,—any clashing of boundaries being averted by making an allowance in measurements in favour of grantees sufficient to cover any discrepancies that cropped up.

As settlement progressed, however, and detached surveys began to close up, serious discrepancies were disclosed, and the preparation of titles for the closing blocks which would correctly describe the lands, and at the same time not clash with the descriptions of the adjoining boundaries, became impossible. While such cases are limited in number the discrepancies may be eliminated by some tentative process of adjustment, or even be ignored without causing serious trouble; but as they multiply the trouble increases, and any tentative process of disposing of them only tends to increase the confusion.

On the introduction of free selection before survey, more especially in Victoria and New Zealand, the difficulties of reconciling surveys initiated all over the country by independent magnetic bearings, coupled with differences in the standard of measurement, became so formidable as to cause serious public inconvenience, and it became apparent in both Colonies that a radical change of system, which should supersede the use of the magnetic needle, was imperative. The problem which had to be solved was not so much one involving the question of absolute bearings or standard, as the devising of some method by which practical uniformity in both could be secured in operations extending over a wide area: and this is the chief difficulty that has to be contended with in improving the Tasmanian system.

**The Victorian  
system of  
Survey.**

In Victoria a geodetic or scientific survey of the whole Colony had been initiated and partly carried out prior to the adoption of the system of settlement by selection before survey. This survey was commenced for the purpose of establishing a reliable basis for settlement surveys. In consequence, however, of the stimulus given to settlement by the change of the law, the demand for location surveys became so great as to tax the resources of the Survey Department to the utmost. It was found impossible to extend the geodetic operations with sufficient rapidity to meet the immediate requirements in every locality, and the result was the abandonment of the more accurate survey for the time, and the perpetuation of the old system with all its defects. When the difficulties arising from the imperfections of the system came to be a matter of serious inconvenience, and it became absolutely necessary to find some means of reconciling discrepancies and revising the whole system of surveys, the geodetic survey was found of the greatest value, and was taken as the basis of operations.

Though far from complete at the time the work was suspended, the position of many points throughout the Colony had been accurately fixed geodetically, and a number of standard lines determined and run out and marked on the ground to the true datum; so far as these went they afford a reliable basis for the determination and elimination of errors in the location surveys, as well as data for the establishment of other standard lines and traverses as a basis for future operations. There was therefore a sound foundation to work from in revising and improving the survey system; and by means of triangulation, standard and traverse lines brought to bear on the erroneous work, errors have been eliminated and discrepancies reconciled by re-survey. New surveys are now based either on such standard lines, or on the lines of previous surveys deemed correct.

**The New Zealand  
system of  
Survey.**

In the case of New Zealand, the difficulties which had to be met in initiating a satisfactory system of survey were much more serious than in the case of Victoria; and Mr. Thomson, the late Surveyor-General of that Colony, deserves great credit for initiating and maturing the present scheme, by which the difficulties have been successfully surmounted, and the public surveys placed on a sound footing. In the initiation of his scheme Mr. Thomson had no general triangulation or other reliable basis to start from; yet it was necessary to devise some method which, while ensuring practical accuracy, should at the same time possess sufficient elasticity to meet the immediate wants of

settlers over the whole Colony. The system adopted is based on the true meridian, with local initiation of surveys; and the mode of procedure may be described as follows:— In order to obtain uniformity and accuracy in the bearings, a series of stations are selected, to be ultimately connected by the principal triangulation, and the course of the true meridian through each determined by astronomical observation on the spot, and the line produced through a specific circuit, and called the meridian of that circuit. Standards of measurement are also determined locally by carefully measuring bases where required. With these data systems of minor triangulation and standard lines are established and connected with the primary stations, and the subdivisional surveys are based on these operations.

As a check on the local surveys the result is the same in principle as if the primary triangulation had been taken in hand in the first instance, though theoretically less accurate; and when the measurement of a base has been accomplished, and the primary stations connected by triangulation, thus binding the whole together, a complete survey of the Colony will have been effected sufficiently accurate for all practical purposes.

I have thought it expedient to give this *resumé* of the Survey systems of Victoria and New Zealand, and the circumstances that led up to their adoption, as the best way of clearly pointing out to you the defects of the present Tasmanian system, and the reasons for the alterations which I have to suggest. The experience of these Colonies furnishes a precedent which, in my opinion, Tasmania could not do better than follow; but whether the Victorian or New Zealand example is the most suitable will depend on the value of the triangulation which appears to have been extended over the greater part of the Colony many years ago.

The experience of these Colonies a valuable precedent.

Some 30 years ago a trigonometrical survey, so far as regards the primary triangulation, appears to have been completed by the late Mr. J. Sprent, subsequently Surveyor-General. For some reason which is not clear this survey seems to have been allowed to fall into desuetude, no use having been made of it except for the construction of a general Map of the Colony published by Mr. Sprent shortly before his death. When in Hobart I made it my business to gather all the information I could find in reference to this survey, but very little appeared to be known about it in the Office of Lands. Fortunately, the original plan of the triangulation was found, complete as regards the distances, but without the angles or bearings. A thorough search was made for the original books and papers connected with the work without success, till just as I was leaving, when a clue to at least some of them was found. It is probable that the examination of these may throw light on the whole subject. I find the work is referred to in the Proceedings of the Royal Society of Tasmania for the year 1855, in a Report by the late Major Cotton, Deputy-Surveyor-General, under whose direction the survey would appear to have been carried on. There are also some remarks by the late Sir William Denison, then Governor of the Colony, and, judging from what is therein stated, the survey seems to have been carried out with great accuracy. If the data given are reliable,—and I do not think Sir William Denison was a man to be deceived in such a matter,—there can be no doubt the work was well done.

Trigonometrical Survey of Tasmania.

Its accuracy has been challenged, however, by the late Mr. Calder, who at one period held the position of Surveyor-General, in a correspondence which took place in the year 1881,—also referred to in the Royal Society's Proceedings. Mr. Calder pronounced the survey to be a *fraud*, and entirely unreliable; but it is not stated what grounds he had for making this assertion; and I look upon the matter as of so great importance to the Colony, that I strongly recommend that the necessary steps be taken to set the question at rest. It is quite possible that the erroneous character of much of the topography of Mr. Sprent's map may have given rise to the impression that the whole data is worthless; but it by no means follows that this is the case because some person evidently imperfectly acquainted with the country has sketched the features incorrectly.

Doubts as to its reliability.

A general survey of the country is a desideratum that will have to be supplied before an accurate map can be produced; and the utilising of this survey would therefore mean the saving of thousands of pounds, which would justify any reasonable expenditure required to test its value.

The cost of applying the necessary test would not be great. It would not be requisite to go through the expensive and tedious process of remeasuring the base. The first step would be the employment of a competent Computer to overhaul the whole of the computations, and supply deficiencies from the data available; then to check the angles and azimuths, at a few selected stations, by actual observations on the ground. The result would positively settle the matter. It is possible, unless care has been taken by Mr. Sprent to permanently mark the centres of the trigonometrical stations in the first

Cost of testing the Triangulation.

instance, that there would be some difficulty in re-establishing the trigonometrical points exactly ; but I think this could be done in a sufficient number of cases ; and if some of the points are lost, and would have to be re-established by observation, the saving would still be very great, provided the survey on the whole is found satisfactory.

System of  
Survey recom-  
mended.

If Mr. Sprent's survey should prove to be satisfactory, it supplies a reliable basis for all future survey operations, whether these be the revision of existing surveys or the projection of new ones. The results of the triangulation may be brought to bear on the work by various methods known to practical Surveyors, and which will be sufficiently understood from my remarks on the mode of procedure in Victoria.

Should this survey, however, prove to be altogether unreliable, then I would recommend the adoption of the New Zealand plan of local initiation, and working up to a principal triangulation, to be perfected hereafter.

Whichever method it may be deemed expedient to adopt, care and strict supervision will be required to maintain uniformity of practice and a good standard of work. The practice of initiating surveys by the magnetic needle, at least those for permanent settlement, must be superseded by the adoption of the true bearing. A common standard for the chain must also be established, and a rigid system of inspection adopted both in the field and office.

Mineral and  
Gold Surveys.

As regards surveys for Gold and Mineral Leases, it is not of much consequence which datum is adopted, true or magnetic, so long as a uniform datum is maintained through every group of contiguous surveys. In the Mining Department of Victoria it is the practice to start the Mining Surveys in a locality either by adopting the bearing of the nearest permanent survey, or by the magnetic needle, as is found most convenient (maintaining the same datum throughout the group) ; and the practice seems to answer all practical purposes. Indeed, as the lessees in all such cases are bound to maintain their boundary posts under penalty of forfeiture of lease, an accurate knowledge of the bearings of the boundary lines, or even their lengths, is not essential ; and the chief use of the data would appear to be that a post can thereby be replaced should it happen to get disturbed.

Magnetic  
Variation.

The magnetic variation, or horizontal deflection of the compass needle, has been referred to in connection with the subject of the public surveys as a matter the exact knowledge of which was a thing of great importance ; and it is perhaps desirable that I should express my views on the point. Many people look upon the matter as important, and fear that the employment of magnetic bearings, to which so much uncertainty attaches in the description of the boundaries of land, must give rise to disputes and litigation between landowners, and between the Crown and grantees. Without presuming to possess any profound knowledge of the laws which govern the rights of landed property, I would, as a practical Surveyor of long experience, venture to express the opinion that such fears, if not altogether imaginary, are generally very much exaggerated. I draw this conclusion from the absence of disputes from this cause hitherto, as well as from a consideration of the little weight that would really be given to such bearings in deciding a dispute. If lands were granted by description alone and the grantee left to find and fix his boundaries therefrom as best he could, an exact knowledge of the magnetic variation at the date of the grant would be essential. But lands are not granted by description alone ; the Crown before the issue of the grant defines the "piece or parcel" to be conveyed, cutting it out of the public estate by officially marking the boundaries on the ground, thus creating and establishing the lines subsequently described in the instrument of title, and then it is handed over ear-marked as it were. The grantee must be presumed to accept the officially marked boundaries in accepting the Crown grant without questioning them ; and once put in possession, it is his function to keep up the boundaries, not that of the Government. If he afterwards, through negligence or any other cause, should allow the position of the original boundary marks to get lost, the re-establishment of these marks would be a matter of evidence in the event of any dispute ; and under such circumstances the description of the boundaries as originally officially marked and set forth in the grant would be important evidence, but only evidence to be taken for what it is worth, of the position of the original marks ; and in weighing evidence no court of law would accept that of the magnetic bearings, with all the uncertainty which attaches to such bearings, as against that of the measured sides ; nor do I think that the evidence of either would be accepted as conclusive against other positive proof of the exact position of the original marks.

Knowledge of  
the magnetic  
variation of  
little practical  
value to Sur-  
veyors.

It will be gathered from the preceding remarks that I do not consider an exact knowledge of the magnetic variation a matter of much importance to the Land Surveyor ; and, in my opinion, if the most exact knowledge were available, it could not be brought to bear on his field operations with a sufficient degree of accuracy to be of any practical value. The compass is a most useful instrument in the hands of the Surveyor for obtaining approximate results ; but owing to the many disturbances to which the needle is subject, not to be trusted in cases requiring great accuracy.

As may also be inferred, I look upon the marking of boundaries on the ground as a most important part of the business of the Survey Department, and that it cannot be too carefully attended to. Corner pegs and trenches should always be of a substantial character; the proper blazing of trees along the lines should not be omitted; and the special marking of reference-trees near corners would often prove of great value, especially when corners happen to fall near tracks or water-courses and are likely in consequence to get destroyed.

Ground-marks should be substantial.

In Town Surveys, where the ordinary marks are sure to get destroyed as soon as building operations are begun, it would be found of great convenience and importance, in re-aligning the streets and sectional points, if the intersections of the corners of the principal streets were specially marked by substantial posts, stones, or some other special mark sunk below the surface of the ground, and a record and description of such marks given on the original plan of the survey. Judging from what I had the opportunity of seeing, the style of marking practised at present is defective.

Special marks for Town Survey.

In support of my views as to the importance which attaches to the original boundary marks, I take the following from a Report of Mr. J. T. Thomson, late Surveyor-General of New Zealand, on the Surveys of that Colony, dated 9th August, 1876. Mr. Thomson writes, in effect, as follows:—"Where tenure is by grant from the Crown, this question arises: Do the ground-marks or written description give possession in relation to extent and position? To my apprehension the ground-marks give possession, they being actual and visible things done, the written descriptions being only accounts of those things which had been done. But why should not the written descriptions have the same validity as the ground-marks? Because they are not only secondary evidences of facts done, but also because they cannot in practice be made perfect, errors being attached to all observations on which descriptions are founded, whether in bearings or distances, while the ground-marks may remain immovable notwithstanding. Admit, for argument's sake, that two points, put at a mile distance by a Surveyor to the best of his ability within the power of his instruments in good faith, are subsequently found in error 2·8 or more links, as the case may be, do the owners lose the excess in breadth of the land in which they were actually and in good faith put in possession, and on which, on reasonable trust, they had put fences, or, it may be, houses?—do they lose possession in favour of the owners of adjoining sections? In other words, are settlers placed on waste lands of the Crown by processes of survey which cannot be perfect, to be from time to time required to shift their fences or houses as time brings other Surveyors with higher classed instruments to test their boundaries? If such a state of things could be supposed possible, it is manifest there could be no security to settlers, their boundaries being never-ceasingly subject to question. Hence we are forced to the conclusion that ground-marks give possession correctly, while descriptions and maps cannot do so, but only by approximation."

Mr. Thomson's opinion of ground-marks of importance.

Mr. Thomson, who goes thoroughly into the matter, concludes by pointing out that in the United States of America and Canada, the great colonising countries of the world, the original lines and ground-marks established by the Government Surveyors are, by Legislative enactment, declared to be unchangeable and unalterable, whether the written area and dimensions in the grant agree or not; and suggests a similar law for New Zealand.

I am not aware whether such an Act has been passed in New Zealand or any of the other Australian Colonies; but both in New Zealand and Victoria, where errors and discrepancies in original surveys have been largely dealt with, the principle of adhering to the original ground-marks is strictly followed. Where such marks are entirely absent, fences or other improvements presumed to have been made in accordance with the original marks are adopted. Where neither exist, then the boundaries, if they affect Crown lands, have to be re-established by the best data and evidence available.

In order to get rid of discrepancies when discovered, and to bring the surveys and titles into harmony, some method of effecting correctness is required. The matter has engaged the attention of the Lands Departments both in Victoria and New Zealand, where a vast amount of discrepant work has had to be dealt with, and methods of treatment have been gradually evolved in both cases which seem to meet the difficulty satisfactorily.

Discrepancies in Surveys how dealt with.

In Victoria the matter is dealt with by Regulations under an Order in Council, of which the following is a copy:—

In Victoria.

"Whenever it may be necessary to adjust the boundaries of any surveyed land, the Surveyor-General shall, on such adjustment, certify as to the correct boundaries and area of any portion or portions of land, and for every such certificate there shall be charged such fee as the Minister may direct."

Such certificate of error is issued in triplicate,—one copy to the owner of the land affected, one to the Registrar of Titles under the Land Transfer Statute, and the other is filed in the Surveyor-General's Office. If not objected to, the correction is embodied in any future certificate of title. Owners might, of course, object to recognise the correction; but as there is nothing in the procedure to prejudicially affect property, they invariably accept.

In cases where it is found that a grantee holds land greatly in excess of the area conveyed, the Department notifies him of the fact, giving him the option of acquiring a certificate to cover the full area held on his agreeing to pay for the excess at the same rate as he purchased the area conveyed by his grant, with 5 per cent. simple interest per annum added since date of purchase. He may decline or put off action, and, if he does, the Department leaves the matter in abeyance and confines itself to simply issuing the usual certificate necessary to reconcile boundaries when dealing with adjoining Crown lands. No fee is charged for a certificate where there is no demand for excessive area, and no demand is made unless the value of the excessive area amounts to five pounds.

Copies of  
Victorian  
certificates of  
adjustment.

In New  
Zealand.

There is a somewhat similar procedure in New Zealand, as will be gathered from the following extract from the Departmental Report for the year 1878-9. One District Surveyor in his Report to the Surveyor-General, writes as follows:—"The official instructions lately issued for the guidance of licensed Surveyors under the Lands Transfer Branch are looked upon by the Surveyors as a boon to them, more especially the clause which directs adherence to the marks on the ground rather than the record of them; but it seems to me that one step further in this direction is required, and that is that this important matter should be enforced by legal enactment. You, Sir, are doubtless aware that there is at present a difficulty in carrying out this useful provision, inasmuch as the Land Registrar cannot grant certificates outside the Crown grant." On which the Surveyor-General remarks:—"The instructions of the Registrar-General of Land on this subject are to the following effect:—'That if the Chief Surveyor on ascertaining, by re-survey or otherwise, the necessity for alteration of any sectional boundaries, cause such alteration to be made on the public maps, and certifies to the Registrar accordingly, there is no reason for insisting on the correction of the Crown grant or other instrument of title. The things to be insisted on are the rectification of the *description* of such boundaries by the Survey Department, and the corresponding correction of the public map before issue of the certificate of title.'"

The import-  
ance of ad-  
hering to  
marked  
boundaries.

The adhering to the *boundaries as marked on the ground rather than the description of them* is a most important point when dealing with old surveys, and the provision permits the elimination of errors, by certificates from deeds of grant, without prejudicially affecting the owners, as I have previously remarked; the object in view being *to reconcile the deeds with the boundaries on the ground, not the boundaries with the deeds*.

Connections.

In the Crown grants of detached allotments I believe it is the practice to give a connection to the nearest allotment adjacent, or some other fixed point. Such connection is not necessary to the definition, and is an element of danger. All that is required to fix the *locus in quo* of the allotment, if properly marked off on the ground, is the distinguishing number of the lot or section, and the name of the county, parish, or township in which it is situated. If the grantee through carelessness allows the boundaries to become lost, the blame rests with himself, and he has no right to expect the State to re-establish them. Blocks of which the boundaries are coterminous are best described as bounded by one another. If connections are useless and dangerous in grants of agricultural holdings, they are more so in the case of mineral holdings, where a few inches are often a matter of dispute. In Victoria it is the practice to grant mineral leases simply by a distinguishing number and plan deposited in the office of the Minister of Mines, a copy being, of course, attached to the lease. Although an element of difficulty and danger if embodied in the title, proper connections should in every case be made by the Surveyor, because a rigid connection of parts is necessary as a check on the work and also for the compilation of maps.

Lease forms.

Manner of  
pegging-off  
Mineral Lands  
defective.

The manner of pegging off mineral lands in Tasmania by simply putting up a post or other mark on some part of the land applied for, leaving the Surveyor to finally fix the boundaries, as described in Clauses 1 and 5 of the Regulations for mineral land, is open to serious objection. In the first place the applicant cannot possibly form an accurate idea of what land he will get until the survey has been made; and, in the second place, it leaves the Surveyor a certain amount of discretion, which he may exercise injudiciously through ignorance, or abuse, if so inclined. There is also a certainty that disputes will occur between the applicants and Surveyors however well the latter may perform their duties. A similar practice prevailed in Victoria at one period, but it was found necessary, on account of the frequency of disputes, to alter the system; and now the Mining Regulations require that an applicant shall mark each angle of the

block he intends to apply for, and the Surveyor is bound to survey according to the marks regardless of the shape of the block. Of course, blocks so defined are very irregular, and very irregular strips are left between holdings, but this is not deemed of any consequence where the tenure is limited; and the fact that the applicant is able to secure the exact site applied for, and that no dispute can possibly arise over the survey of the boundaries, far outweighs any objection on the score of the irregular shape.

The method of contract, or payment by a schedule of prices, is objectionable in principle under circumstances implying responsibility and trust, for the reason that when a strict attention to his duties is against a man's interests there must always be a strong inducement to shirk the work; and I am not aware of any instance in the Australian Colonies of Contract Surveyors holding the responsible position of that of the District Surveyors in Tasmania. The contract system is, however, perhaps the only way in which the public requirements can be met at a reasonable cost under a law which permits sparse and unrestricted settlement by selection over wide areas; and, for this reason, the method of payment by fees is adopted to a greater or less extent in all the Colonies where such mode of settlement has been sanctioned. But in every instance, except in Tasmania, so far as I am aware, the contractors are under the control and supervision of salaried officers. There was, indeed, a period in the history of free selection in Victoria when, from the enormous pressure of administrative work, the Survey Department was unable to maintain a strict supervision over the Contract Surveyors. The result was most unsatisfactory, and was the cause of much subsequent trouble and expense, which has not yet been altogether got over. I consider it will be most creditable to the gentlemen filling the position of District Surveyors in Tasmania, who have worked so long under the contract system without supervision, if no bad consequences are found to ensue.

Contract system of Survey.

Taking all the circumstances into consideration, I do not deem it necessary or expedient to recommend any radical change in the present system of Survey by Contract, so long established; all that is required, in my opinion, to ensure efficiency, being better control and supervision, which I think would be attained by the appointment of a competent Inspecting Surveyor, on salary, to supervise and check the field operations from time to time, and to see that the work is carried out in all cases in accordance with a code of Regulations to be prepared.

System to be continued.

Appointment of Inspecting Surveyor recommended.

\* The present plan of appointing authorised Assistants to the District Surveyors should in my opinion be modified, as the effect of the practice must in some measure interfere with the responsibility of the principals. I think, as a rule, it would be preferable to allow the District Surveyors to employ the necessary assistance for themselves, and only interfere when they were unable to cope with the work satisfactorily; and then, in the event of an Assistant being sent, to appoint him to act independently, assigning him a definite part of the District, and holding him solely responsible for the proper performance of the duties within such part—paying him the full fees directly. Such Assistants could be transferred from one District to another as circumstances required, which would give an elasticity to the staff necessary to meet emergencies arising from the sudden demand for Mining or other surveys in any locality. Assistants so employed should of course be duly qualified Surveyors.

The appointment of Assistant Surveyors.

I consider the present scale of fees inadequate and somewhat unequal in its application; and if a higher standard of accuracy is insisted upon in the field, and a careful attention to the details necessary to secure a proper check on the office work, more time and labour will be requisite, and the Surveyor must be paid accordingly. Perhaps it would be a little more equitable to both the Surveyors and the public if, for the purpose of fixing the Survey Fees, the lands of the Colony were divided into three classes, instead of two as at present; viz.—

Scale of Survey Fees.

- 1st Class—Ordinary Crown lands;
- 2nd Class—Densely wooded lands;
- 3rd Class—Densely wooded, rugged, scrubby country.

In my opinion the fee for the survey of a block of 320 acres of each class should be £10, £15, and £20 respectively, and in proportion for any greater or less area: the full fee to be allowed in each case whether one or more surveys are effected at the same time in the same locality. A scale of fair proportions is found as follows:—Taking the maximum and minimum areas, 320 acres and 20 acres, allowed to be taken up under "The Mineral Lands Act," and the prices suggested for the maximum in each class as the basis, make a fair average, allowing for the plan and travelling expenses, then take the

\* District Surveyors are allowed to employ the necessary assistance, and the Department only interferes when the work falls into arrears. (Lands Office.)



fee for any area between 320 and 20 acres as directly proportionate to the square roots of the maximum area and the area required. By taking some ratio of the maxima and minima so found, the scale may be made generally applicable to all areas and classes of surveys. I annex (Appendix 2) scale so computed for the three classes of country and prices suggested above, allowing 35s. as a fair average for plan and mileage; to which I attach for further elucidation a copy of a general schedule of prices, based on a similar scale of contract prices for selection surveys, which has been adopted in Victoria for regulating the rates payable for all kinds of departmental work, and found to work well.

Scale of Fees  
for Mineral  
Survey.  
For Victorian  
Scale of Fees  
see copy of In-  
structions and  
Regulations  
for Mining  
Surveys.

I consider the prices fixed by these scales sufficient for surveys for agricultural settlement; but taking into consideration the special accuracy and urgency required in the case of gold and mineral lease surveys, I think the Surveyors should be allowed special mileage fees in each case in addition, at the rate of 2s., 3s., and 4s. per mile one way, according to the class of country, for every mile beyond three which they have to travel from their office or some fixed centre, only one travelling fee to be allowed when more than one survey has to be made at the same time in the same locality. Every new discovery should be considered a mileage centre when once established as a mineral or gold-field.

Travelling fees for new surveys far from any established centre might be fixed specially by the Commissioner or the Surveyor-General.

Revision of  
old Surveys.

In adopting a new and more accurate system of survey, the question presents itself, Should the existing surveys be revised, and corrected to the new standard? It is doubtless desirable that a re-survey should be made so as to afford data to bring the titles of property into harmony with the boundaries as they exist on the ground; but this is not essential to carrying out the reforms proposed, nor am I by any means certain that it is the business of the Government to undertake the re-survey of lands already granted, which must necessarily be a costly affair. Holding as I do that it is the marks on the ground that give possession, such survey would not alter existing boundaries, and its value would chiefly be to furnish information for the rectification of titles, which may be considered more a private matter than one of public concern as regards the lands already gone from the Crown. The responsibilities of the Government under the Real Property Act may possibly render a re-survey imperative at a future period, but until the necessity arises I am of opinion that it should be allowed to stand over. In cases where new surveys come in contact with old work it will be necessary to re-survey, and record the lengths and bearings of the old boundaries in terms of the new data, or, where the original marks are lost, to re-establish them from the marks of adjacent properties, and have the discrepancies recorded by some system of certificates of error previously referred to as having been adopted, under similar circumstances, in Victoria and New Zealand. Isolated blocks that have been alienated will have their boundaries checked by the surveys of the adjoining Crown lands, and the deeds may be brought into conformity with the new surveys by means of such certificate, as soon as they are surrounded by new blocks.

Territorial  
sub-division  
for Survey  
purposes.

For the purpose of establishing standard lines and bearings and locating inevitable errors in sectional surveys, it is convenient to sub-divide the territory into blocks of moderate size. In Victoria the sub-divisions under the geodetic system, of degrees and tenths of a degree, were suitable. The tenth of a degree, measuring about 7 miles by  $5\frac{1}{2}$  miles, also answered for a parish. Since the geodetic system was departed from, an arbitrary parish sub-division has been adopted of about the same sized blocks; and the whole Colony has been so divided on the plan, and the parishes named ahead of survey in many cases, leaving the actual boundaries to be adjusted to the natural features of the country as the surveys proceed. When selection enters a new parish, it is the practice to run so much of the boundary as may be necessary to form a connection and afford a datum for bearings, and a new locality or working plan of the parish is commenced with the first survey in it. In New Zealand they have adopted meridian circuits with Survey districts of 12 miles square, and sub-divisions of about three miles square.

In my opinion the parish sub-division would be found the most convenient in the somewhat mountainous country of Tasmania, and the existing general Map of the Colony would suffice for sketching out the outline of the parishes, and enable the Surveyors to fix the boundaries definitely when occasion required. The advantage of such sub-division is, that upon a survey being made within a parish the position is at once localised sufficiently for record and reference whether the actual boundaries of the parish have been defined on the ground or not, and the site becomes a centre round which subsequent surveys may be grouped.

Contractors to  
make com-  
plete surveys.

In every case where the Surveyor is allowed the full fee, it should be a condition that he make a complete survey, even if the block abuts on the side of a block previously surveyed by himself. This not only would check his own chainage, but also serve

to show whether there had been any tampering with his previous marks,—a matter of importance to know sometimes: and if the corners of adjoining blocks are not coterminous, the difference in the length of the sides should be measured as a check both on the chainage and the plotting. When the side of an old survey is adopted as a datum of the bearings of a new one, the line should be ranged out afresh for at least 20 chains; and no shorter side should be taken for this purpose if a longer is available. An instrumental closure of the angles in the field should be strictly insisted upon in every instance; and if the figure is other than a rectangular parallelogram, its computation, in the usual form for computation by reduction of traverse and double areas, should be made by the Surveyor; the traverse lines of irregular sides,—such as rivers or water-courses,—to form part of the surround of the figure, and the areas between such lines and the irregular boundary computed by offsets and insets. A true copy of the actual field notes, and a fair copy of all computations to be sent in with the plan for examination and check by the office computer.

As all piece surveys made from time to time must, to a large extent, be built up one upon another, it is essential that every means should be taken, both in the field and in the office, to guard against mistakes, and secure the greatest accuracy possible under the circumstances.

It is not possible to effect any material or satisfactory improvement in the present County maps without a careful revision and recompilation from the original data to reconcile discrepancies and eliminate errors; and, if such a revision has to be made, it becomes a question whether it would not be better that it should be undertaken on a comprehensive basis, so as to lay the foundation for a better class of all kinds of maps and plans required, instead of attempting to improve the present County maps. The dilapidated and disconnected condition of many of the maps in office use causes much delay and trouble in conducting the business, which would be saved with better maps. Besides, there is the risk of the original data being entirely lost if steps are not taken to preserve it by renewing the plans before they become altogether illegible. In my opinion the more comprehensive plan would be the best.

Maps.  
(New compilation recommended.)

The facility with which maps can now be reproduced by means of photo-lithography, to any scale desired, at a cost merely nominal compared to hand-drawing, has led to the adoption of this process in all establishments where much map-work has to be done. The process requires that the plans, in the first instance, should be drawn in a style suitable for photography; when this is done their reproduction from time to time becomes an easy and inexpensive matter. I would therefore recommend that the necessary photographic apparatus be obtained; and, in any renewal of maps which may now be undertaken, that the introduction of this process should be kept in view, so that what is done may be done once and for all time.

Photo-lithography: its use and value.

The first thing to be considered in preparing new drawings is the several kinds of plans required. Maps for office use,—as working plans, record and locality plans,—require to be on a sufficiently large scale to admit of all necessary data being inserted: generally, a scale of 4 inches to a mile for country lands, and 20 inches for town lands, will be found sufficient; while 1 inch to a mile, or less, is a suitable size for County maps; but as the latter class of maps can, and are intended to be produced from the former by photo-lithography, the scale can be varied at pleasure, and it is not necessary, therefore, to take this class of map into consideration in connection with the original drawings. What is requisite, then, is a good set of plans on the larger scales suitable for photography, to enable the Department to produce any kind of map that may be required.

New drawings.

The cost of compiling and preparing new drawings of all sold lands suitable for photo-lithography would be considerable; but much of the work would not be urgent, and might be overtaken gradually, as the exigencies of the office required. I believe the plan would be found the cheapest in the end, and the only way to effectually cure the defects in the present maps and provide for future requirements.

Cost of new drawings.

Plans for photography must be drawn on suitably sized sheets, in a firm hand, without colour, but the fullest information may be inserted in writing; and to obviate the necessity of referring back to the originals, the new drawings should be made as complete as possible by the insertion of all necessary information regarding the appropriated lands; i.e., the name of the original grantee, with the area and dimensions (bearings and distances), and its official number, should be inserted on the face of the plan in each allotment or section. Blocks surveyed but not sold,—area and dimensions. Parish and county boundaries should be indicated by the usual conventional dotted lines; and where undefined, shown approximately, to facilitate the joining of the sheets on reduction.

The usual sub-division is to give a sheet to each parish; but a parish may be given on two sheets if too large to be included in one, or *vice versa*, two parishes may appear in

one sheet if large enough to hold them. On some available corner of each sheet a reference to the original plans used in the compilation should be inserted so as to facilitate their being referred to should occasion require.

The production of County maps from these large sheets is a simple and comparatively inexpensive process; the reduction is made photographically, and the reduced copies joined and transferred to the stone, omitting all details not necessary in the small maps, and adding by hand hill features or any other particulars that may be deemed necessary to make them more complete.

Photographic  
apparatus.—  
Cost, &c.

Assuming that the photographic process must be adopted, I have obtained a report, which I subjoin (Appendix 3) from Mr. Noone, the Photographer to the Lands Department of Victoria, as to the cost of the necessary apparatus. The total cost will, of course, depend on the character of the building erected; but I should say, if gone about economically, the whole cost should not exceed from £450 to £500.

One photo-lithographer would be sufficient to manage all the work of the Department, and any lithographer would very soon acquire the necessary knowledge of photography to be able to use the instrument. Besides its immediate value to the Lands Department, the apparatus would doubtless be found of great service to other branches of the public service, public works, railways, &c.

Test exami-  
nation for  
Surveyors and  
Draughtsmen.

The examination of candidates for employment in the Surveyor-General's Department should be of a sufficiently searching character to thoroughly test the applicant's professional knowledge, both theoretical and practical.

To frame a series of questions and other tests to do this involves a good deal of trouble; therefore no candidate should be admitted to examination who cannot produce *prima facie* evidence of having undergone the necessary training.

In Victoria the examination for the Lands Department are conducted by a Board constituted as follows:—The Government Astronomer, Surveyor-General, Assistant Surveyor-General, a District Surveyor, the Chief Draughtsman, and a representative of the Victorian Institute of Surveyors.

The Board apportion the work among themselves, each taking a part in the preparation and checking of papers, or in examining *viva voce*. The written portion is carried out under the eye of the Secretary to the Board, who hands out and receives back the papers.

The whole examination occupies several days. Certain marks are assigned to each subject, and the total required to pass fixed before the examination commences. Each examiner assesses his part of the work, but the final result is not known until the Board meets and notes are compared. The method is strictly impartial, and works well; and Victorian certificates are respected in the other Australian Colonies. Candidates for employment in the Mining Department of Victoria undergo a further examination in subjects relating more especially to Mining Surveying and Engineering. The two examinations could be combined in one.

This method of conducting examinations would probably be too elaborate for the requirements of the Department, and something after the form of test in force in New Zealand would be found more suitable to the circumstances of the Colony. I have therefore procured for your information a copy of the New Zealand Survey Regulations in which the prescribed test now in force there is given; and I can suggest nothing better so far as it goes.

Gentlemen possessing certificates of qualification from the Colonies of Victoria, New South Wales, and New Zealand might safely be admitted to practice without examination, provided they can also show certificates of good conduct from the Surveyors-General of these colonies.

With regard to the New Zealand Survey Regulations, I am of opinion you could not do better than adopt them (so far as applicable) as a model for Regulations for your Department. They have been carefully prepared, and are in many respects admirable—more especially the section referring to surveys under the Transfer of Lands Statute. Taking into account the difficulties that have often to be contended with in consequence of errors in the original surveys, there is no class of surveys that require more care and experience in dealing with them than surveys for transfers and registration of titles. These surveys are usually performed by Surveyors outside the Department, who are looked upon as taking the responsibility on themselves, but in reality the responsibility of any mistakes or complication that may be occasioned through their blunders devolves

on the Government who adopts their plans, and guarantees all certificates of title issued under the Act. The mischief that may result from carelessness or incapacity on the part of Surveyors under "The Real Property Act" cannot be estimated; and the Commissioner of Lands cannot, in my opinion, be too careful in the selection of the Surveyors who are entrusted with the performance of duties so important. The work is of a character that no efficient check can be applied, and the only guarantee the Government can have that the work is being properly performed is the character and professional standing of the gentlemen entrusted with it.

The system of disposing of lands by selection in single isolated lots or sections gives rise to a number of small detached plans or diagrams, the registration and preservation of which give as much trouble as if they were larger. To obviate the trouble and expense of keeping a separate registry of such plans, the practice in both the Lands and Mines Departments of Victoria is to attach the original plan to the application papers, with field notes or other documents referring to the survey, so that everything connected with any particular lease or licence is brought together under the original file number, and is available for reference at any moment. A copy of the diagram is, of course, laid down on the record plan of the locality, first in pencil on receipt of the plan from the Surveyor, afterwards inked in and perfected on the issue of the lease or grant. Allotments of 320 acres and under can, as a rule, be shown on a plan the size of foolscap paper; and this is the size and form of diagram adopted. Thin tough paper is used, as it answers all purposes and is more convenient for printed forms than drawing paper. The design was originally prepared by the Survey Department, but blank forms are now kept on sale by the leading stationers for the supply of Surveyors. The protractor and other printed particulars saves the Surveyor much time in the preparation of his diagrams.

Surveyors' plans and diagrams.

Field notes may be kept in the usual tabular form, or in the form of a hand sketch. I prefer a combination of the two methods, as given in the Regulations and Instructions for the guidance of Mining Surveyors in Victoria. The hand sketch is of great assistance to the draughtsman in the office in following the details. If the notes are not kept in ink in the field, they should be inked in immediately afterwards while all particulars are fresh in the mind of the Surveyor.

Field notes.

As regards the office plans, all record and working plans should be of moderate size for convenient handling, not exceeding at most a sheet of antiquarian paper. They should be kept flat, put away in shallow drawers in plan presses, under a proper system of registration and numbering for ready reference,—not more than from 10 to 15 plans to a drawer; if too many the plans are liable to damage in pulling out.

Office plans.

In connection with the suggested reforms the question will doubtless be asked: Is it not too late in the day to incur the expense of introducing a radical change in a system which, though shown to be defective, has hitherto met public requirements without giving rise to serious difficulties? Much of the best lands of the Colony have already passed from the State; and if it be true, as herein assumed, that the descriptions of properties as given in the grants are governed by the ground-marks, what does it matter if discrepancies do exist between these descriptions and the boundaries as marked on the ground? So long as the marked boundaries can be identified the title must be good.—This is the natural conclusion; and so long as the estates as originally granted remain intact serious difficulties are not to be apprehended; but as soon as properties begin to be subdivided the case is very different. The Registrar or Recorder of Titles cannot go outside the original grant; the combined dimensions of the several parts must conform to that of the whole, or inextricable confusion is bound to result. Where transfer surveys disclose serious discrepancies there is no way out of the difficulty but by re-survey of the original block or parcel, and a correction of dimensions to accord with the actual boundaries. These surveys are necessarily very expensive on account of the care that has to be taken to make certain of old boundary lines; and unless effected with accuracy the evils must be perpetuated,—a cause of expense to the landowner, and source of trouble and risk to Government by whom the certificates of title are guaranteed.

The expediency of a change of system.

From the defects inherent to surveys based on magnetic bearings, there is very little doubt but much of the alienated lands will require to be re-surveyed at some time or other as subdivision takes place; and if, by a change of system, this after trouble and expense can be obviated as regards future grants, there can be no question as to the expediency of making the change, even if the first cost of the surveys is thereby enhanced. No doubt a large proportion of the best lands have already passed from the State; but three-fourths of the territory still remains,—amounting to from 11 to 12 million acres,—and although the greater part of this consists of mountainous country unfit for settlement, there must be a large extent of land scattered throughout the various glens and valleys fit for occupation, which will be taken up as population increases and land advances in value.

## SUMMARY OF SUGGESTIONS.

1. That a professional officer should be appointed as Surveyor-General, to take charge of the professional branch of the Lands Department, with sufficient professional assistance to enable him to maintain efficient control and check over the work both in the field and in the office.
2. That the requisite steps be taken to test the accuracy of the Trigonometrical Survey of the Colony by the late Mr. Sprent.
3. That, in the event of this survey being found reliable, it be adopted as the basis of future survey operations.
4. That, if found defective, the New Zealand system be adopted.
5. That the use of the magnetic bearing be, as far as possible, discontinued, and the true bearing adopted.
6. That a complete new compilation of maps be made from the original data on a plan and in a style suited for photo-lithography.
7. That the necessary apparatus for the reduction and reproduction of maps by the photo-lithographic process be procured for the use of the Department.
8. That the present Contract system of Survey be not disturbed, but that Contractors' work be subjected to proper supervision and check by salaried Officers, under stringent regulations, and a revised scale of fees.
9. That the present regulation as to pegging off land by applicants be altered as regards mineral applications.
10. That connecting lines be not given in any Crown Grants or Leases.
11. That Surveyors and Draughtsmen seeking employment in the Department be subjected to a test similar to that in force in New Zealand.

---

To give effect to these suggestions, the following additions to the professional staff will, in my opinion, be required:—

A duly qualified Officer as Surveyor-General.—This office might, perhaps, be combined with the Deputy-Commissionership of Lands and Works if the office is filled by a gentleman of the requisite professional standing.

A Chief Surveyor as Field Inspector.—The salary of an Officer qualified to properly discharge this duty should be, at least, £450 per annum, with a camp or equipment allowance of £200 a year, or travelling expenses when in the field.

One Assistant Surveyor.—Salary, £350, and camp allowance £150 per annum; temporary only.

One competent Geodetic Computer to revise and complete the trigonometrical computations; temporary only. Salary at the rate of £350 per annum.

One Computer and Draughtsman, with a knowledge of field-work, to examine and check the Contract Surveyor's plans and computations; salary, say £250.

I estimate that it will take two Officers to properly attend to the current work, including mining plans and all other surveys passing through the office, but an Assistant might be supplied from the present staff.

To carry out the new compilation suggested, the staff required will depend on the vigour with which the work is prosecuted, and the experience and capability of the men employed. Taking the area of the alienated lands of the Colony at about  $4\frac{1}{2}$  million acres, or 7100 square miles, and the average parish at 25 square miles, the number of parish plans would be 284, and adding, say 16 for towns, the number to be prepared would be 300. An experienced draughtsman, I estimate, would be able to produce 15 such plans per annum, or the whole in 20 years, which would be equal to five draughtsmen for four years. The salary for thoroughly capable men would average about £200 per annum. The compilation could therefore be accomplished in four years by five draughtsmen at a cost of, say, £1000 per annum; and probably this would be sufficiently expeditious to admit of the plans being photo-lithographed and utilized without materially increasing the expense of the photo-lithographic branch. One photo-lithographer and one lithographic printer would be able to keep up with the five draughtsmen.

The Trigonometrical Computer should accomplish the work required of him in six months, and the Assistant Surveyor I count upon as only required temporarily to help in verifying the triangulation and in starting a proper system of connecting points and lines in the localities where they are now most required. In the event of the head of the

Survey Branch being able to devote his time exclusively to professional duties, I do not reckon on an Assistant being required beyond, say, one year, unless it should be deemed expedient to continue his services with a view to extending the topographical knowledge of the country round some of the principal mining centres,—work urgently required, and which an effort should, in my opinion, be made to accomplish with the least possible delay, as good maps would assist the prospector and tend to develop the resources of the country.

The extent to which the services of the present drawing staff would be available to assist with the proposed new compilation would depend on the amount of current work passing through the office.

Judging from the average number of all kinds of applications for which surveys were effected, and the total area of land sold during the last five years, it seems to me probable, under improved office arrangements which would provide for a subdivision of labour, by separating the clerical from the professional work and assigning each officer a specific portion of the daily duties, that most of the time of two at least of the present draughtsmen might be available; this would leave three draughtsmen at £200 a year each to be provided for. Another lithographer, or lithographic printer, would also be required at a salary of, say, £150.

The amount of these additions would be—

	£	s.	d.
Salaries .....	2325	0	0
Photographic apparatus and building, say ..	500	0	0
Add wages of a field party per annum.....	400	0	0
Add wages of field assistance to Inspector ..	200	0	0
<b>TOTAL .....</b>	<b>£3425</b>	<b>0</b>	<b>0</b>

Looking at the small amount expended in the Survey Branch at present, and the proposed increase as an addition thereto, the extra sum will appear large; but I think there can be no doubt but the professional staff has been allowed to fall below the strength requisite for the efficient performance of the duties which devolve on it, and that a material addition has become absolutely necessary to place the office on a footing to cope satisfactorily with the business, and supply maps and other information which the public have a right to expect from the Department.

Part of the proposed additional expenditure is only temporary; and I think it may be also assumed that a portion at least of the extra expense proposed in connection with the production of new maps would be recouped by the sale of the maps. And I further submit, if the risk of after trouble and expense likely to result, as I have pointed out, from the inaccuracies in the present surveys can be averted by change of system and a reasonable additional expenditure on the surveys in the first instance, it would be false economy to perpetuate the defects of the present method by withholding the assistance necessary to carry on the business of the Department efficiently.

Trusting that these suggestions may prove of service to the Government,

I have the honor to be,

Sir,

Your most obedient Servant,

ALEXANDER BLACK.

*The Honorable* NICHOLAS J. BROWN,  
*Commissioner of Lands and Works, Tasmania.*

APPENDICES.

No. 1.

Lands and Works Office, Hobart, March 17th, 1883.

SIR,

Doubts having arisen as to the efficiency of the present system of Surveying as practised in Tasmania, I requested the Surveyor-General of Victoria to favour me by naming to me an experienced Surveyor whom he could recommend to enquire into and report upon the whole system, and suggest any improvements necessary to the more efficient conduct of this important branch of my Department.

Through the courtesy of the Honorable Walter Madden, Minister of Lands, the Surveyor-General was enabled to inform me that your services would be available for this purpose for a period of six weeks.

I have therefore to request that you will be good enough to direct your attention to the following points :—

- First. To enquire into the present system of Surveying practised in Tasmania, suggesting any improvements necessary in order to secure a more accurate system, having regard to the amount of revenue derived from Crown Lands, and the peculiar rough and mountainous character of the Colony.
- Second. To report upon the present system of employing District Surveyors upon contract, and whether, in your opinion, it would be more advantageous to employ salaried Surveyors, and to fix remuneration to be given to Surveyors either by contract or by salary.
- Third. To prescribe a proper test examination to be passed by gentlemen seeking employment in the Surveyor-General's Department.
- Fourth. To suggest a system of field inspection of surveys.
- Fifth. To suggest a system of office check in order to test the accuracy of Surveyors' diagrams.
- Sixth. To suggest any improvements in the method of furnishing diagrams and field notes.
- Seventh. To examine into the system of compiling County plans, and to suggest any improvement that you may deem practicable.
- Eighth. To advise generally upon any measures calculated to promote the efficiency of the Surveyor-General's Department.

I have the honor to be,

Sir,

Your obedient servant,

(Signed) NICHOLAS J. BROWN, Minister of Lands and Works.

A. BLACK, Esq., Assistant Surveyor-General, Victoria.

No. 2.

WASTE LANDS ACT.

PROPOSED Scale of Survey Fees for Areas from 20 to 320 Acres.

	Ordinary Crown Lands.	Heavily timbered and scrubby.	Heavily timbered, rugged, & scrubby.
	£ s. d.	£ s. d.	£ s. d.
20 acres and under (minimum) .....	3 16 6	5 1 6	6 6 6
Above 20 and not exceeding 40 acres .....	4 13 6	6 8 6	8 4 0
40       "       60 .....	5 6 6	7 9 6	9 13 0
60       "       80 .....	5 17 6	8 7 6	10 17 6
80       "       100 .....	6 7 6	9 3 0	11 19 0
100       "       120 .....	6 16 0	9 17 6	12 18 6
120       "       140 .....	7 4 0	10 10 6	13 16 6
140       "       160 .....	7 11 6	11 2 6	14 13 0
160       "       200 .....	8 5 6	12 4 6	16 3 6
200       "       240 .....	8 18 0	13 4 6	17 11 0
240       "       320 (maximum) .....	10 0 0	15 0 0	20 0 0

The full fee to be paid in every case for surveys of land specially applied for.  
Surveys made at the instance of the Department, fees as per schedule attached.

Formula for computing Scale.

Let  $a = 320$  acres.  
 $b =$  Any less area to 20 acres.  
 $c =$  Survey fee for 320 acres.  
 $d = 35s.$  = average allowance for plan and travelling.  
 $e =$  Fee for area required.

$$e = \frac{\sqrt{b}}{\sqrt{a}} \times (c - d) + d.$$

Example: Let the fee for 320 acres be £10, required the fee for 100 acres :—

$$e = \text{Fee for 100 acres} = \frac{\sqrt{100}}{\sqrt{320}} \times (\text{£}10 - \text{£}1\ 15s.) + \text{£}1\ 15s. = \text{£}6\ 7s.\ 6d.$$

This formula applies fairly up to areas of 2000 acres.

*Mineral and Gold Fields Acts.*

For areas of 20 acres and upwards, same as under Waste Lands Act, with special mileage as below.  
Under 20 acres and over 10 acres,  $\frac{1}{3}$  the maximum fee for class of country under the Waste Lands scale.

Ten acres and over five acres,  $\frac{1}{4}$  ditto.

Five acres and under,  $\frac{1}{5}$  ditto.

Interior lines to fix objects within blocks, at per mile,  $\frac{1}{4}$  ditto.

Connection to nearest fixed point; at per mile,  $\frac{1}{4}$  ditto.

*Water Right Lease or Licence.*

Survey of race or channel not exceeding half a mile in length,  $\frac{1}{4}$  the maximum.

Exceeding half a mile and not exceeding one mile,  $\frac{1}{3}$  ditto.

Over one mile in length, 1s., 1s. 3d., and 1s. 6d. per chain, according to class of country.

With a special mileage allowance added in each case of 2s., 3s., and 4s., according to class of country, for every mile over three miles the surveyor has to travel from the mileage centre for the locality. The mileage to count only one way, and only one rate allowed if more than one survey is made in the locality at the same time to be apportioned amongst the applicants for survey.

## No. 3.

*REPORT as to Cost and Description of Lithographic Apparatus suited for Plan Work.*

*Department of Lands and Survey, Victoria,  
Melbourne, 23rd April, 1883.*

SIR,

The Government of Tasmania should order a six (6) inch rectilinear copying lens from J. H. Dalmeyer, of 19, Bloomsbury-street, London, W.C., of the same quality as supplied by him to this Government some five years ago. This lens will make a picture 34 by 34 inches, with perfect marginal lines.

Also a lens capable of taking pictures 13 by 16 inches, by same maker.

The cost of the large lens will be £105, and of the smaller lens about £15.

They should also order at the same time the ground glass frames and dark slides for bath cameras; that for the larger should be fitted with rolling slide, and inner frames to hold glass 22 by 30, 18 by 22, 16 by 18, and 13 by 16 inches. The smaller slide should have inner frames for glass 10 by 12 and 8 by 10 inches. These slides and fixtures cannot be made in the Colonies. These slides, &c. will cost about £20.

The cameras cannot be made until the lenses arrive, but any good pine or cedar will do to make them of. My largest is made of cedar, panelled and polished, is about 9 feet long when drawn out, and cost about £25. The smaller camera is made of deal, and answers all purposes.

The only other thing that will require to be ordered from Home is a flat gutta percha bath, with a well attached, and some sheets of gutta percha to make new baths or repair old ones. The size bath I would recommend to be ordered is one to take plates 30 by 22 inches; of course the bath would require to be some inches larger. For the smaller plates an ordinary dipping bath will answer (say to take plates 16 by 18 inches). I never take anything larger than 22 by 30 inches, as I find this size is most convenient for the photographic paper, two sheets covering a negative with some to spare.

This does not limit the size of the plan to be made, as any number of sheets can be put together, and if carefully done the joined up transfer is as perfect as if taken in one piece. This is owing to the perfection of the lens. I am now copying a plan for the Mining Department, about 30 feet long, and when put together it will be impossible to tell where the joinings are.

The other materials requisite for photo-lithography can all be obtained in the Colony. A saving might be made in the article of glass, which could be got from England in the sizes required at about 25 per cent. less than Melbourne prices.

The building would require to be about 30 feet long by 20 feet wide, and two storeys high. If on one floor it would require to be longer. The roof and sides of the operating room should be as much as possible of glass; ground glass is best, but ordinary glass frosted with paint will do. It should be lofty, say 20 feet in the centre, to lessen the heat. This room should have free access for the light from the North, and uninterrupted by buildings in that direction. The dark room to be in the South end. The floors must be firm and free from vibration.

In all these matters it will be best to consult a photographer on the spot; or, if required, a drawing of the Melbourne building could be obtained on application. If there is any further information you require for the Tasmanian Government, it will give me much pleasure to supply it.

I have the honor to be,

Sir,

Your most obedient servant,

JOHN NOONE.

A. BLACK, Esq., Assistant Surveyor-General, &c.

I ESTIMATE the total cost, including building, at from £450 to £500.—A. BLACK.