EAST AFR. PROT.

No. 222 Ent 2

DESPATCH.

C. O. 22242

Rec'd 20 JUN 08

365

(Subject.)

Report of Survey Dept. 1907-8

Sends with twenty Annual [illegible] Commissioner of Lands.

(Minutes.)

Mr. Read

This is one of the reports called for in connection with the C[olonial] Report. They were asked for that report & have been returned by Col. Ainsworth. If that had not been intended

Clerk

to form part of the C[olonial] Report here, I should think this might be printed; but I notice that Col. Montgomery asked that only should be sent to the Roy[al] Geog[raphical] Society. We have not so far as I am aware had any request from the Society for reports of this nature & unless you think it worth while to let them see this (for return) I do not think we need do any thing. The main points have been included in the Commissioner's report.

? Potts 6.6.08. 31.5.08

at once; H. J. R. 1/6

Governor's Office,
Mombasa,
June, 1st 1908.

365

st AFRICA PROTECTORATE.
No. 365
(Incl.S.).

My Lord,

I have the honour to submit the reports of the Survey Department for the year ending the 31st March last, together with a Minute by the Commissioner of Lands.

Survey reports
Minute by Comr. Montgomery.

2. Both Major Smith's and Mr. Waring's reports show a record of good work done during the year, and contain much interesting information.

3. It is satisfactory to note that the arrears are being rapidly dealt with, and that in a short time the Survey will be abreast of its work. In the meanwhile development in the Coast Area has made a marked advance, and increased attention will be given to its requirements.

I have the honour to be,
With the highest respect,
My Lord,
Your Lordship's most obedient,
humble servant,

[signature]

The Right Hon. Principal Secretary of State
for the Colonies,
Downing Street,
LONDON, S.W.

Governor's Office,
Mombasa,
June 1st 1908.

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SURVEY DEPARTMENT

BRITISH EAST AFRICA

ANNUAL REPORT

Financial Year 1907-08.

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GENERAL REMARKS. The annual report for 1907-08 is divided into three parts, viz:

TRIGONOMETRICAL BRANCH

CADASTRAL BRANCH

UASINGISHU RAPID ALLOTMENT.

I have the pleasure of reporting very good progress throughout. The trigonometrical branch has achieved a very largely increased output with a still further improvement in accuracy.

CADASTRAL BRANCH. I have forwarded Mr. Waring's report on the Cadastral Branch as it stands; I have a few remarks to add.

The Cadastral Branch has reduced its long arrears to manageable proportions. The diagram of progress of systematic cadastral mapping in sheets shows that very little progress has been made in such work. So long as the vast areas of farm surveys remained they completely blocked the way. Much greater progress in the production of sheets should take place next year.

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There is the difficulty that a smaller scale gives a less accurate map. I propose to avoid it by printing the rectangular co-ordinates of all farm corners on the sheet. These co-ordinates being calculated from the traverses would be of a higher order of accuracy than that with which a 1/20,000 or indeed a 1/10,000 sheet can be plotted.

PLICATIONS.

There has been a very marked reduction in the number of new applications this year. This has been an important contributary cause of the great reduction made in arrears. I believe this reduction to be very largely due to the uncertainty of the position of the Land Owners and Occupiers owing to the delay in the production of a revised Land Ordinance. I do not wish to imply that these delays could have been avoided, far from it: I am of opinion that delay and a set back in applications is far better than an ill digested act. I wish to emphasise the importance of having the ordinance as early as may be.

RAPID

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RAPID ALLOTMENT. A new system of marking farms rapidly on the ground has been introduced, and in my opinion is a marked success. By the aid of this system I am prepared to guarantee the rapid settlement of any tract of country free from complicated native or other rights which I may be directed to survey for settlement.

The survey work for rapid allotment would probably chiefly fall on the trigonometrical and topographical section of my department, strengthened as it will be next year by more topographers.

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Excellent progress has been made during the year 1907-08. In my last annual report I explained that the base measurement, base extension and astronomical observations necessary for starting triangulation on the Athi plains near Nairobi had been completed before the close of the financial year, enabling us this year to progress very rapidly with a fair start.

Connection with Mbuamberuka on the German Boundary triangulation was obtained by the measurement of the very large triangle Mbuamberuka - Kiuu - Lemuta. Thus we obtained our longitude. The series was extended northwards to Fort Hall, the slopes of Kenya and Kyeri. It crosses the most thickly settled parts of the splendid undulating Kikuyu. Over this area the main work is supplemented by large numbers of secondary points. I have called this the Kyeri series. From Lemuta and Kerita on the top of the Kikuyu table land a second series diverges following the Rift Valley northwards to the region of the Eldama Ravine station running at those respective points of the railway and crossing Lembus connecting with both series measured last year. This series is named the Rift Valley series.

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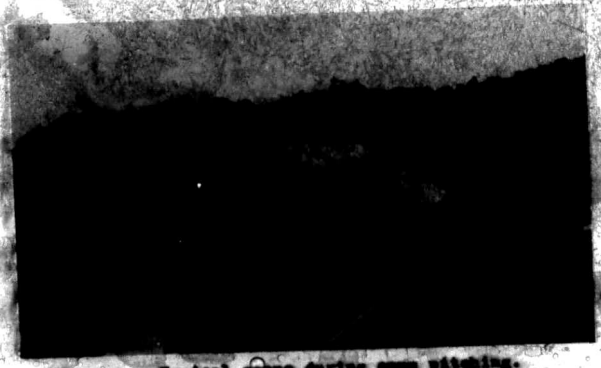
Kikuyu warriors ready to receive Mr. Winston Churchill,M.P. at Fort Hall



Typical scene during camp pitching.

Kikuyu warriors ready to receive Mr. Winston Churchill, M.P, at Fort Hall

Typical scene during camp pitching.

there already exists over most of this area a tertiary triangulation by Mr.Ortlepp which I shall now be able to incorporate in the completed work. This tertiary triangulation had a maximum triangular error of 15". I consider that when stiffened by numerous connections with the main triangulation of the Lumbwa series it is likely to be of sufficient accuracy for the requirements of this part of the country.

It would have been better if I had been able to establish more secondary points in Lumbwa. But the exhaustion of the transport vote and the necessity of a recess to work out final results for so large an area covered by triangulation, made it necessary to relinquish field operations about the middle of February. The computations are advancing satisfactorily and will probably be completed soon enough to allow of the resumption of field operations as soon as the end of the rains permits.

In person I was able to work in the field for about two months only. Attendance at the meetings of the Land Board interrupted observing work to some extent. Indeed had it not been that I was able to come in and return to Fort Hall on my Motor car, I should have been unable to spend as much time in the field as I did. It may be noted that I was in the field in the Uasingishu rapid allotment for over a month and a half in the latter part of the year, as is recorded in the section of this report headed Rapid Allotment.

The

Survey porters crossing a stream near Lumbwa country. The 8" theodolite box is in midstream

The Deputy Director of Surveys, Trigonometrical Branch, Captain G.S.Knox, R.E., was absent on leave during the early part of the year. Returning to this country in October, he was nearly 3 months in the field. The Assistant Director of Surveys, Trigonometrical Branch, Lieutenant E.W.Cox, R.E., was at work the whole time being 6½ months in the field. The success of this years operations is very largely due to his energy and skill.

Mr.H.Cox (late Company Sergt-Major, R.E.,) was in the field for 7 months selecting stations and building trigonometrical beacons. He has a remarkable eye for the country and his selections were always judicious. He also did some plane-table reconnaissance work. His services on Rapid Allotment are mentioned in that section of this report. Altogether he was working for 9 months in the field in the last financial year. He has got through a very large amount of work in an admirable manner.

Corporal Macdonald R.E., was at work in the field for nearly 3 months. He was occupied with reconnaissance and beacon building work. In the earlier part of the year he had to be retained in my office during the absence on leave of Mr.Rohm, my clerk and accountant.

In addition I had the assistance of Captain Stigand, 1st K.A.R., for 6½ months. He was building beacons and doing reconnaissance work, giving valuable assistance. Lieutenant Ward, 1st K.A.R., also assisted at similar work for about three months.

Summarising

Summarising these facts we get the equivalent of

2 observers in the field for 5½ months
3 beacon builders . . . . 5½ months
2 topographers . . . . . 2 months

The following table compares the output and accuracy of this years work and that of the previous year;

	1906-07	1907-08
Principal Triangulation		
Area in square miles	1578	7320
Errors:Average triangulation error	1.97"	2.77"
Mean	2.39"	2.28"
Probable	1.61"	1.52"
Number of triangles	29	59
Number of stations	15	41
Bases measured	2	0
Latitudes observed	2	0
Azimuths "	2	1
Secondary triangulation		
Area in square miles	835	3610
Errors:Average triangular	3.2"	2.51"
Mean	4.1"	3.06"
Probable	2.8"	2.08"
Number of triangles	67	183
Number of stations	13	40

	1906-07	1907-08
Intersected points		
Additional area covered square miles	2420	5375
Reconnaissance survey square miles 10 in-complete sheets on 1/125,000	2292	3350

In the Nyeri series the probable error in position of the final points is ± 4.66 feet in direction of the triangulation and ± 3.10 feet at right angles. For the Lumbwa series the corresponding figures are ± 6.48 feet and ± 4.32 feet.

A check azimuth was observed at Nyeri with a probable error of ± 0.31". The discrepancy between the azimuth and that carried forward from Athi river by the Nyeri series was 1.63".

The junction of the Lumbwa series with last years Sotik series is of considerable interest since it completes a long chain of triangulation. The Anglo-German Boundary series, which it will be remembered was observed with smaller instruments and with less reliable trigonometrical beacons, connects Kisumu via Karungu and the German Boundary with Mlomobaraaha. This department has now connected Kisumu and Mlomobaraaha via Lumbwa Nairobi and Athi river.

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1906

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(1). The difference in length of the side Chemwibi-Sekanani as given to the Sotik series of

1906

1906 and the Lumbwa series 1907 is 0.397 feet in a length of 101433.29 feet or 1/255,000.

Or we state the same result thus:

The difference of the Athi base as measured on the ground and as computed from the Kisumu base is one third of an inch in 1.3 miles.

This is a very good result.

(2). The difference in Azimuth between Athi and the Lumbwa series on the same line is 18.0". This is worse than I expected. The Kisumu Azimuth is not equal in value to the Athi Azimuth checked as it is by the very good Azimuth at Nyeri.

(3). The difference in latitude of Chemwibi common to the two series is 2.9". This is not surprising. I expected considerable local attraction at Kisumu.

(4). The difference in the longitude of Chemwibi is 1.9". This is a definite comparison between the Anglo-German Boundary triangulation and the work of this department. It is a closing error in longitude on a circuit 640 miles in extent.

Considered in this way it is an error of 1/17,700. It is probably chiefly due to the earlier less accurate work.

In considering the foregoing figures the most striking feature is the large increase in the area triangulated which is nearly five times as great in 1907-08 as in the previous year.

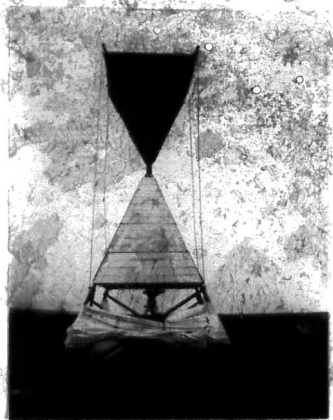
On the other hand no bases or latitudes were measured this year, a fact which goes far to explain the

the difference. One other reason for the smaller output in 1906-07 was the delay which occurred at the beginning of that year in consequence of operations being ordered in Sotik instead of in the region of Nairobi as I had planned.

The probable triangular errors have fallen. I attribute this improvement to an improvement in centreing the station mark under the visible signal. We find, that although the greatest care is taken in erecting the station point precisely under the vertex of the double pyramids of our large timber beacons, and although the feet of the beacons are carefully supported with concrete, a certain amount of settlement occurs in the first fortnight after construction. When a permanent set has been reached further settlement is trifling. We have accordingly, when observing, carefully measured these centreing errors, and allowed for them. In nearly every case these corrections have decreased the triangular error. Increased practice may account for some of the improvement.

I may remark that we have discontinued the use of iron beacons which proved too expensive in manufacture and transport.

In the case of secondary triangulation the reduction of the triangular error has partly been due to another cause. When we resumed work on the Nyeri series after the rains the weather was thick and hazy for some time. It became doubtful whether

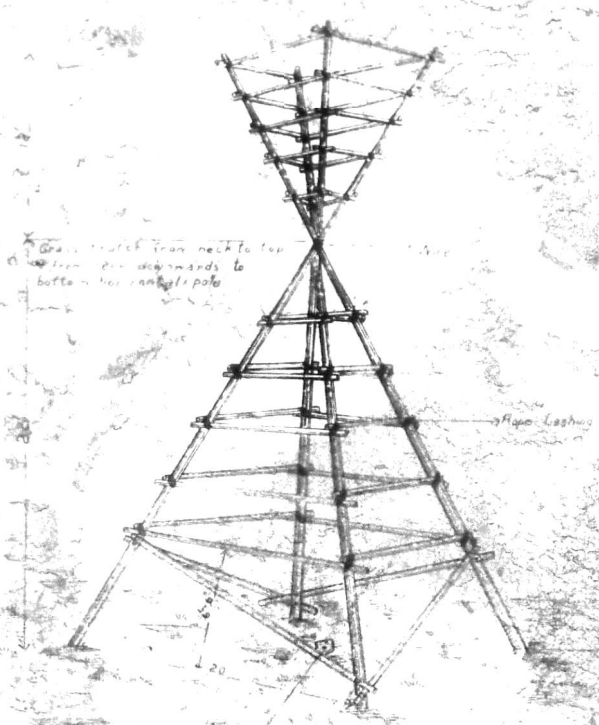


An iron survey quadriped centred over a cement observation pillar, from which astronomical observations for latitude and azimuth are to be observed.

A wooden survey quadriped in a clearing of the bamboos on a ridge of the Mau Escarpment. 8" theodolite is centred underneath with a wind screen on the windward side.

WOOD SURVEY BEACON

(UNTHATCHED)



whether we should be able to employ the large triangles I had intended to use. It might have been necessary to employ smaller triangles of the secondary work so that for some time we were observing the minor triangles with equal care.

The weather cleared a little later and our extra care with the minor stations became unnecessary. Its mark remains in the increased accuracy. But the slower work necessitated made some delay. I consider a probable error of 2.06" better than is required for this class of work.

The very good agreement in the comparison of the lengths of the bases at Kisumu and Athi make me think it is unnecessary to consider the measurement of any check base between them.

On the other hand I think latitudes and azimuths at Njoro on the eastern slope of the Mau appear advisable. A suitable main point has been prepared about 200 yards from Njoro station on the Uganda Railway. Latitudes are also required at Nyeri in that series. I propose to postpone these observations to a later date, on account of the urgency of extending our operations to the coast next season.

A point of considerable importance for the consideration of the technical advisers at home of the Secretary of State may be stated by the following question.

With a triangulation realising a probable triangular error of the order of 1.52" would it be

worth

Buying Ostrich eggs on the march.

A view from the east of the north end of
Lake Nakuru. Old caravan road in foreground.

worth while to go to the extra expense of a rigid adjustment by means of the method of least squares? From a geodetic point of view an arc from Kisumu to Mombasa of an amplitude of about 6½ degrees on a diagonal bearing and actually crossing the equator would be of value for determing the figure of the earth.

So far the only applications of the method of least squares have been made in reducing the quadrilaterals of the base extensions. We have not reached the limit of accuracy possible with opaque signals and 8 inch micrometer theodolites. We measure only 8 rounds of angles on four aeros, and no doubt the triangular error would be improved by an increased number of angular measurements.

It appears to me that it is not advisable to alter the number of measurements or the methods in the middle of the work. Such an alteration introduces complications in general adjustment.

I recommend that my question be considered.

It is my opinion, concurred in by the Land Officer, that next year the turn of the coast district has come. I propose to carry a series of large triangles via the railway down to the coast near Mombasa. This method, besides the most satisfactory means of connecting up our longitudes, will also be superior in speed to making a fresh start with a new base at the coast. It will be necessary to measure a base at the coast, but that can well

be

be postponed till a later date. We shall be able to select a suitable site for a base whilst carrying on the triangulation so that a good deal of time will be saved in searching for the best site. From Mombasa the triangulation should consist of both primary and secondary work and we should proceed northwards beyond Malindi.

The lower Tana requires attention, and a connection should be made with the German Usambara triangulation. A base of verification must be measured and astronomical observations taken, but I think the relative importance of these latter requirements had best be decided at a later date.

OGRAPHY. Some topographical reconnaissance work was done by the members of the Trigonometrical Branch and has been compiled with the surveys of Captain Stevenson and some route mapping of Mr. Lane, which is of better value than is usual for such work. I intend to forward copies (in one colour) of them in sheets for transmission to the Topographical Section of the General Staff for their information, but it seems to me that it is not worth while to go -- print them in their present state just yet.

It is with great satisfaction that I heard of His Lordship's approval of the additional staff for the Trigonometrical Branch to enable it to undertake Topographical work in a more systematic and comprehensive manner.

It

It is my opinion that topographical work should first be undertaken in the region north of Nairobi in fact over the area of the Nyeri series by completing the sheets which I was unable to finish last year. The very important sheets east and west of Nairobi should then be undertaken.

It is an important general principle for Topography to follow over the area previously triangulated and to complete their work sheet by sheet.

I proceed to analyse the costs incurred by the Trigonometrical Branch.

The General Management expenses for two years mean the expenses of the Directing Staff and I share them equally between the Trigonometrical Branch and Cadastral Branch. The trigonometrical share, as will be seen, is divided up so as to show the total cost of the bases, the different series and the topographical work completed in the last two years.

Initial expenses include personal emoluments previous to being ready to commence work in the field, passages, instruments, tools, building expenses &c., amounting to Rs:33,790. As a fair approximation I treat this as a capital expenditure to be written off in four years at Rs:8,450 per annum.

Computation expenses are the expenses incurred, chiefly personal emoluments, during recess.

By local expenses I mean all expenses incurred in the field including personal emoluments, transport etc.

Base measurement, base extension, astronomical observations Kisumu.

Share of general management	Rs: 1040
Share of initial charges	1270
Local expenses	12210
	Rs: 14520

Triangulation Setik Series.

General management	4000
Initial charges	5000
Computation expenses	6000
Local expenses	28450
	Rs: 43450

Topography 1906-07

General management	790
Initial charges	900
Local expenses	890
	Rs: 2580

Base measurement, base extension, astronomical observations Athi.

General management	1040
Initial expenses	1270
Local expenses	7510
	Rs: 9820

Triangulation, Nyeri and Lumbwa series.

Triangulation, Nyeri & Lumbwa series.

General management	Rs: 6000
Initial charges	7460
Computation expenses (not yet complete)	7390
Computation expenses(estimated balance)	6000
Local expenses	58430
	Rs: 85280

Topography 1907-08

General management	1000
Initial charges	1000
Local expenses	3060
	Rs: 5060

Recapitulation.

Base measurement Kisumu	Rs:14520	£ 970
Triangulation Sotik series	43450	2900
Topography 1906-07	2580	172
Base measurement Athi	9820	655
Triangulation Nyeri & Lumbwa series	85280	5680
Topography 1907-08	5060	337

The Kisumu base cost nearly 50 % more than that on the Athi because reconnaissance was required before starting at Kisumu in order to try and find a more suitable base than that used for the Anglo-German Boundary survey.

The

The triangulation, Sotik series, comprised 1375 square miles (880,000 acres) consequently the cost per square mile was Rs:31.50 or cost per acre Rs: 0.049.

The triangulation Nyeri & Lumbwa series comprised 7320 square miles (4,684,800 acres). This gives the cost per square mile Rs:10.82, cost per acre Rs:0.017.

The great reduction of cost per square mile is due to several clauses.

In the first place the change of plans involved in His Excellency's order to commence work in the Sotik meant delay of nearly two months before beginning work. Increasing practise of all concerned tells even more in increasing the output than in increasing the accuracy. The country traversed in the year just finished was on the whole more favourable than that of the previous year. In Sotik the principal triangles were measured first and the secondary triangles were measured afterwards, which involved going over some of the ground twice whereas in the later year the two sets were measured concurrently.

I expect that next year the cost per square mile is likely to be much the same, as the long series of large triangles projected to reach the coast should counterbalance the slower rate of progress I anticipate whilst operating in the coast district.

Later

Later operations at the coast are likely to be more expensive.

The topography of 1906-07 comprised 2,393 square miles (1,531,520 acres) giving a cost of per square mile Rs:1.07 or cost per acre Rs:.0017.

The topography of 1907-08 comprised 3350 square miles (2,144,000 acres) giving the cost per square mile of Rs:1.52 or a cost per acre of Rs: .0024.

I do not think the figures in this case are sufficiently large for them to give a reliable idea. The fact that the 1907-08 work was done separately may explain the rise in cost. The Kikuyu country was also more difficult to survey.

In concluding my annual report on the Trigonometrical Branch I have great pleasure in recording the fact that every member of the department has given me the most loyal and effective support, without which the results obtained must have been impossible.

Nairobi,
18th April, 1908.

CADASTRAL SURVEYS.

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ANNUAL REPORT, 1907 to 1908.

The Cadastral Survey Branch is responsible for the primary survey of public and private estates; for the location of public roads and reserves; and for all surveys relating to the alienation or leasing of Crown lands under the Ordinances of the Protectorate.

The general organisation of the Branch remains the same as it was last year, and the staff has been slightly augmented.

It is under the immediate direction of the Deputy Director of Surveys, Mr. E.L.L.Waring, and comprises the following :-

I HEADQUARTERS.

(a).	Central Office.	Deputy Director of Surveys.
(b).	Drawing & Map Office, including examination of diagrams.	Chief Draughtsman. 1 European do. 5 Indian do. 1 Probationer do.
(c).	Correspondence & Accounts.	1 Chief Clerk & Accountant. 1 Assistant do. 2 " Goanese clerks.
(d).	General Stores.	. . . . .

(II.

II. GOVERNMENT SURVEYORS.

1 Assistant Director of Survey.
3 District Surveyors.
4 Senior Staff Surveyors.
5 Junior Staff Surveyors.
3 European Assistant Surveyors.
4 Indian Assistant Surveyors.

III. LICENSED SURVEYORS.

Ten in number, engaged on Contract Surveys.

IV. MOMBASA BRANCH OFFICE.

A Branch office opened in April last. This office is under the charge of the Coast District Surveyor, and renders information and assistance to the local public. It also affords information to the intending settler, who otherwise would be compelled to journey to Nairobi headquarters. The Recorder of Titles of the Coast district has a room in this office, and it is understood that the local Land Court will hold its enquiries there.

The work and responsibilities of these sections include :-

I. Central Office:- The general administration, management and supervision of the Branch and sections, and the direction and control of the operations of Government and Licensed surveyors.

Drawing and Map Office:- In which all plans or diagrams for title deeds relating to Crown Lands are prepared. This section also undertakes the compiling of general land charts, the recording and registration of

(applications

applications for land thereon, the checking of survey work, computations and diagrams, and the preparation of general plans and maps. The public has as well to be attended to in this office, and any person desirous of examining plans accommodated.

Correspondence and Accounts. - The receiving, despatching and recording of correspondence; the keeping of accounts, and the preparation of all payment vouchers for labour, wages and purchases; returns, etc. In addition an enquiry and order office is maintained. The general stores are also under the charge of this section.

II. Government surveyors.
III Licensed surveyors. - Who are engaged in effecting the following surveys :-

Land selections granted to applicants by the Land Department, including agricultural and grazing areas; fibre, forest and rubber concessions; the laying out of blocks of farms for selection; public roads, reserves, native areas, town and residential building plots; the establishment of property beacons; and systematic cadastral mapping.

In this year the total staff, exclusive of Licensed surveyors, consists of 32 officials, of whom 21 are Europeans and 11 Indians and Cocoese; whilst in the preceding year there were 24 employed, comprising 15 Europeans and 9 Indians and Cocoese.

The Licensed surveyors number ten, though only five have been at work. In 1906 to 1907 there were 8 actually employed. These surveyors are granted licences by the Department to survey Crown Lands, and carry out work under the direct instructions and supervision of the Branch.

Two additional licences have been issued in the current year.

In addition to the staff of officials, a large though varying number of native carriers and labourers are employed, as well as a number of Indian Chainmen. Each surveyor is where necessary, allowed a maximum of twenty carriers and bush cutters and two chainmen when in the field. But where surveys are situated at a considerable distance from the line of Railway, in country where food is unobtainable, additional carriers are rendered necessary for the transportation of supplies. This is naturally contributory to an increased cost of survey.

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In April last year, the proposals previously put forward of grading the Government staff surveyors were approved, and three classes, viz., District, Senior and Junior staff surveyors, established. The system seems likely to give good results.

A considerable number of surveys have been effected during the course of the year, and the total area of lands of all classes actually surveyed amounts to 862,760 acres, shewing a decrease of 7,507 as compared with the previous return for 1906 to 1907. But in addition to the above a proportion of the Nasin Guishu Plateau surveys, amounting to twenty farms of 2,500 acres each, totalling 50,000 acres, have also been provisionally surveyed by Mr.Galbraith of this Department, during the months of February and March. This amount is not included in the above total, and adding it the aggregate will amount to 912760 acres, or an increase over the previous year of 42,493 acres. This 50,000 acres is being transferred to a separate report.

The number of surveys comprised in the net acreage (862,760 acres) total 1,182, of which 987 represent the number of areas surveyed for farms, concessions, etc., and totalling 860388

(acres

acres and 295 the building and residential plots, totalling 2,372 acres. Vide statement NOII in Appendix.

No large increase in areas over the previous year is shown, which is accounted for by the fact that a smaller number of applications for large concessions, such as fibre and forest areas, were received and surveyed; whilst a large number of applications for small farms and plots were dealt with, and it is obvious that to survey and demarcate a block of country into small areas takes considerably more time than to survey the whole as one block.

The Licensed Surveyors have, moreover, been less employed than hitherto, and it will be seen that roughly only half the expenditure under this head for survey work done last year has been incurred in this year. Their output of work is accordingly reduced.

It will be observed from statement No.III that the annual increase has been fairly regular up to this year since 1907. It is now likely, however, that the maximum output has been reached in so far as the areas of land actually surveyed for farms and concessions, building plots, etc. are concerned, and in future returns it is probable that a decrease under these heads will occur, in favour of increased cadastral mapping and other classes of work, by which I mean the cadastral mapping of the Coast districts,

(tertiary

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No large increase in areas over the previous year is shown, which is accounted for by the fact that a smaller number of applications for large concessions, such as mine and forest areas, were received and surveyed; whilst a large number of applications for small farms and plots were dealt with, and it is obvious that to survey and demarcate a block of country into small areas takes considerably more time than to survey the whole as one block.

The Licensed Surveyors have, moreover, been less employed than hitherto, and it will be seen that roughly only half the expenditure under this head for survey work done last year has been incurred in this year. Their output of work is accordingly reduced.

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(tertiary

tertiary triangulation, and connecting traverses.

In addition to the surveys of areas detailed in the Statement attached, the following other work has been done :-

The cadastral mapping of Mombasa, Nairobi and Kisumu townships has been undertaken, and a total of twenty-eight cadastral sheet-maps, on a scale of 1:500, and covering an area of 20 square miles, have been produced. Twenty-eight cadastral sheets to a scale of 1:2,000, of the Kotik settlement scheme have been partly completed, and nine of the Kericho Government station, to a scale of 1:1000, have been plotted, and are ready for lithographing and publication. The provisional maps of Nairobi and Mombasa have been lithographed in England, and are now on sale.

There has been a constant increase in the setting out of new streets, building plots and allotments in the townships mentioned, viz., Nairobi, Naivasha and Nakuru, which have been carried on simultaneously with the general surveys. The designs of these streets and plots have all been adjusted on the approved lines laid down by Mr. C. E. Williams in his report of the 28th January, 1907, and surveyed and set out accordingly.

A considerable amount of provisional work has been effected in the Coast district under the supervision of the Honourable Secretary for Native

(Affairs

Arusha, and the general approximate boundaries of native lands recorded on compiled maps, as well as privately owned areas held under Zanzibar titles within the sultan's dominions. Though this work is purely reconnaissance, it was essential that it should be done, owing to the involved state of land tenure in that district, and the absence of any general maps showing the disposition of occupied lands and areas available for alienation and development.

Tertiary triangulation, independent of the returns of acreage, has been carried out covering an area of 963 square miles, of which 455 sq.miles is in the Meru country and South-Eastwards, and 508 sq. miles forms an extension to Mr. Grigg's original Rift Valley system.

In the 63 triangulation of the tertiary triangulation in the Meru survey the following triangular errors were realised :-

Average error	6.2"
Mean "	6.1"
Probable "	6.4"

In the Mau triangulation 18 triangles were observed, with the following triangular errors :-

Average error	6.4"
Mean "	6.8"
Probable "	6.8"

On the acreage return (852,760 ac.) 350,798 acres - which includes 100,000 acres under the Soy settlement scheme - have been surveyed by Government staff surveyors, at a mean cost of 9.88d. per acre; and 311,967 acres by Licensed surveyors, at a

(cost

cost of 1.42d. per acre, both these rates are exclusive of supervision charges, which, so far as the Cadastral Branch is concerned, amount to 0.29d. per acre.

The following will show the comparative costs of work per acre :-

	Cost per acre. Pence	Cents.
1. Kotik settlement scheme survey; 102,000 acres at a cost of £2,0 .. =	4.80d.	30
2. Other surveys; 260,793 acres at a cost of £4,700 =	4.50d.	28
3. Mean cost of surveys by staff surveyors; Total, 380,~~000~~ 793 acres at a cost of 26,700 .. .. =	4.58d.	29
4. Cost of surveys by Licensed surveyors 511,947 acres at a cost of £3,055 =	1.42d.	9
5. Mean cost of all surveys; Total, 892,760 acres at a cost of £9,75~~5~~ .. .. =	2.74d.	17
6. Supervision Charges; Total, 892,760 acres at a cost of £1,~~0~~ .. .. =	0.29d.	2

Note:- It should be borne in mind that the above costs include that of setting out and partitioning off land into the various areas required, and not the survey of existing visible boundaries.

The item of surveys' proportion of supervision charges is 2s. 4d., or 56c., and is in addition to Cadastral Branch. Item 6 in the above statement is the amount added before the total supervision charges to 0.29d. per acre or cents 2.

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Page 10.

The difference in cost between Licensed surveyors' work and that of Crown surveyors is chiefly due to the fact that all the best class of work, i.e., the survey of open grass lands in large blocks or grouped together grass, tree or bush or forest cutting, such as the Hutt Valley grazing areas, goes to Licensed surveyors, whilst all isolated and difficult work, and surveys in the lower lying districts and in dense tropical jungle, have to be effected by the Government staff. Further, Licensed surveyors refuse to undertake the surveys of small areas at the present schedule rates, saying that they cannot make it pay, nor are they disposed either to work in the Coast or Lake districts.

I give below the present price per acre for survey of five different areas, exclusive of all excess charges leviable. 5,000 acres would represent an average sized grazing farm in this country, and although the rates increase rapidly as the areas become smaller, they do not do so sufficiently to cover the average cost of the survey.

	Survey Fees at Schedule Rates.	Fence per Acre.	Cents per Acre.
	£s		cents.
160 acres	85	2.50	53
640 "	170	4.25	26
1000 "	220	5.50	22
5000 "	480	1.24	10
10000 "	680	1.88	7

survey Fees on other areas are so rare, and I attach a schedule (p. 55), giving these in detail.

As regards the cost of the early survey in particular, these areas, based on Major system of triangulation, are at such a distance from the Railway as to necessitate a very heavy expense in transport, the bush-cutting also proved exceptionally expensive. The area available for settlement turned out to be comparatively small, and the elongated shape of the land available could hardly have been worse from the point of view of economical survey.

It should be noted that the Official survey staff has in the course of the year a multitude of other duties and minor surveys to perform, and for this reason a comparison of work done in area and the relative output of Licensed Surveyors is not possible.

Government Staff Surveyors' miscellaneous work includes the following surveys, the character of which prevents their being tabulated in a schedule of Returns :-

(a.) The location and demarcation of public roads, townships, building lines, etc.

(b.) The inspection of surveys.

(c.) The investigation and re-establishment of lost boundary marks.

(d.) The surveys of Disputed boundaries.

(e.) The re-surveys of old land grants.

(f.)

(f.) Tertiary triangulation.

(g.) Plane table surveys for cadastral sheet maps.

(h.) Assisting District Commissioner in fixing boundaries of native reserves.

(i.) Various reports called for by the Land Department.

(j.) Various connections to isolated work by traverse and triangulation.

(k.) Traverses of existing roads and tracks.

(l.) The pointing out of property beacons to landowners:

all of which do not appear in the returns of areas surveyed.

Much loss of time is also occasioned by the isolated nature of many of the applications for land the survey of which are undertaken by the staff, more especially in the cases of Mission stations. These often entail more time in travelling than in effecting the demarcation and survey, and consequently reduce considerably the apparent efficiency.

The work done in connection with the fixing of the boundaries of Native Reserves, which consists of unclosed compass or plane table traverses or intersected points, is not included in the returns of areas.

The total survey Fees received during the year amount to R^{s} 59,078.92^{c} Of these R^{s} 19992.30^{c} (have

have been returned to the land applicants, leaving a net balance of R$ 39,886·62. The refund of fees is made for various reasons; either the land applied for is required by Government, and consequently the application is refused, or it has previously been alienated, or the applicant himself withdraws his application.

For details of Survey Fees and Refunds see Statement No. IV.

The sum of R$ 45,884 has been paid to Licensed Surveyors during the year. This is a decrease of R$ 41,671·13 as compared with the year 1906 to 1907.

The following are the recorded payments under this head :-

	R$
Year 1904 - 1905	27,180
" 1905 - 1906	60,757·37
" 1906 - 1907	87,884·12
" 1907 - 1908	45,884

The net Receipts for the year are :-

	R$
1. Survey Fees and Boundary Marks ...	39,086·62
2. Maps & Plans, including M.O. sheets	1,387·46
3. Fees for Surveyors' Licences ...	750
Total:-	41,224·08

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Drawing and Map Office.- The output of cadastral plans by this Office has been satisfactory. A total of 219 deed plans for separate areas representing 788,852.0 acres, and 105 plans of building and residential plots, of a total of 350.1 acres, have been forwarded to the Land Department for conveyancing purposes.

928 maps or plans have been specially prepared for Government Departments, for which no charge is made, and 270 plans for members of the public, for which the cash receipts amount to Rs.1203.54c. 154 War Office sheets at Rs.1.12c and Rs.1.50c each have been sold to the public, and 128 supplied free on requisition to Government Departments.

Sheet maps have been prepared by compilation showing in detail all grants of land in the Protectorate, as well as Forest and other Crown areas and the majority of the reservations for natives.

These maps comprise generally the Railway zones, and extend as follows:-

(a.) Mackinnon Road station to Sultan Hamud station, Uganda Railway.
Scale 1 in. to 4 miles.

(b.) Sultan Hamud station to Escarpment station, Uganda Railway, and including Kyeri Government station.
Scale 1 in. to 4 miles.

(c.) Escarpment station to Kisumu (Port Florence) Uganda Railway, including the Elgeyo Escarpment & Sotik.
Scale 1 in. to 4 miles.

Para 11a.

Drawing and War Office.- The output of survey plans by this Office has been satisfactory. A total of 219 deed plans for separate areas representing 788,252.9 acres, and 105 plans of building and residential plots, of a total of 350.1 acres, have been forwarded to the Land Department for conveyancing purposes.

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Scale 1 in. to 4 miles.

(c.) Escarpment station to Kisumu (Port Florence) Uganda Railway, including the Elgeyo Escarpment & Sotik.
Scale 1 in. to 4 miles.

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(d.) The final sheet, combined to Jacking on road, is under preparation and will shortly be complete d.

These maps show the amount of independent cadastral surveys of property effected in the Protectorate. They are somewhat large to embody in a report, but copies can be supplied if necessary.

General maps of the country giving various particulars have been prepared in accordance with demand. They comprise:-

(e.) A general map of the Protectorate shewing Native, Game and Forest Reserves, and the boundaries of Provinces and Districts. Scale:- 1/1,000,000
1.014 in. to 16 miles.

(f.) do. do. shewing the boundaries of Provinces and Districts and Trigonometrical stations. Scale as above.

(g.) Compiled general plan of Malindi district shewing land grants.
Scale 1 in. to 2 miles.

(h.) Compiled general plan of the Coast, Mombasa to Malindi, shewing native areas, private holdings and unoccupied lands. Scale 1 in. to 4 miles.

(i.) Compiled general plan of the Coast as above, Mombasa to Vanga (Anglo-German boundary)
Scale 1 in. to 2 miles.

(j.) Sheet No.2 of Kimbu, shewing lands granted, has been extended, and now includes Punda Milia (10 miles distant N.E. of Nairobi.)
Scale 1 in. to 1 mile.

In addition to the compiled maps, tracings and conveyance plans, the usual miscellaneous demands have been attended to. These comprise the supplying of information and sketch tracings to settlers and the general public, to Government Departments, and to

the staff in connection with the execution of surveys.

The Drawing Office is also charged with the important task of the registration of applications for land; that is, the recording of applications lodged in the Land Office upon general charts which are continually being compiled from all available sources and brought up to date.

This naturally throws additional responsibility upon that Office, and the interruptions consequent upon the admission of the public and officials who require to inspect plans and land charts showing the disposition of lands available for application otherwise reduces considerably the output of actual draughting work.

The establishment of a separate Public Map Office was asked for in 1906, but up till the present time it has not been sanctioned.

Process printing methods in reproducing plans have been continually employed, and the greater proportion of the demands have been met by supplying photo prints. Messrs. Penrose & Sons' papers Nos. I/100, 101 and 103 have been utilised to a large extent, with satisfactory results.

For details of maps prepared and issued during the year, see Appendix No. V.

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Correspondence and Accounts.- In this section a total of 1,672 letters and telegrams have been received and dealt with during the year, and 2,572 despatched. These figures are exclusive of inter-departmental correspondence in the form of minutes, paysheets, indents, invoices, and the survey fees accounts.

It is noted with satisfaction that Lord Elgin has referred to the necessary increase required in this section of the staff, and that the appointment of two Chinese assistant clerks, who were provisionally engaged two years ago, has now been confirmed and included in the current Estimates. It is with difficulty that the work has been kept up to date, and a considerable amount of overtime has been necessary during the past year. I trust that with appointment of a suitable and efficient assistant clerk and accountant, which appointment was sanctioned last year, and has up to the present been filled by a person temporarily employed, the requirements of the work will be met.

It will also probably shortly be necessary to provide a clerk for the Kowloon office, who will deal with the local correspondence, accounts, paysheets, and enquiries. This will allow of the surveyor in charge spending more time in the field, though the fact that the majority of the enquiries received refer to survey matters and

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Para 184.

land details renders necessary the fairly constant attendance in the office of a surveyor at that place.

Methods of Survey.- The field work is carried out by the staff and licensed surveyors under the instructions and supervision of the Branch, and a high standard of surveying is maintained.

In bush or close country standard rigorous traverses are effected, such have been fully described in detail in Major Close's Text Book of Topographical Surveying. Five-inch micrometer theodolites are employed for the angular observations of these traverses, and linear measurements are made with the modern long steel tapes, correctly adjusted under given tensions to a standard length by comparison with a standard measure of 400-ft laid down at Nairobi by Major C.E.Smith M.C. Director of Surveys.

The measured traverse lengths obtained with these tapes are duly corrected for changes of temperature, sag, where necessary, tape slope and sag. Under these conditions the limit of error extended is well over that fixed, viz., 1 in 2,000 and is often 1 in 5,000.

An accuracy such as this is rendered doubly necessary in a tropical country, where beacons soon by various means become obliterated or lost in a jungle of tropical vegetation. The re-determination of their original positions and their re-establishment become a matter of grave responsibility devolving upon the Government

Para 144.

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An accuracy such as this is rendered doubly necessary in a tropical country, where beacons soon by various means become obliterated or lost in a jungle of tropical vegetation. The re-determination of their original positions and their re-establishment become a matter of grave responsibility devolving upon the Government

Department which establishes them and defines their original position from observed numerical data.

In open grass country, and in cases of certain other areas, farms are set out and surveyed by what is commonly termed the Co-ordinate method; that is to say by means of an extension of a system of minor triangulation from a base specially laid down and measured for the purpose. In surveys executed by this method, river, road or railway boundaries of property are determined by tacheometrical observations, or fixed by intersected points. I am of opinion that these methods, when used in connection with the determination of irregular boundaries, are to be deprecated in favour of actual measurements by traverses. A point to be noted, also, is that these bases are of varying order of accuracy, and are of little or no value beyond the immediate requirements of the surveys to which they refer.

The methods used by the Department in defining boundaries of properties are of the following description, each being used in accordance with the class of work involved :-

1. Wrought Iron Beacon, constructed of angle iron 5'0" x 2½" x 2½" x ¼", sunk 12 inches into a 6 to 1 concrete block 2'0" x 2'0" x 2'0". Wrought iron number plates 9" x

Page 10.

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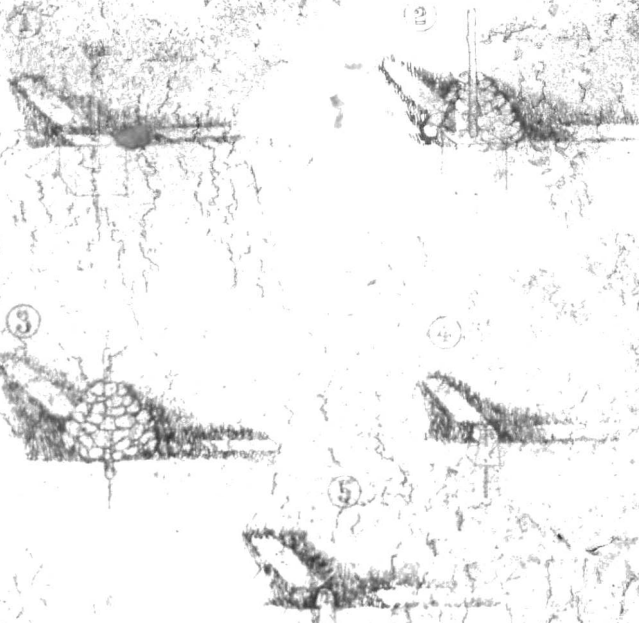
The beacons used by the Department in defining boundaries of properties are of the following description, each being used in accordance with the class of work involved :-

1. Wrought Iron Pegs, constructed of angle iron 3'0" x 2½" x 2½" x ⅜", and 18 inches into a 6 to 1 concrete block 2'0" x 2'0" x 2'0". Wrought iron number plates 2" x

M 1

SKETCH DIAGRAM OF BEACONS



SURVEY DEPARTMENT,
CADASTRAL BRANCH,
East Africa Protectorate.

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4½" x 1-16", with bolts for ditto, painted and lined.

2. Post and Concrete Centre Beacon, constructed of 16" length of 1" gas-pipe or ½" iron bar, set in 5 to 1 concrete block 1'6" x 1'6" x 1'6" flush with ground surface with 6'0" x 4" diam; wooden post set over the mound of stones 8 ft. in height x 8ft. diam. Post numbered.

3. Same as No.2, but without concrete block.

4. Concrete Beacon large, composed of 4 to 1 concrete block tapering from 9" square to 12" square x 16" length, with 9" x ½" diam. iron bar set in concrete, numbered on sides.

5. Concrete Beacon small, as above, tapering from 6" square to 8" sq. x 16" length, numbered on sides.

6. Dressed Stone Beacon 6" x 6" x 1'9", painted and numbered.

7. Special Beacons, as may be estimated for and determined by the Director of Surveys.

In townships standard closed traverses are laid down along the main streets and roadways, and the main stations permanently marked below ground level by iron casting bars set in concrete. On these all future re-subdivision and surveys will be based. The ultimate limits of error in these standard traverses does not exceed 1 in 10,000, and will probably reach an accuracy of 1 in 15,000. The work is, therefore, consistent with the most modern German and Continental practice.

Unexamined Areas surveyed into Farms, and Selection of Lands. - 100,000 acres have been surveyed and demarcated into twenty 5,000 acres farms in the Sotik district, which, with the exception of four farms taken up, are now available for the settler. In addition to these there are eighteen 320-acre agricultural farms situated on the road between Lumbwa and Kericho surveyed and ready for allotment, and 107 farms on the Main Uasin Plateau, referred to in a separate report by the Director of Surveys, have been set out and provisionally surveyed, and are now available for application by the intending pastoralist.

With the exception of these surveyed areas, the system of selection of Crown lands before survey still in many instances continues. This system renders the subsequent systematic and equitable division of property for public sale a matter of great difficulty, and further, the subsequent

Para 22.

location of roads and means of access to farms cannot always be dealt with with due regard to engineering requirements.

Applications for selections of land under this system are frequently extremely vague and unsatisfactory, and the description of the land required by the applicant is often most misleading to the surveyor. It would be of great assistance if a person applying for land were bound to give a clear description of the locality and the boundaries of the area required, and it would be of further advantage if he were bound to mark one of the leading or principal corners upon the ground in a prescribed manner, and to give the approximate bearing and distance therefrom to the nearest known point.

Applications registered for survey, and future work.

It is, I think, satisfactory to note that the long lists of outstanding surveys extending over the past five years is at last being rapidly overtaken, and that these areas will soon no longer exist. At the commencement of the year (April 1907) the applications for farms and concessions registered in the Land Department and held up for survey amounted to approximately 900,000 acres. (An exact figure is unobtainable here since many of the applications refer only to a piece of vacant land, the area of which is not ascertainable until after survey).

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At the present moment the arrears stand at approximately 350,000 acres. Of these 250,000 acres are in hand or instructions for survey issued, and they will be completed in a about 4 months time, leaving a balance of 100,000 acres to be dealt with. Of this latter area 80,000 acres represent the total applications of five small syndicates for land situated in the outlying districts of Tanaland and Jubaland. With the possible exception of these 80,000 acres, the whole of the existing arrears should be wiped out in five months time, and the old grievance of the settler will then be done away with, viz:- that it is impossible to get his land surveyed.

It seems, moreover, that a very reduced number of applications for land is now being received only 38,719 acres having been registered for survey since January 1st last, or 12906 acres per month. Should this continue it will shortly allow of the systematic cadastral survey of the Coast districts a most important work, being taken in hand, as well as the surveys of native reservations and the laying out of unoccupied Crown lands into suitable sized areas for farms and other purposes as demands arise.

The linking up with the major triangulation system of all the existing survey work, such as the Rift Valley Farms, the farms along the Uganda Railway, and on the road through Kyambu and to Fort Hall and Nyeri, as well as on the Lan Enarpm

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allowed be taken in hand, and the systematic cadastral mapping in sheets proceeded with. This latter does not imply extensive future survey operations but involves a certain amount of tertiary triangulation, based on the major system, with connections to principal points of former surveys, the intermediate work being adapted by adjustments and replotted direct.

In view of the overtaking of the arrears indicated, the reduction in the staff in the proposed Estimates for the current year by the two additional surveyors asked for need not be taken into account as materially affecting the ultimate completion of the cadastral survey of the country.

Personnel.- There is little to record in the changes of staff. Mr. F.C.Kyle, Junior Staff Surveyor, resigned his appointment on the 15th June 1907, and the following new appointments have been made:-

Mr. F.M.Lamb	Senior Staff Surveyor	
" W.W.Nightingale	do.	do.
" J.Spalding	Junior do.	do.
" R.G.Crofts	do. do.	do.
" H.E.Wynne	Assistant to Surveyors.	

One of the District Surveyors' appointments has been vacant during the year, though Mr.F.M.Lamb has been acting in that capacity since the date of his appointment to the Department. The vacancy is now being filled by Mr.J.T.Stiles of the Uganda Survey Department.

Up to the present time the Survey staff and other officials attached to the Cadastral Branch, with exception of the Deputy Director in charge, have been employed upon a three years agreement or temporary

basis. The results would, I think, be justified if the senior appointments were now placed upon a more permanent basis, and I would ask that consideration be given to this matter.

I would draw attention to the fact that the Cadastral Branch is still housed in a temporary corrugated iron and wooden structure, and one anxiously awaits the transfer to a suitable permanent building, which will reduce to a minimum the risk of loss and damage to valuable records by fire.

In concluding this report, it affords me great pleasure to acknowledge the loyal assistance I have received from the staff, and the willing manner in which the various duties connected with the work have been carried out, often in the face of trying and unlooked for difficulties not always appreciated in settled and more civilized countries. Both Mr.A.E.Townsend, Assistant Director of Surveys, at the head of the survey staff, and Mr.T.H.Galbraith, District Surveyor, deserve special mention for the good work they have done in the interests of the Government. Messrs.Fanting and Bunting who are in charge of the drawing office and the Correspondence and Accounts sections respectively have also done particularly good service and have carried out their duties in the most satisfactory manner possible, with a staff reduced to a minimum.

Nairobi
April 1908.

Deputy Director of Surveys
Cadastral Branch

The following Statements are appended:-

27 Statement No.1.

Detailed statement of farm lands, concessions and building plots surveyed April 1st 1907 to March 31st 1908.

28 Statement No.2

General Statement of Land surveyed. April 1st 1907 to March 31st 1908.

29 Statement No.3

Comparative Annual Statement of Lands Surveyed April 1st 1907 to March 31st 1908

30 Statement No.4

Survey Fees received. April 1st 1907 to March 31st 1908.

31 Statement No.5

Plans and maps prepared and supplied. April 1st 1907 to March 31st 1908.

Schedule of Survey Fees.

APRIL 1st 1907 to MARCH 31st 1908.

Month	Agricultural Areas		Grazing Areas		Forest and Rubber Areas		Fibre Areas		Cotton Areas		Native Reserves & Blocks		Total	
	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres
APRIL 07	1.	2.350	1	55.234	..	....	6	150,042	11	19.711	..	....	20	227,391
May	3	3,234	..	....	..	....	..	....	..	....	1	1.000	12	91152	4,375
June	1	4	3	7,500	..	....	..	....	4	6,721	1	17,000	14	442	23	31,375
July	16	4.120	6	13,048	..	....	..	....	..	....	1	12,012	10	58	33	29,138
August	7	1,203	11	23,041	..	....	1	12,000	..	....	1	10,205	64	567	64	53,309
September	3	535	15	37,287	1	6,956	..	....	..	....	..	....	1	20	20	57,855
October	6	1,548	36	136,277	1	852	..	....	..	....	1	2.788	4	80	88	140,779
November	..	....	1	2,200	2	1,000	..	....	..	....	1	1.240	14	12	22	5,217
December	2	974	42	78,016	..	....	..	....	..	....	4	9.000	47	1,421	95	89,864
January'08	8	715	8	19,000	2	4,048	..	....	..	....	3	5,644	8	20	1,333
February	9	1.151	8	20,666	3	1,000	..	....	..	....	7	34.000	172	1,720	77,540
MARCH	7	1,621	25	101,973	..	....	..	....	..	....	7	26,500	..	....	39	129,184
TOTAL:-	63	16.106	160	501,737	8	12,046	7	162,042	16	26,432	33	138,1.5	1805	6,378	1,888	2,760

N.B:- Total exclusive 50,000 acres Uasin Gishu Mateau. Vide separate report.

Nairobi.

18th April 1908

E.L.HAMING
Deputy Director of Surveys, Central Branch.

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Central Branch.
Survey Department
Annual Report 1907-1908

Statement No.II

C A D A S T R A L S U R V E Y S

GENERAL STATEMENT OF LANDS SURVEYED.

April 1st 1907 to March 31st 1908.

Month	Total areas of Farms Concessions &c. Numbers	Acres	Residential and Building plots, including streets Number	Acres	Total Number	Acres
APRIL '07	26	227,391	Nil	Nil	26	227,391
MAY	4	4,284	148	91	152	4,375
JUNE	10	31,335	18	42	28	31,375
JULY	23	28,080	10	62	33	28,139
AUGUST	20	52,742	64	567	84	53,309
SEPTEMBER	19	57,835	1	20	20	57,855
OCTOBER	49	140,729	4	50	53	140,779
NOVEMBER	7	5,165	15	52	22	5,217
DECEMBER	48	89,060	63	164	111	89,264
JANUARY '08	15	18,298	5	35	20	18,333
FEBRUARY	27	76,267	572	1,273	599	77,540
MARCH	39	129,184	Nil	Nil	39	129,184
Total:-	287	860,368	896	2,372	1,183	862,760

Note:-

Total excludes 80,000 acres Masai Cishu Ploteau
Vide seperate report.

E.L.WARING

Deputy Director of Surveys. Central Branch.

Nairobi
16th April 1908.

COMPARATIVE ANNUAL STATEMENT OF LANDS SURVEYED.

APRIL 1st 1907 to MARCH 31st 1908.

Year	Class of Land						
	Agricultural	Grazing	Forest and Rubber	Fibre and Cotton	Native Areas, Reserves, Waste Crown Lands & Provisional Surveys	Residential & Building Plots	Total
	Acres	Acres	Acres	Acres	Acres	Acres	Acres.
1904-05	40,740	526,802	10,000	32,000			618,542
1905-06	25,277	389,413	220,860	101,074	Details not extracted: Areas included in totals.		745,553
1906-07	9,667	519,914	64,320	276,306			870,207
1907-08	16,106	504,737	12,941	136,474	138,125	4,372	802,760

Includes :-
Fibre Concessions, i.e. Areas for collection of Wild Sansevieria Fibre..... 102,048 ac.
Areas for Cotton cultivation..... 36,452
Weir bi. 138,474 ac.

N.B.:-
Total excludes 90,000 acres Basin Lushu Plateau. Vide separate report.

14th April 1908.

E.L. WARING
Deputy Director of Surveys, C. Branch.

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COMPARATIVE ANNUAL STATEMENT OF LANDS SURVEYED.

APRIL 1st 1907 to MARCH 31st 1908.

Year	Class of Land						
	Agricultural	Grazing	Forest and Rubber	Fibre and Cotton	Native Areas, Reserves, Waste Crown Lands & Provisional Surveys	Residential & Building Plots	Total
	Acres	Acres	Acres	Acres	Acres	Acres	Acres.
1904-05	49,740	526,802	10,000	32,000			618,542
1905-06	25,277	399,413	220,860	101,074	Totals not extracted:		745,583
1906-07	9,667	519,914	64,320	276,366	Areas included in totals.		870,267
1907-08	10,106	504,737	12,944	136,474	138,125	472	802,750

Includes :-
Fibre Concessions, i.e. Areas for collection of Wild Sansevieria Fibre..... 102,048 ac.
Areas for Cotton cultivation..... 26,132
Mar bi. 128,474 ac.

N.B:-
Total excludes 20,000 acres Usain Gishu Plateau. Vide separate Report.

14th April 1908.

L.C. WARING
Deputy Director of Surveys, C. Branch.

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C A D A S T R A L S U R V E Y S

SURVEY FEES RECEIVED
April 1st 1907 to March 31st 1908

---oOo---

1907		Rs. c.	Rs. c.
Apr.	Receipts.....	8,974.06	
	Refunds.....	3,757	5,217.06
May	Receipts.....	5,947.80	
	Refunds.....	2,743	3,204.80
June	Receipts.....	1,955	
	Refunds.....	1,515	439
July	Receipts.....	6,345.50	
	Refunds.....	605.94	5,739.56
Aug.	Receipts.....	4,921	
	Refunds.....	1,987	2,934
Sept.	Receipts.....	2,178.40	
	Refunds.....	1,085.38	1,093.02
Oct.	Receipts.....	7,149.66	
	Refunds.....	1,1 2	5,967.66
Nov.	Receipts.....	5,087.	
	Refunds.....	252	4,835
Dec.	Receipts.....	6,138.50	
	Refunds.....	1,618.98	4,519.52
1908			
Jan.	Receipts.....	4,013	
	Refunds.....	772	3,241
Feb.	Receipts.....	983	
	Refunds.....	2,133	1,150 (min.)
Mar.	Receipts.....	5,386	
	Refunds.....	2,340	3,046
	Net Receipts 1907-08		Rs.39,086.62
	Total Refunds, Rs18,992.50		
	Net Receipts 1906-07		Rs.42,554.06

J.Bunting
Chief Accountant.

E.L.WARING
Deputy Director of Surveys, C.Br.

dastral Branch, Survey Department.
Annual Report 1907-08

STATEMENT NO.IV

CADASTRAL SURVEYS

SURVEY FEES RECEIVED
April 1st 1907 to March 31st 1908

---oOo---

1907		Rs. a.	Rs. a.
April	Receipts.....	8,974.06	
	Refunds.....	3.757	5,217.06
May	Receipts.....	5,947.80	
	Refunds.....	2.743	3,204.80
June	Receipts.....	1,955	
	Refunds.....	1.516	439
July	Receipts.....	6,345.50	
	Refunds.....	605.94	5,739.56
Aug.	Receipts.....	4,981	
	Refunds.....	1.947	3.034
Sept.	Receipts.....	2.178.40	
	Refunds.....	1.085.38	1.093.02
Oct.	Receipts.....	7.149.66	
	Refunds.....	1.1 2	5.967.66
Nov.	Receipts.....	5,087.	
	Refunds.....	252	4.835
Dec.	Receipts.....	6.138.50	
	Refunds.....	1.618.98	4,519.52
1908			
Jan.	Receipts.....	4,013	
	Refunds.....	772	3.241
Feb.	Receipts.....	985	
	Refunds.....	2.153	1,160 (min.)
Mar.	Receipts.....	5.386	
	Refunds.....	2.340	3.046
	Net Receipts. 1907-08		Rs.39,086.62
	Total Refunds. Rs18,992.50		
	Net Receipts 1906-07		Rs.42,554.06

Bunting
Chief Accountant.

E.L.WARING
Deputy Director of Surveys, C.Br.

Cadastral Branch, Survey Department
Annual Report 1907-08

STATEMENT NO.V.

CADASTRAL SURVEY BRANCH

PLANS AND MAPS PREPARED and SUPPLIED
April 1st 1907 to March 31st 1908.

	No.	Value Rs. c.
CONVEYANCE PLANS SUPPLIED to the LAND DEPARTMENT :-		
1. Of Farms & Concessions. Total acreage 758. 32.0.	219	2,409.00
2. Of Residential & Building plots " 350.1	108	1,188.00
MISCELLANEOUS MAPS OF LAND GRANTS, SPECIALLY PREPARED:-		
1. Supplied to Government Departments.....	928	3,999.68
2. " " the public.....	279	1,203.54
PUBLISHED CADASTRAL MAPS NAIROBI. 1/2500 scale:-		
1. Supplied to Government Departments.....	70	78.40
2. " " the public.....	1	1.12
PUBLISHED CADASTRAL MAPS MOMBASA.		
Lithos. not yet in hand		
CADASTRAL MAPS of SOTIK. 1/10,000		
Nil.		
PUBLISHED WAR OFFICE PROVISIONAL MAPS. 1/250,000 scale		
1. Supplied to Government Departments.....	128	151.48
2. " " the public.....	154	183.92
Total No.	1887	Rs.9125.14

N:-
o charge is made for maps supplied to Govt. Depts.
rcpd. C.FANTHORPE R.J.WARING
15th April 1908. Chief Draughtsman Deputy Director of Surveys G.Br.

STATEMENT NO.V.

CADASTRAL SURVEY BRANCH

PLANS AND MAPS PREPARED and SUPPLIED
April 1st 1907 to March 31st 1908.

	No.	Value Rs. c.
CONVEYANCE PLANS SUPPLIED to the LAND DEPARTMENT :-		
1. Of Farms & Concessions. Total acreage 788,282.9.	219	2,[illegible].00
2. Of Residential & Building plots " 350.1	108	1,[illegible].00
MISCELLANEOUS MAPS OF LAND GRANTS, SPECIALLY PREPARED:-		
1. Supplied to Government Departments.....	928	3,999.08
2. " " the public.....	279	1,203.54
PUBLISHED CADASTRAL MAPS NAIROBI, 1/2500 scale:-		
1. Supplied to Government Departments.....	70	78.40
2. " " the public.....	1	1.12
PUBLISHED CADASTRAL MAPS MOMBASA.		
Litho. not yet in hand		
CADASTRAL MAPS of NOTIK, 1/10,000		
Nil.		
PUBLISHED WAR OFFICE PROVISIONAL MAPS. 1/250,000 scale		
1. Supplied to Government Departments.....	128	151.48
2. " " the public.....	154	183.92
Total No.	1887	Rs.9195.14

N.B:-
No charge is made for maps supplied to Govt. Depts.

Prepd. C.PANTING L.L.WARING
16th April 1908. Ch.Draughtsman Deputy Director of Surveys G.Br.

EAST AFRICA PROTECTORATE.

SURVEY DEPARTMENT,
CADASTRAL BRANCH.

RULES

Issued by His Majesty's Commissioner under the provisions of the Crown Lands Ordinance, 1902.

(1). Rule 10 of the rules issued under the aforesaid Ordinance and dated December 21st, 1903 is hereby cancelled.

(2). The following scale of fees for survey purposes shall be as follows :—

Rs.					
15	for any survey up to and including 15 acres.				
	for every additional acre up to and including 40 acres.				
	for any area exceeding 40 acres but not exceeding 50 acres.				
	do	50	do	60	
	do	60	do	70	
	do	70	do	80	
	do	80	do	90	
	do	90	do	100	
	do	100	do	105	
	do	105	do	110	
	do	110	do	115	
	do	115	do	120	
	do	120	do	125	
	do	125	do	130	
	do	130	do	135	
	do	135	do	140	
	do	140	do	145	
	do	145	do	150	
	do	150	do	160	
	do	160	do	170	
	do	170	do	180	
	do	180	do	190	
	do	190	do	200	
	do	200	do	210	
	do	210	do	220	
	do	220	do	230	
	do	230	do	240	
	do	240	do	250	
	do	250	do	260	
	do	260	do	270	
	do	270	do	280	
	do	280	do	290	
	do	290	do	300	
	do	300	do	310	
	do	310	do	320	
	do	320	do	330	
	do	330	do	340	
	do	340	do	350	
	do	350	do	360	
	do	360	do	370	
	do	370	do	380	
	do	380	do	390	
	do	390	do	400	
	do	400	do	410	
	do	410	do	420	
	do	420	do	430	
	do	430	do	440	
	do	440	do	450	
	do	450	do	460	
	do	460	do	470	
	do	470	do	480	
	do	480	do	490	
	do	490	do	500	
	do	500	do	510	
	do	510	do	520	
	do	520	do	530	
	do	530	do	540	
	do	540	do	550	
	do	550	do	560	
	do	560	do	570	
	do	570	do	580	
	do	580	do	590	
	do	590	do	600	
	do	600	do	610	
	do	610	do	620	
	do	620	do	630	
	do	630	do	640	
	do	640	do	650	
	do	650	do	660	
	do	660	do	670	
	do	670	do	680	
	do	680	do	690	
	do	690	do	700	
	do	700	do	710	
	do	710	do	720	
	do	720	do	730	
	do	730	do	740	
	do	740	do	750	
	do	750	do	760	
	do	760	do	770	
	do	770	do	780	
	do	780	do	790	
	do	790	do	800	
	do	800	do	810	
	do	810	do	820	
	do	820	do	830	
	do	830	do	840	
	do	840	do	850	
	do	850	do	860	
	do	860	do	870	
	do	870	do	880	
	do	880	do	890	
	do	890	do	900	
	do	900	do	910	
	do	910	do	920	
	do	920	do	930	
	do	930	do	940	
	do	940	do	950	
	do	950	do	960	
	do	960	do	970	
	do	970	do	980	
	do	980	do	990	
	do	990	do	1000	

FOR LARGER AREAS THAN 1024.0 ACRES.

Rs.	Acres.		Acres.	
67	per 1000	from 10500	to 11000	(Rs. 7 for odd hundreds or part thereof
68	do	11000	11500	do do
69	do	11500	12000	do do
70	do	12000	12500	(Rs. 8 do do
71	do	12500	13000	do do do
72	do	13000	13500	do do do
73	do	13500	14000	do do do
74	do	14000	14500	do do do
75	do	14500	15000	do do do
76	do	15000	15500	(Rs. 9 do do
77	do	15500	16000	do do do
78	do	16000	16500	do do do
79	do	16500	17000	do do do
80	do	17000	17500	do do do
81	do	17500	18000	do do do
82	do	18000	18500	do do do
83	do	18500	19000	do do do
84	do	19000	19500	do do do
85	do	19500	20000	do do do
86	do	20000	20500	do do do
87	do	20500	21000	do do do
88	do	21000	21500	do do do
89	do	21500	22000	do do do
90	do	22000	22500	do do do
91	do	22500	23000	do do do
92	do	23000	23500	do do do
93	do	23500	24000	do do do
94	do	24000	24500	do do do
95	do	24500	25000	do do do
96	do	25000	25500	do do do
97	do	25500	26000	do do do
98	do	26000	26500	do do do
99	do	26500	27000	do do do
100	do	27000	27500	do do do
101	do	27500	28000	do do do
102	do	28000	28500	do do do
103	do	28500	29000	do do do
104	do	29000	29500	do do do
105	do	29500	30000	do do do
106	do	30000	30500	do do do
107	do	30500	31000	do do do
108	do	31000	31500	do do do
109	do	31500	32000	do do do
110	do	32000	32500	(Rs. 10 do do
111	do	32500	33000	do do do
112	do	33000	33500	do do do
113	do	33500	34000	do do do
114	do	34000	34500	do do do
115	do	34500	35000	do do do
116	do	35000	35500	do do do
117	do	35500	36000	do do do
118	do	36000	36500	do do do
119	do	36500	37000	do do do
120	do	37000	37500	do do do
121	do	37500	38000	do do do
122	do	38000	38500	do do do
123	do	38500	39000	do do do
124	do	39000	39500	do do do
125	do	39500	40000	do do do
126	do	40000	40500	do do do
127	do	40500	41000	do do do
128	do	41000	41500	do do do
129	do	41500	42000	do do do
130	do	42000	42500	do do do
131	do	42500	43000	do do do
132	do	43000	43500	do do do
133	do	43500	44000	do do do
134	do	44000	44500	do do do
135	do	44500	45000	do do do
136	do	45000	45500	do do do
137	do	45500	46000	do do do
138	do	46000	46500	do do do
139	do	46500	47000	do do do
140	do	47000	47500	do do do
141	do	47500	48000	do do do
142	do	48000	48500	do do do
143	do	48500	49000	do do do
144	do	49000	49500	do do do
145	do	49500	50000	do do do
146	do	50000	50500	do do do
147	do	50500	51000	do do do
148	do	51000	51500	do do do
149	do	51500	52000	do do do
150	do	52000	52500	do do do
151	do	52500	53000	do do do
152	do	53000	53500	do do do
153	do	53500	54000	do do do
154	do	54000	54500	do do do
155	do	54500	55000	do do do
156	do	55000	55500	do do do
157	do	55500	56000	do do do
158	do	56000	56500	do do do
159	do	56500	57000	do do do
160	do	57000	57500	do do do
161	do	57500	58000	do do do
162	do	58000	58500	do do do
163	do	58500	59000	do do do
164	do	59000	59500	do do do
165	do	59500	60000	do do do
166	do	60000	60500	do do do
167	do	60500	61000	do do do
168	do	61000	61500	do do do
169	do	61500	62000	do do do
170	do	62000	62500	do do do
171	do	62500	63000	do do do
172	do	63000	63500	do do do
173	do	63500	64000	do do do
174	do	64000	64500	do do do
175	do	64500	65000	do do do
176	do	65000	65500	do do do
177	do	65500	66000	do do do
178	do	66000	66500	do do do
179	do	66500	67000	do do do
180	do	67000	67500	do do do
181	do	67500	68000	do do do
182	do	68000	68500	do do do
183	do	68500	69000	do do do
184	do	69000	69500	do do do
185	do	69500	70000	do do do
186	do	70000	70500	do do do
187	do	70500	71000	do do do
188	do	71000	71500	do do do
189	do	71500	72000	do do do
190	do	72000	72500	do do do
191	do	72500	73000	do do do
192	do	73000	73500	do do do
193	do	73500	74000	do do do
194	do	74000	74500	do do do
195	do	74500	75000	do do do
196	do	75000	75500	do do do
197	do	75500	76000	do do do
198	do	76000	76500	do do do
199	do	76500	77000	do do do
200	do	77000	77500	do do do
201	do	77500	78000	do do do
202	do	78000	78500	do do do
203	do	78500	79000	do do do
204	do	79000	79500	do do do
205	do	79500	80000	do do do
206	do	80000	80500	do do do
207	do	80500	81000	do do do
208	do	81000	81500	do do do
209	do	81500	82000	do do do
210	do	82000	82500	do do do
211	do	82500	83000	do do do
212	do	83000	83500	do do do
213	do	83500	84000	do do do
214	do	84000	84500	do do do
215	do	84500	85000	do do do
216	do	85000	85500	do do do
217	do	85500	86000	do do do
218	do	86000	86500	do do do
219	do	86500	87000	do do do
220	do	87000	87500	do do do
221	do	87500	88000	do do do
222	do	88000	88500	do do do
223	do	88500	89000	do do do
224	do	89000	89500	do do do
225	do	89500	90000	do do do
226	do	90000	90500	do do do
227	do	90500	91000	do do do
228	do	91000	91500	do do do
229	do	91500	92000	do do do
230	do	92000	92500	do do do
231	do	92500	93000	do do do
232	do	93000	93500	do do do
233	do	93500	94000	do do do
234	do	94000	94500	do do do
235	do	94500	95000	do do do
236	do	95000	95500	do do do
237	do	95500	96000	do do do
238	do	96000	96500	do do do
239	do	96500	97000	do do do
240	do	97000	97500	do do do
241	do	97500	98000	do do do
242	do	98000	98500	do do do
243	do	98500	99000	do do do
244	do	99000	99500	do do do
245	do	99500	100000	do do do
246	do	100000	100500	do do do
247	do	100500	101000	do do do
248	do	101000	101500	do do do
249	do	101500	102000	do do do
250	do	102000	102500	do do do

(3). The above scale is conditional on the blocks of land being approximately square in shape. In the case of blocks having very irregular boundaries or being long and narrow in shape the fee shall be determined by the Chief Surveyor. The fee charged shall be based on the length of the perimeter.

(4). An extra charge may be made for survey in case of land situated at a greater distance than 20 miles from the Uganda Railway to cover the cost of the transit. Such charges shall be determined by the Chief Surveyor.

CHIEF SURVEYOR'S OFFICE,
NAIROBI,
EAST AFRICA PROTECTORATE.
December 30th, 1904.

RAPID ALLOTMENT REPORT

by

DIRECTOR OF SURVEYS.

----oOOo----

DELAYS IN LAND SETTLEMENT.

In past years, in fact ever since white settlement in the country commenced, the great difficulty which had to be contended with by the Administration, the greatest cause indeed of complaint by would-be settlers, was the long delay which occurred in settlers getting on the land. I have in previous reports analysed the causes of these delays at considerable length, and I will only mention here one, perhaps the most important, namely an insufficiently staffed survey department. The surveys of properties were always long in arrears, and as a consequence surveys when done, had to be done in a hand to mouth manner which negatived systematic work by sheets, and was open to various other technical objections, gravely discounting the accuracy and general utility of the surveys.

It was strongly felt by myself and others that the only satisfactory solution was to mark out farms first, and then when sufficient numbers of farms had been marked to allow applications for particular farms. This is easy enough to do where a country is completely mapped but by no means so easy when this is not the case, and when information

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as to the capabilities of the soil etc., is extremely defective.

LAND BOARD

RAPID ALLOTMENT. The question of adopting a system of rapid allotment was mooted in the Land Board and in due course a fair trial of the system was agreed to by superior authority.

I quote the resolutions of the Land Board:

"Adjourned meeting of Land Board, Tuesday September 10th, 1907".

(1) "The question of rapid allotment of farms being brought before the board, it was unanimously resolved to recommend that:-

i. Farms be marked off in approximate areas properly defined by permanent numbered beacons.

ii. That the farms so marked be described by beacons and not by acreage and be alloted as a farm.

iii. That on application being made for such a farm a deposit be made on a scale to be decided by the Honourable the Commissioner of Lands.

v. That the alloteee of farms shall have the option to have the survey of his land made by a licensed surveyor or the Government Survey Department on his application when convenient to the Department; that if the survey be made by a licensed surveyor the diagram shall be submitted to the Director of

of Surveys who, if he approves same, shall countersign such diagram, and the document shall then be treated as if compiled by a Government Department.

vi. The expense of survey shall be met from the deposit so far as the amount of the latter will admit; the fees charged by the Government Survey Department shall be notified by authority from time to time for the information and guidance of the public, but it is to be understood that such fees as fixed by Government with regard to Government work are not binding on persons employing licensed surveyors.

vii. That the sum to be deposited by the would-be settler be a moderate sum to be fixed independent of the area applied for, and the board recommend that such sum shall not exceed £10.

viii. That no title be given to a settler until survey fees be paid; and that in future settlement, the rent of the farm be payable from the date of receipt of Temporary Occupation Rights, the right to the land to date from the day such rent is calculated.

ix. That the rent should be fixed on each farm and be subject to reassessment eventually according to the acreage when accurate survey is completed, but the acreage is nowhere to be stated in the Occupation Deed.

x. That no repayment of rent for error in areas be made.

xi.

xi. That the round sum of £5000 be placed on the estimates to be disbursed by the order of the Honourable the Commissioner of Lands among the departments concerned to meet the expenses of rapid allotment.

xiv. That a resident Inspector of Farms be appointed after consultation with the Land Board in each of the following Provinces, viz., Kenya, Ukamba, Seyidie, Naivasha and Kisumu, and that one inspector be appointed to the Tanaland and Jubaland Provinces: that the duties of these Inspectors shall be to shew the beacons of farms to applicants, to grant Temporary Occupation Rights and to perform all such duties in connection with land as have hitherto devolved on the Provincial Commissioner, and that until this be carried out three Inspectors be immediately appointed and that one of the three have his headquarters at Mombasa.

xvi. That the Allotment Board consist of:-

1. Director of Surveys or his representative
2. The Land Officer do do do
3. Chief Conservator of Forests do do
and 4. Director of Agriculture do do do
and 5. one practical farmer, provided the services of a non-official member of the Land Board cannot be secured, and the services of the latter are remunerated.

RINCIPLES

PRINCIPLES LAND BOARD RECOMMENDATIONS.

The principles underlying these recommendations are quite simple.

It matters far more to a settler to get on the land quickly and to know his boundaries or beacons with certainty than to obtain an exact number of acres.

The beacons or boundary marks must be well constructed and practically permanent, they must be difficult to move fraudulently and not liable to destruction by wild beasts or grass fires. Such beacons must be the final boundary marks for title and not any definition by area or by diagram. Hence the provision that acreage should not be mentioned in the deeds and the provision for subsequent surveys.

INDEX MAP.

At the same time an index map is necessary to shew the relative position of the farms and to avoid confusion in numbering them.

I shall explain my action as to this index map and the extent to which it can be relied on at length later on in this report.

FARM BEACONS.

Dealing first with the class of beacons which were erected. I shew how I arrived at its design.

The farm beacon consists, as will be seen from the diagram, of a hardwood pole about six feet long and six inches diameter at the butt. This is planted in a hole 18 inches deep at the bottom of which

UABIN GISHU PLATEAU
(Rapid Allotment)

FARM BOUNDARY BEACONS

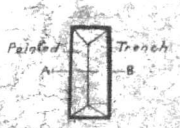
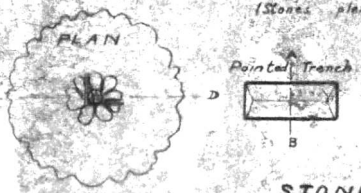
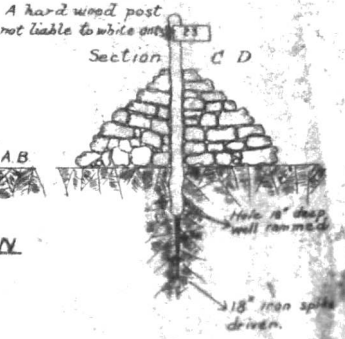


DIAGRAM 1.
(Stones plentiful)





STONE BEACON

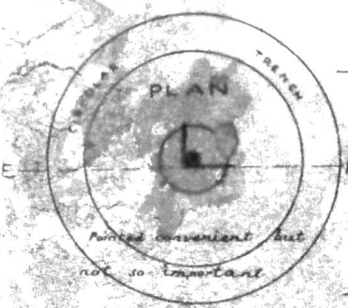
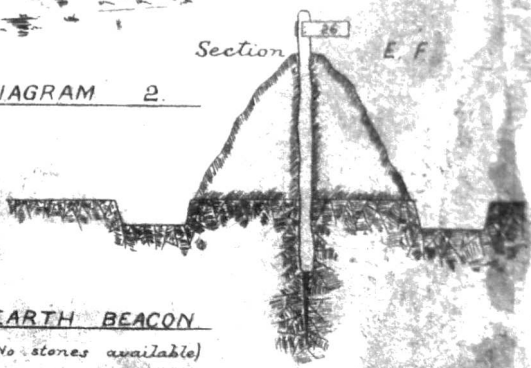
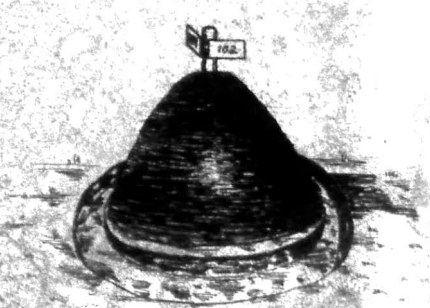


DIAGRAM 2.



EARTH BEACON
(No stones available)



Making a Path Boundary Beacon

Making a Farm Boundary. Page 208.

which an iron peg has been driven. The top end is roughly squared and small iron plates, painted white, are nailed to them: the numbers of the farm for which it is a boundary are painted on the plates in black, and it is best to paint the number also on the post itself. Stones are heaped round the post making a good cairn about three feet high. Small pointer trenches are dug giving roughly the direction of the boundary lines. Where few stones are available we substituted an earth mound for the stones. We obtained the mound by digging a circular trench. In this case pointer trenches are convenient but not so important.

At first sight this may appear somewhat elaborate. I give the reason for each part of the specification.

The four chief causes of destruction of beacons are white ants, grass fires, wild beasts and fraud.

(a). White ants. The post must be of hard wood resistant to white ants. Wild olive wood is very suitable. I believe Juniper to be equally good. There are others which I do not know. In practice we used wild olive wood almost entirely.

(b). Grass fires. The trench round the earth heaps or the cairn of stones forms some protection. But the iron peg at the bottom of the hole and the iron plates nailed to the top are designed to obviate damage by fires, as they could still be found, even if the post be burnt.

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(c). Wild beasts. A good stout pole is well fixed in the ground, and the cairn or heap of earth should not only add sufficient strength, but should also make the post less attractive to a pachyderm troubled by irritation of the cuticle.

(d). Fraud. The iron peg driven at the bottom of the hole would be troublesome to remove, and might escape the attention of one who had not been informed of its existence. The circular trench in earth beacons or the pointer trenches in stone beacons are especially intended to defeat fraud. A trench is not readily filled in and made good. It would take years for the grass to grow over it again so as to defy detection. If not deliberately meddled with it is practically permanent.

A rather elaborate mark is more formidable to move than a simple post.

Finally the index map should be sufficiently accurate to allow the detection by its means of large alterations in the beacons. I mean movements of more than 100 yards or so.

LINNHAM'S
ASINGISHU
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I now proceed to give a short summary from my diary.

26th January,1906. Mr Arnoldi's waggon with about 6000 lbs of food for porters etc., was despatched from Nakuru. Ten days were allowed for him to reach the edge of the forest where the track to Mr.Van Breda's farm diverges from the Molater Road after

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ITINERARY
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crossing the Mau. It was anticipated that he would have to take double journeys between Ravine station and the edge of the forest. He did not exactly carry out his orders so that a certain numbers of days had to be deducted from his period of serving us.

February 1st. The Director of Agriculture, myself (Director of Surveys), Mr.Scholefield, representing the Land Office, Mr Flemmer, the members of the Rapid Allotment Board, together with Mr.Galbraith (District Surveyor) left their respective starting points by rail for Londiani station.

February 2nd. Reached Londiani met Mr.Cox (Surveyor Trigonometrical Branch). Commenced march to Ravine.

February 3rd. Reached Ravine station. Mr.Fetheringham's cart with six oxen engaged.

February 4th, 5th, 6th. Continued our march and camped clear of forest at commencement of UASINGISHU country on the Teruka river. We decided to commence operations from the South-East instead of from Kidalat, that is to say from the West. This was unavoidable owing to the waggon having gone to the wrong place. It had however the objection that we were starting at a part where I had no trigonometrical points and, in order, to use plane-tables with advantage, points are necessary. I could not immediately establish points.

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February

Camp on march to Usaingishu 11 miles west of Narine on Solater Road.

Camp on Usaingishu Plateau.

February 7th, 8th, 9th, 10th. I, with Mr. Galbraith and Mr. Cox, established sufficient points. Meanwhile Messrs Macdonald, Plemmer and Scholefield marked some farms. Progress was as yet very slow as the plane-tables had not begun work.

February 11th, Mr. Cox began plane-tabling and nearly caught up with the farms marked. Counting from 7th to 11th 5 farms only had been marked in 5 days.

February 12th 13th. Moved camp about six miles to the Lesum river. Mr. Galbraith sent to establish boundaries of Grogan and Lingham concession. Subsequently he was chiefly employed along the Eastern and Northern boundaries working more or less independantly. I may here remark that the great value of plane-table survey began to show itself, without the plane-table we should have wasted time over the Grogan and Lingham boundary. It also enabled us to know the areas closely as we went along. About 9 farms had been marked in 7 days.

February 15th, 16th, 17th. Moved camp KAPMKABUEN river. I was still chiefly occupied establishing points for the plane-table but I began also to assist with marking farms. As time went on I became more and more available for such work until about 24th February I had completed the trigonometrical points, and a second plane-table was always employed. 25 farms marked in 10 days.

February

Discussing the days work.

Finding position of Fayu Boundary beacon with plane-table.

February 18th, 19th, 20th, 21st. At Kapkoi Hill camp. About 24 farms marked in 14 days. On the 21st other work called away the Director of Agriculture. 40 farms were marked in 14 days.

February 22nd, 23rd. Sambul river camp.
48 farms in 16 days.

February 24th, 25th. Ngeriya river camp.
54 farms in 18 days.

February 26th, 27th, 28th, 29th. Ngeriya river 2nd camp near Losiria Hill.
68 farms in 22 days.

March 1st, 2nd, 3rd. Mundopeto river camp.
77 farms in 25 days.

March 4th 5th. El El Daru river camp. (The Mundoreto changes its name to above).
88 farms in 29 days.

March 8th, 9th. Gualgaria river at Nandi border.
110 farms in 31 days.

Among this total of 110 farms are 5 outspans. For one reason or other 33 farm beacons had been omitted by the board in its progress and these were afterwards completed by Mr. Cox.

March 10th. The Allotment Board broke up. Messrs Plowman, Scholefield and Galbraith proceeded by the shortest route to the Railway at Muhoroni and reached their destination on 16th March. Mr. Cox remained to complete the plane-table maps

with

with regards to contours and to put in 33 beacons. I also instructed him to complete his maps to Londiani station in order to show the best road to Uasingishu from that point. He found a road much shorter and better than that by the Ravine station and reached Nairobi on the 9th of April, 1906.

I myself completed certain trigonometrical observations and reached Nairobi on the 19th of March.

RATE OF PROGRESS.

The chief interest attaching to these extracts from my diary concern the rate of progress. It will be noticed that at first we only reached a progress of one farm per diem. So slow was this that the Director of Agriculture thought at one time that the scheme was a failure at any rate so far as the combination of plane-table surveying and rapid allotment was concerned. As soon as Mr.H.Cox had been able to start his plane-table our rate of progress began to mend. Later again when I with my plane-table was available we increased our speed considerably till just before we broke up; as many as 9 or 10 farms were marked in one day.

At first the porters were very slow in erecting beacons, and it was not till several had been built that the headmen could be trusted to complete them, allowing the Europeans to go on to other beacons without waiting till each one was finished. It will be noted that the whole output over the whole period of working days was 110 farms in 31 days, or a rate of 3½ farms per diem.

RATE.

RATE TO BE EXPECTED IN FUTURE.

From this I infer that if two plane-tablers with plane-tables are ready before an allotment board commences work that a rate of about 6 farms a day can easily be attained. 110 farms under these circumstances would require the presence of an "Allotment Board" for only 18 days instead of 31. I shall return to this point in my recommendations for future boards.

ECHNICAL METHODS.

A great part of British East Africa is admirably suited for plane-tabling. Many natural landmarks exist and the clearness of the atmosphere, except when grass fires are numerous, is a very great assistance. For plane-tabling with rapidity and accuracy it is necessary to have a good number of points fixed. For this purpose Triangulation is much the best and the quickest method of fixing points.

In the case of the Uasingishu a small theodolite (3 inch) was used. With such an instrument triangles, when beacons have been erected, can be measured with mean triangular errors of about 24" which is sufficiently accurate for plane-tabling on the 1/62,500 scale (about 1 inch to 1 mile.)

A lesser degree of accuracy is obtained when a hilltop with no conspicious mark on it is measured; b[illegible] the accuracy is still good enough for a map on the scale given.

CAUSES OF ERROR.

CAUSES OF ERROR. With a sufficient number of points so fixed, which should of course be connected to the main triangulation of the country, the principal errors occurring in plane-tabling are due to plotting errors and irregular expansion and contraction of the paper. The latter cause can be eliminated to a considerable extent by properly mounting the paper. Plotting errors may amount to 100 feet on the scale adopted. The probable error of points fixed by plane-table, such as farm boundaries, would be somewhat greater; perhaps 150 feet in any direction. I have not so far from these premises rigidly solved the problem of what is the probable error in area to be expected; but I think I shall be on the safe side if I say that the probable error of area is not likely to be greater than about one per cent. I should perhaps explain for those who are un acquainted with the mathematical theory of errors that if the probable error in each of the 110 farms is 1 % you would have errors of less than 1 % in about 55 farms; about 35 would have errors greater than 1 % but less than 2 % ; about 15 would have errors between 2 % and 3 %, about 4 would have errors between 3 % and 4 % whilst only one would have an error of over 4 % .It is extremely unlikely that any farm in the whole series would have an error of over 5 %.

Errors of this class appear to me to be small enough to give a man, taking up a farm, a very good idea of its area for agricultural purposes, and for the immediate assessment of rents.

I

440

I do not consider however the errors are sufficiently small to make final survey at a later date unnecessary. From the Survey point of view the great advantage of the system is that it frees the Survey Department from any necessity for immediate final survey before it is prepared to undertake such survey in a regular manner in systematic sheets.

In this connection it must be remembered that a great deal of the so-called final survey which has been done in the past will require redoing, and that I am by no means prepared to guarantee a higher accuracy in many such surveys, which are unconnected and consequently incompletely checked.

FOREST.

Inside the areas marked for farms there is a good deal of timber in small patches and scrub. This timber will be most useful to the farmer, but there is not enough to make it worth while to exclude any of these areas except in two cases. Farms No.86 of about 2420 acres and No.84 of about 2720 acres contain about 1450 acres and 1270 acres of forest respectively. These two farms are contiguous so that this forest consists of about 2720 acres. I very much doubt whether it would pay the Government to work these forests as forests. I expect it would be better to keep them as farms. It would seem necessary to consult the Forest Department.

ANS OF ACCESS
O UASINGISHU.

At present access to the new farms laid out in the Uasingishu is obtained by a rather round-about

round-about route if wagons are taken. It is necessary to proceed via Londiani Station or Nakuru Station on the Railway to Eldama Ravine and thence over the Mau by the Solater road which passes a few miles South of the nearest farms. A trifling expenditure can very much shorten and improve the access. The best way will be to proceed from Londiani station 7½ miles along the present road to Eldama Ravine; then turning westwards to climb the leading spur to Timboroa, and passing near the summit of that mountain to leave Wath Lake to the eastwards and join the Solater Road near the Lake. The distance from the point where the Londiani - Ravine road is left up to the point where the Solater road is joined is 11½ miles. I do not advocate at present the construction of an expensive road. The track recommended requires no forest cutting. I think that £50 spent on the improvements of a few bad places would suffice. For the rest a wagon driven up and down a few times would mark the road sufficiently for others to follow. Further on a few drifts or bridges on the track leading northwards to Van Breda's farm and some improvement in the alignment of the descents to the Losum river would be valuable. I should think £100 would cover the necessary work.

CONSIDERING IMP-
OVEMENT £150.

I strongly recommend that the suggested improvements at an outlay of £150, as stated above, should be made.

COST

COST OF WORK.

I have analysed the expenses of the Uasingishu Rapid Allotment according to Departments, but showing the expenses of the "non-Official member" separately, I have also separated railway expenses because they would vary much according to the locality chosen. They are higher in this particular case than they usually would be elsewhere.

I add a column showing an estimate of what would have been the effect on expense if we had followed the improved methods which I recommend in the light of the experience gained. I should add that these figures are not exact as certain charges of minor amounts are outstanding.

	Actual Expenditure	Estimated Revised Methods
Survey Department	5078	5078
Agriculture "	1874	1300
Land Office	1310	800
Non-Official	1413	700
Railway expenses	1616	1616
Rupees:	11291	9294
110 areas were marked of which 3 were outspans. Cost per farm	108	84
The average area was acres 2550, cost per acre	4 cents	3.3 cents

For the sake of comparison the present schedule rate of survey fees for a farm of 2550 acres is

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is Rs:340. The average cost per acre of farm survey last year done by the Cadastral Branch was 17 cents.

The average cost of cadastral survey of a farm of 2550 acres would have been last year about Rs:433.

These farms have cost us on the average Rs:102 already. The question has been asked will subsequent final survey be cheapened so much as to allow of its being done for the difference between the cost of rapid allotment and survey fees according to schedule rates: that is to say at an average rate of Rs:331. Taking cost of cadastral survey only I am sure that it can be done. The advantage of having good beacons erected and a good topographical map are very great. If trigonometrical operations are included in the cost the question is altered and I think the costs would be rather greater. But it must be remembered that we shall eventually get maps of far higher quality than the cadastral plans of the past.

In future operations where the surveyors have a start of an allotment board I plan making the triangulation of good secondary quality. In such case no more trigonometrical operations would be necessary at a later date.

SUGGESTIONS FOR FUTURE.

I now proceed to describe certain improvements which I think can be made in future schemes of Rapid Allotment. These improvements would chiefly act in direction of reducing cost.

The Honourable Commissioner of Lands would first

first arrange the preliminaries by selecting an area for work with due regard to the requirements of applicants, natives, forests, agriculture, survey and the Land Board. In general the needs of survey would be met by chosing areas as far as possible fitting in with the general programme of topographical sheets for the Protectorate, and the nearer the area selected be to the main triangulation which has been finished the better.

A party of three representatives of the Survey Department would then proceed to the spot and erect semi-permanent trigonometrical beacons all over the country to be surveyed from 5 to 10 miles apart according to the class of country. They would also erect such beacons as might be necessary to connect with the main triangulation of the country. One member of the party would commence observing as soon as the other two had erected his forward beacons. And he compute his positions as he went along. He would use a five or six inch theodolite. The other two as soon as they had finished erecting the necessary beacons would return to the theodolite observer and getting from him the positions that were ready would commence plane-tabling. They would pay special attention to the correct delineation of the rivers, and seeing that they were going over the country again would not delay their work by completing the contours.

The Allotment Board proper would assemble on the ground. The theodolite observer would conveniently represent the Director of Surveys. The Director of Agriculture (and I think this

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officer should usually attend himself), a representative of the Land Office, a member of the Land Board and if necessary a representative of the Forest Department would assemble as before. They would, as before, examine the country and put in the farm beacons. With two plane-tablers ready this should lead to rapid work.

A fortnight or three weeks including journey would complete their labours. Very likely it would be convenient to leave a few extra farms to be marked by the plane-tablers who would remain behind to finish their work.

There is however a possible alternative; the board might travel through the country at an even more rapid rate, if they only left general instructions to the plane-tablers as to the area of farms and methods of marking, and did not themselves erect beacons. To this course I see two objections; if the board is travelling through the country and marks the Farm beacons, then would always be plenty of labour available as their marches must necessarily be short. Whereas the ordinary porters of two plane-tablers would not supply sufficient labour to erect many Farm beacons each day. In the second place the evidence of independent witnesses i.e. of members of the board might be of great value subsequently in cases of fraud.

I recommend that the board itself erect the beacons or a large proportion of them.

METHODS

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In the Umsingishe water was plentiful and the rivers were so close together that we usually laid out farms with two water frontages and they stretched from river to river. This method has the advantage that by walking along the river the farm beacons are easily picked up. It has however two rather serious objections. Fencing will doubtless be necessary and a river boundary is an awkward one to fence. In nearly every case the rivers were not boundaries in the sense of being impassable; nearly everywhere they could readily be crossed. In the second place it is easier to fix on a plane-table a point on a spur of a ridge than a point near a stream.

I think that where the rivers are sufficiently closely spaced to admit of reasonably shaped farms being laid out with the rivers running through the middle of them it would be best in future to adopt this arrangement. I do not refer to large unfordable rivers.

I do not like to close my report without alluding to some irresponsible gossip which, I believe, was current at the time. Our expedition was alluded to as the "UMSINGISHU PICNIC"&c., Such gossip was unjust. 110 farms cannot be properly marked in 31 days without hard work. We usually started soon after sunrise, and seldom got back to camp before sunset.

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(Signed) G.E.Smith
Major R.E.
D.S.

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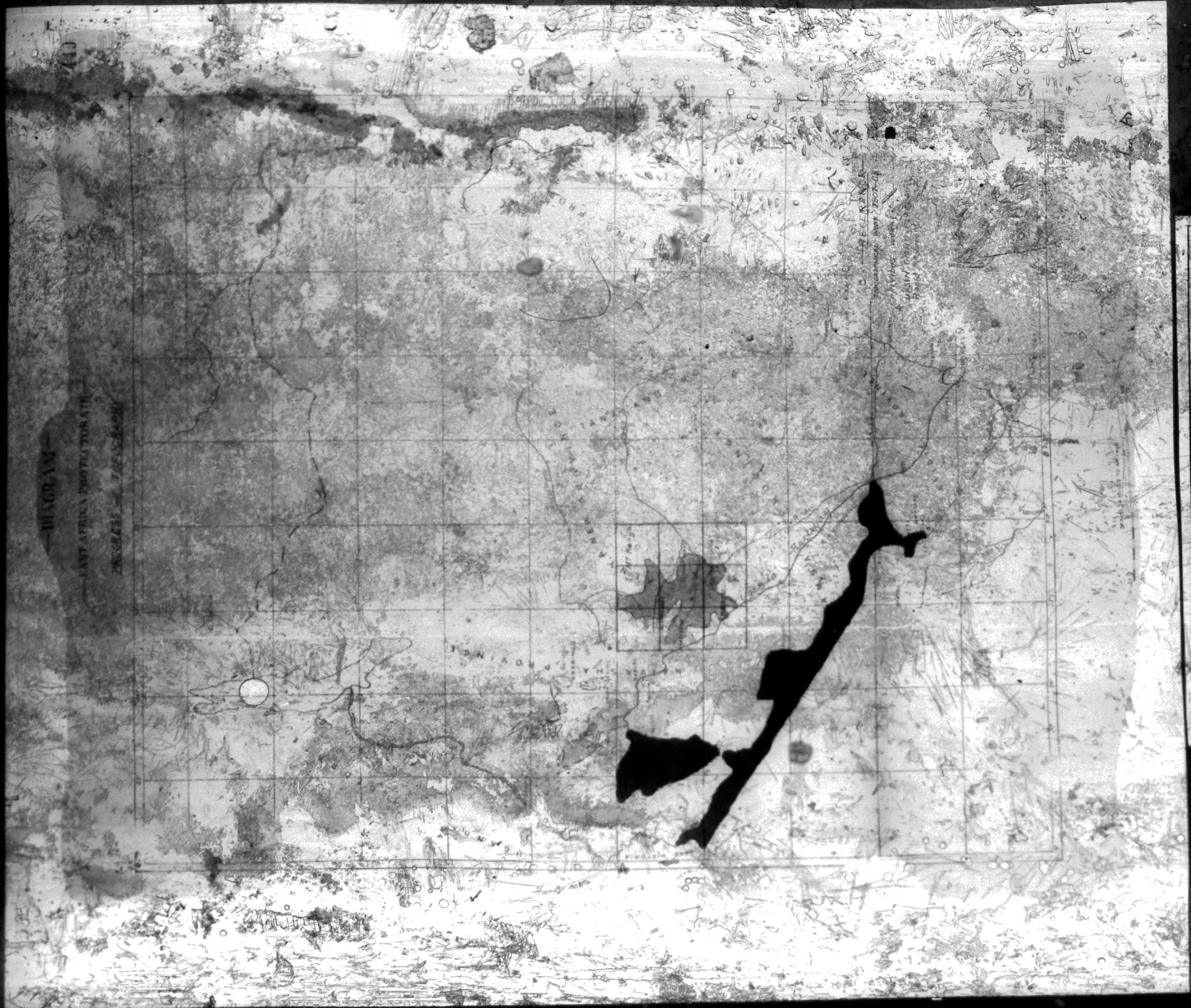
(Signed) G.E.Smith
Major R.E.
D.G.S.

—DIAGRAM—

EAST AFRICA PROTECTORATE

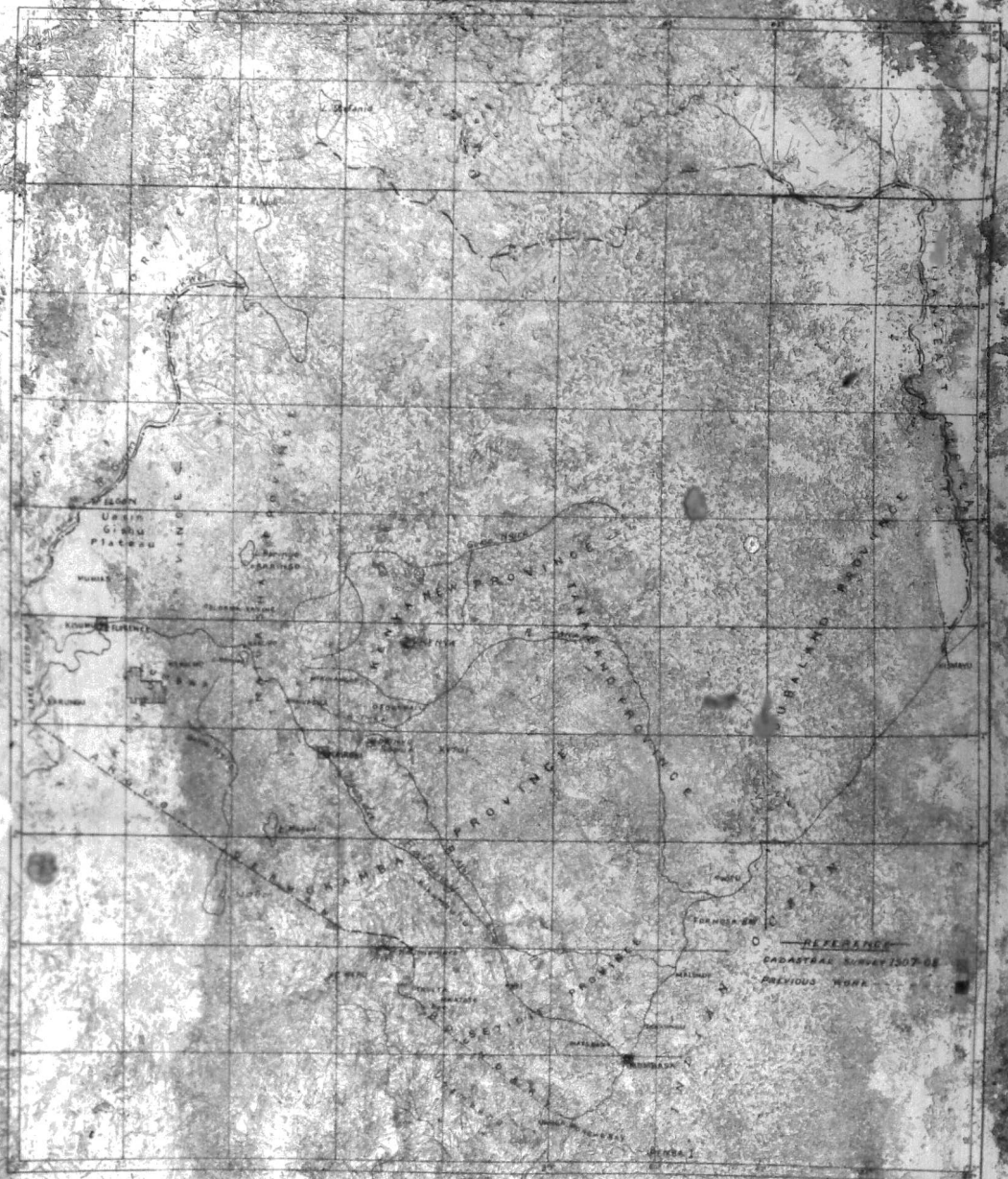
SHOWING TRIANGULATION



DIAGRAM

EAST AFRICA PROTECTORATE

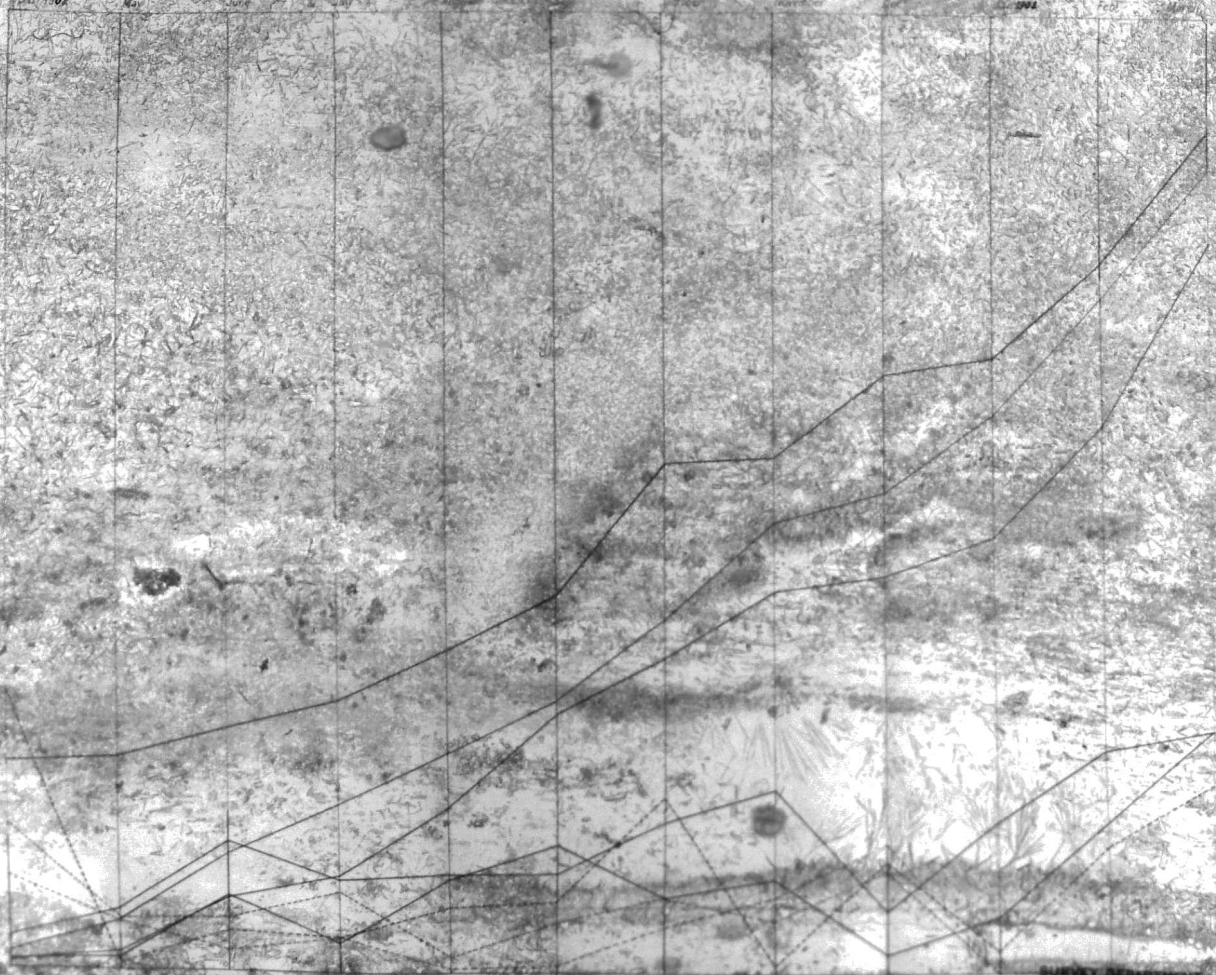
SHOWING CADASTRAL SHEETS



April 1908.

RETURN DIAGRAM

Financial [illegible] 1907-8.



SURVEY DEPARTMENT,
CADASTRAL BRANCH,
East Africa Protectorate.