

ANNUAL REPORT

ON THE

SURVEY OPERATIONS IN BENGAL

DURING THE YEAR

1900-1901.

From 1st October 1900 to 30th September 1901.



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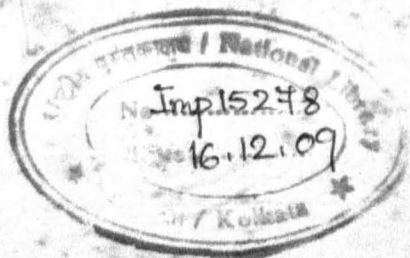
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ANNUAL REPORT
OF
THE SUPERINTENDENT OF PROVINCIAL SURVEYS, BENGAL,
ON THE
SURVEY AND RECORD OF RIGHTS OPERATIONS IN BENGAL
DURING THE YEAR 1900-1901.

No. $\frac{2759}{R-7-65}$.

FROM CAPTAIN R. T. CRICHTON, I.S.C.,

Superintendent of Provincial Surveys in Bengal,

TO THE SECRETARY TO THE BOARD OF REVENUE, LOWER PROVINCES.

Dated Dinapore, the 9th November 1901.

SIR,

I HAVE the honour to submit the Report on the Survey Operations in Bengal during the past survey year, namely, from the 1st October 1900 to 30th September 1901.

Major G. B. Hodgson, I.S.C., was in charge from the 1st to the 8th of October, and Captain A. Mears, I.S.C., officiated from the latter date until the 6th November, when, on my return from furlough to Europe, I took over and held charge for the remainder of the period under report. During the year the title of my office has been changed from Superintendent, Settlement Surveys, to Superintendent, Provincial Surveys.

CHAPTER I.

GENERAL REMARKS.

Outturn of work and expenditure.

2. The outturn of work accomplished is given in detail in Appendix I of this report.

The following tabular statement gives the outturn in square miles:—

DIVISION.	District and estate.	Traverse survey.	Cadastral survey.	Record-writing.	Topographical survey.
1	2	3	4	5	6
TEMPORARILY-SETTLED AND GOVERNMENT ESTATES.					
<i>Major settlements.</i>					
Bhagalpur	Sonthal Parganas (Damin-ikoh Government estate).	735(a)	...	...	...
PRIVATE ESTATES.					
<i>Major settlements.</i>					
Bhagalpur	Monghyr	747	741	729	26
Patna	{ Patna	60	56	56	11
	{ Darbhanga	64(b)	413	597(c)	...
Bhagalpur	Purnea	728	...	...	...
Patna	Gaya (Maksudpur estate) ...	128	...	...	...
Dacca	Backergunge	608	33	33	...
Chota Nagpur	Singhbhum (Porahat, Kera, Chainpur, and Bandgaon Estates).	540	...	...	...
<i>Miscellaneous.</i>					
Patna	{ Champaran	84	...	...	84
	{ Darbhanga (Madhubani Municipality).	1	1	1	...
Rajshahi	Jalpaiguri (Baikantapur estate boundary survey).	...(d)	...	...	...
	Total	3,696	1,244	1,416	121

(a) Includes 166 square miles of jungle blocks and Paharia villages, also 2 square miles surveyed in the area returned as jungle blocks last season.

(b) Retraversing to relay stations of 1895 lost.

(c) The excess of record-writing over survey is on account of completion of the area surveyed only during previous season.

(d) Traversing of 97 linear miles for demarcation purposes.

A comparison of the outturn with the programme, as originally sanctioned, shows the following differences:—

(a) In Monghyr 147 square miles more than was originally intended have been traversed. In cadastral survey 191 square miles and in record-writing 179 square miles more than was anticipated have been accomplished. In topographical survey 175 square miles less than was anticipated has been dealt with.

(b) In Patna 60 square miles, for which no allowance was originally made, have been traversed in the *diara* area adjoining the Monghyr district. Also 56 square miles of cadastral survey with records and 11 square miles of topographical survey, for

- neither of which any allowance had been made, have been accomplished.
- (c) In the Sonthal Parganas the area traversed exceeds the programme by 35 square miles.
 - (d) In Backergunge the area traversed exceeds programme by 8 square miles and 33 square miles of cadastral survey with records, which were added to the programme in the middle of the season, have been accomplished.
 - (e) In the Maksudpur estate the traverse area has proved to be 22 square miles less than that originally reported as for survey.
 - (f) In Purnea the traverse area of the Surjapur pargana has also proved to be 22 square miles less than that originally reported.
 - (g) In Darbhanga the cadastral area has proved to be 31 square miles more than was anticipated.
 - (h) In Singhbhum the original programme, before the addition of Anandapur, was 595 square miles, of which 540 have been accomplished.

The foregoing are the only differences of any importance. As regards (a), there was a misunderstanding between the Survey and Settlement Departments as to the programme in Monghyr. The Settlement Department was under the impression that the survey and record-writing of North Monghyr and its adjoining *diara* tract would be completed by October 1902, but the survey programme made this quite impossible. The above fact having been pointed out, the Board approved of the revised programme. The difference between the cadastral and topographical areas, as originally estimated and actually accomplished, is due to the fact that, owing to the changes in the course of the Ganges river, it is impossible to state, until the traverse survey has been accomplished, how much area must be undertaken, in order to comply with the orders to survey up to the southern high bank. Again, even when this stage has been arrived at, it rests with the Settlement Department (guided, of course, by the rules as to survey of Government estates and villages partially and entirely included in the *diara* tract) to direct how much of the *diara* area is to be surveyed cadastrally and how much topographically.

As regards (b), the areas surveyed in district Patna, the foregoing remarks also apply, as this tract has been dealt with in connection with the Monghyr *diara* work, and my predecessor could not possibly have foretold that the southern high bank of the Ganges would extend so far into the Patna district.

The other differences in the traverse areas in Backergunge and Purnea and the cadastral area in Darbhanga are due to the programmes only giving approximate areas for the tracts to be surveyed. The extra cadastral area in Backergunge was sanctioned by Government during the course of the field season.

In Singhbhum the traverse survey of the Anandapur estate was sanctioned after the original programme had been approved, but owing to the ill-health of the establishment, and owing to the great proportion of the establishment having only lately been trained, it was impossible to deal with this further area, and I was unable, owing to the pressure and greater urgency of traverse surveys elsewhere in Bengal, to supplement the establishment during the field season.

The foregoing remarks show that the programme has been worked up to in full in all districts except Singhbhum, and the grand total of the area accomplished in Bengal exceeds the total of the original programme by 151 square miles of traverse, 311 square miles of cadastral survey, and 299 square miles of record-writing. Against these figures, there is only a minus quantity of 164 square miles of topographical survey which is a very small deficit when compared against the plus items, more especially so as the cost and intricacy of topographical work is far less than that of cadastral.

3. The expenditure incurred during the year is given in Appendix II, and the following statement shows the cost rate per square mile for each class of work, inclusive of shares of the controlling office and the 4 per cent. charge for instruments. Under the recent orders of the Government of

India, the charge, for instruments is not made against the following survey operations, the expenditure of which falls under the head of Imperial, viz., Singhbhum and Champaran:—

DISTRICT.	COST RATE PER SQUARE MILE.			
	Traverse.	Cadastral.	Record-writing.	Topographical survey.
1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.
Sonthal Parganas	55·4	...	...	...
Monghyr and Patna	29·4	70·9	58·2	16·0
Darbhangha ... ..	...	94·0	95·2	...
Purnea	38·4	...	...	...
Gaya-Maksudpur estate	39·8	...	...	...
Backergunge	75·2	...	...	...
Singhbhum	55·9	...	...	...
Champaran	46·2	...	...	61·3

The cost rate for traversing in the Sonthal Parganas, viz., Rs. 55·4 per square mile, is high, but this is due to the very difficult nature of the country in the Damin-i-koh and to the great amount of sickness amongst the establishment.

The traverse cost rate of Rs. 29·4 per square mile for Monghyr and Patna is satisfactory, and is due to the large area accomplished by the North Bihar traverse section and the consequent low incidence of cost of control per square mile. The rate of Rs. 129·1 per square mile for cadastral survey and records in Monghyr and Patna is satisfactory, and compares well with the cost-rates of previous season's work in Bihar. The low rate is attributable to the large area accomplished, viz., 797 square miles and to the larger size of the average field, viz., 0·59 of an acre. The cost rate for topographical is also good. The work was very simple and amounted to practically only a boundary survey with few details.

The cost rate for Darbhanga of Rs. 189·2 per square mile for cadastral survey and records is high. The rate of Rs. 94 for cadastral survey, however, includes the bringing up to date of 186 square miles surveyed during the previous season but not khanapuried, and another reason of this high rate is the restricted programme, i.e., only 413 square miles remained to complete the Darbhanga district. The high rate for record-writing, as compared with Monghyr work, is accounted for by the much smaller fields (only 0·35 of an acre) of Darbhanga. The outturn was also only 597 square miles as compared with the 785 of Monghyr and Patna. The cost-rate of Rs. 38·4 for traversing in Purnea is, I think, fair considering the unhealthiness of the tract surveyed. It should also be remembered that the cost of moving the camp and establishment to Purnea is included in this rate.

The rate of Rs. 39·8 for the Maksudpur traversing is good considering the very scattered nature of the work and the difficulties experienced and time lost in locating the villages of the estate.

The rate of Rs. 75·2 for traverse work in Backergunge is very high. This is accounted for by the fact that this is a newly started survey, and therefore, the cost of tents, office furniture, camp equipment and their transit charges as well as transit charges of establishment and instruments, are included in the expenditure. Also a large number of cylinders for marking stations had been ordered in advance from Ranigauj. Arrangements have been made for the supply of cylinders locally, and none of the foregoing charges will be recurring in future seasons' work, but we cannot expect the cost rates to be as low as in Bihar, because no local labour is available and all *khalasis* have to be imported and then paid at nearly double the Bihar rates

of pay. The nature of the country makes the supply of boats to the surveyors necessary, and this is a heavy item of expenditure. The future cost-rate should be about Rs. 60 per square mile unless the programme is largely increased.

For the cadastral survey and record-writing in the Bamna Estate of the district, I have not computed the cost rates, as this was an experimental survey carried out by a very large establishment for the small area, and the resulting cost rates cannot be any guide for future work.

The cost rate of Rs. 55-9 for Singhbhum traverse work is high. This is due to the difficult nature of the country, excessive sickness amongst the establishment and to the small programme. This section has a full programme in Singhbhum and Ranchi next season and the rates will be lowered very considerably.

The cost rates of Rs. 46-2 and Rs. 61-3 for traverse and topographical surveys in Champaran are, I think, fair considering the difficult nature of the country (which had to be closely contoured), the sickness amongst the establishment and the small programme.

General Principles.

4. The general principles of procedure have not been changed. The survey establishment carries out the traverse and cadastral surveys and also, under the direct instructions and supervision of the Settlement Department, the record-writing. During the recess season the entire field establishment of Inspectors and amins is retained, and each man completes the records and statistical statements of the villages surveyed by him.

The relations between the Survey and Settlement Departments have been most cordial.

Diara Surveys.

5. The experience of the past season has shown the impracticability of traversing the boundaries of villages in *diara* tracts according to the old revenue survey. There are three reasons why in *diara* tracts the revenue survey "mauza" is seldom correctly demarcated: *firstly*, because the changes in such tracts are naturally very great; *secondly*, because where the old boundary ran across sand and waste lands its exact position was of little or no interest to the inhabitants of the adjoining villages, and *thirdly*, because the *diara* survey of 1865 has, in the minds of the inhabitants, superseded the old revenue survey, and consequently the preliminary demarcation conforms generally to that of the *diara* survey. I have therefore decided in *diara* tracts to traverse in future according to the preliminary demarcation found on the ground and to serve out to the line-clearers and theodolite surveyors traces from the 1865 survey (instead of from the old revenue survey as heretofore) to enable them to proceed where they find the demarcation deficient. The usual comparison with the old revenue survey will be made afterwards in office and all differences shown where necessary.

Another difficulty in *diara* tracts which made itself severely felt during the season under report is the uncertainty as to the area to be dealt with and then how much of this area is to be surveyed cadastrally and how much topographically. This uncertainty upsets all programmes and estimates, and I propose to meet it by having traverses run along the high banks of the river immediately after the close of the rainy season. This will give us an idea as to the area to be dealt with some time beforehand and there is no reason why in future *diara* surveys these preliminary traverses, which would be on high ground not liable to riverain action, should not be run a whole season in advance. The second portion of the difficulty cannot unfortunately be met so completely, but as soon as we know the limits of the *diara* tract, by the method indicated above we can allot all Government and temporarily-settled estates contained within this tract, for cadastral survey and thus arrive at some approximation of the areas for cadastral and topographical surveys.

Village site Surveys.

6. During the year under report village sites in Bihar have been surveyed in detail on the 64" scale, each hut being separately and accurately surveyed.

As the hut is, however, linked with its *sahin* or homestead land and is therefore only a *kitta* of the unit of survey, the Board have approved of a proposal to omit the survey of huts except under certain stated conditions. The cadastral survey rules for the coming season have been altered accordingly and particular attention is to be paid that no unnecessary surveying is done on the larger scale. Cheaper contract rates will be paid for village site surveys and a considerable saving in expenditure should be effected.

Training School for Traverse Surveyors.

7. The sudden large increase of the traverse survey programme from 1,379 square miles in 1899-1900 to 3,791 square miles during the past season put a very severe strain on our resources, and although all available experienced surveyors were given employment, it was necessary to employ a number of men who were put through a short course of instruction and then despatched on to field work. The result was a considerable amount of revision work which with a fully trained establishment would not have been necessary. The cadastral programmes were several times in danger during the season owing to delays in the traverse, and it was only by working in the field late into the recess season, that the programmes have been carried out. I proposed to the Board that as the programme for the coming season is even larger than that just accomplished, a training school for theodolite surveyors, chaining *tindals* and line-clearing *tindals* should be formed. This proposal has been approved by Government and the school was opened at Dumka in September under the direct control of Mr. C. S. Gasper, and there are about 40 sub-surveyors and the necessary number of *tindals* undergoing a course of instruction. These men will, at the close of the school, be drafted into the different field parties for the coming season's work. The cost of the school will be met by the field parties to whom the successful students have been appointed. The result, owing to increased efficiency and the expected savings on revision work, should be an almost immediate reduction of cost rates.

Attitude of the Inhabitants.

8. The attitude of the inhabitants to the traverse operation in all districts is described as having been extremely apathetic, except in Singhbhum, where considerable interest was shown and help readily afforded. The Sonthalis are reported to have shown rather more interest than they did last year, but this is not saying much. As regards the cadastral and record-writing operations, the attendance afforded in the Darbhanga district was satisfactory. In Monghyr the numerous petty landlords gave a lot of trouble by non-attendance and attempts to suppress their *raiyats*. The *raiyats*, however, displayed considerable interest and were very anxious to obtain their *parchas*. In Backergunge no active opposition was encountered which, I think, may be considered satisfactory.

Preliminary Demarcation.

9. The preliminary demarcation was, as in previous seasons, carried out by the inhabitants who were warned beforehand by means of notices distributed by the *chaukidars*. The demarcation in Singhbhum and Darbhanga was generally satisfactory. In the uplands of Monghyr, and in Backergunge indifferent, and in the Monghyr *diara*, Purnea and Gaya practically non-existent.

Powers of Officers under the Survey Act.

10. All survey officers in charge of traverse and cadastral operations were gazetted as Assistant Superintendents of Survey under the Survey Act [V (B.C.) of 1875] in the several districts in which they were employed. These powers were very little used except in Monghyr, where 2,676 process-fee notices, aggregating Rs. 2,007, had to be issued, and 161 fines, amounting to Rs. 2,865, had to be levied. All these notices and fines were against the petty landlords. The *raiyats* gave no trouble.

The sum total, for the whole of the survey operations in Bengal, was Rs. 2,850-12 for process notices and Rs. 3,600 for fines. The new form of

notice, intimating to the inhabitants the dates on which their attendance on the *amins* would be necessary, has been again used with success in Darbhanga, but it is hard to say whether it was of much use in Monghyr, probably it served its purpose with the *raiyats*, but the petty landlords entirely ignored it.

Health of Establishments.

11. One of the difficulties of the season has been the unusual amount of sickness amongst the survey establishments. In Darbhanga the health of the establishment has been uniformly good throughout the season, and the same remark applies to Monghyr notwithstanding the prevalence of plague in this district.

In Purnea, Singhbhum, Champaran, and the Sonthal Parganas the establishments suffered severely from fever. At times as many as 50 per cent. of the entire establishment were on the sick list. In Backergunge there was not much sickness to complain of, but two outbreaks of cholera amongst the imported *khalasis* caused some trouble.

Copies of Records.

12. During the season Rs. 3,965-14-4 were deposited by zamindars of the districts under survey, and others for copies of maps and records. Of this amount, Rs. 1,144-6-8 has been deposited in the treasuries as the Government fee or expended on Court-fee stamps and folios, and the balance paid to the copyists and examiners.

Badar Establishments in the field.

13. In order to ensure promptness in dealing with attestation *badars*, by far the greater portion of the *badar* work is now dealt with by small establishments with the field parties, and the cadastral sheets and area statements are kept with the field parties for this purpose until the close of the attestation stage. In all 6,550 *badars*, referring to the previous season's outturn in Darbhanga, have been thus dealt with during the season under report. There are no arrears of work.

Bengal Drawing Office.

14. In January last the control of the Bengal Drawing Office was transferred from the Assistant Surveyor-General to the Superintendent, Provincial Surveys. The steps taken for the reorganisation of this office and the working thereof are noted in the detailed report.

Entry of village names on map and records.

15. In accordance with the decision arrived at in April 1900, the names of villages are not inked upon the cadastral sheets until lists prepared by the Settlement Department at the attestation stage are received. Numerous mistakes in transliteration were at first found in these lists, and they have been attended to by the Settlement Officers concerned.

This work also affects the Bengal Drawing Office, where the maps and records of the past nine years' work will have to be brought into conformity with the new thana village lists. This work is being attended to by the "badar" section of the Bengal Drawing Office.

Recess Quarters.

16. The Behar traverse section and the Singhbhum traverse section recessed at Mussoorie. The Sonthal Parganas and Backergunge sections recessed at the head-quarters of their districts. The Darbhanga cadastral section recessed at Bhagalpur and the Monghyr cadastral section at Digha (Dinapore.) Both these cadastral sections were to have recessed at Bhagalpur, but it was thought advisable for sanitary reasons not to bring two large establishments into the same station. A proposal to locate one of the sections at Monghyr was opposed by the local authorities on account of the prevalence of plague, and finally Digha was decided upon.

Training of Junior Civilians.

17. The following members of the Indian Civil Service were put through a short course of instruction in traverse and cadastral surveys during February last, viz., Messrs. Rainy, Macpherson, Byrne, Peterson, Dunlop, Hazlett and Thomas.

Nepal Boundary.

18. Whenever the season's work has touched on the Nepal frontier, careful comparisons of our work with Colonel Tanner's survey of 1882-83 and with the old revenue survey maps have been made.

The surveys agree well, only one stone prism, No. 15, the site of which was cut away by the Kamla river, had been moved and replaced on more secure ground 373 feet to the west of its original position. An independent survey has been made of this portion of the boundary, and the matter has been referred to the Resident in Nepal, but no reply has as yet been received.

CHAPTER II.

PART I.—REPORTS ON SURVEYS AND RECORDS OF RIGHTS IN TEMPORARILY-SETTLED AND GOVERNMENT ESTATES UNDER SETTLEMENT OF RENTS AND LAND REVENUE.

MAJOR SETTLEMENTS.

SONTHAL PARGANAS DISTRICT.

The traverse survey detachment in this district, under the charge of Mr. H. Dowman until the 10th June 1901 and afterwards under Mr. C. S. Gasper, was employed solely on the completion of the survey of the Government estate of the Damin-i-koh.

Field work commenced on the 18th October 1900 and closed on the 2nd June 1901.

The area accomplished which completes the Damin-i-koh estate consists of 735 square miles, comprising 979 villages and 22 jungle blocks.

The above-mentioned 22 jungle blocks cover an area of 166 square miles, and comprise in addition to forest lands a number of paharia unsettled villages which are not for survey. The area traversed also includes three villages, covering 2 square miles, which fall within the jungle blocks of the previous season's outturn. These villages have now, at request of the Settlement Officer, been traversed in detail.

The preliminary demarcation of village boundaries, which was carried out by the *parganites* under instruction from the Deputy Commissioner, was found satisfactory.

There were 17,723 new traverse stations in the season's work, and for the making of these 1,969 trijunction stones, 6,582 clay cylinders and 9,172 pegs were utilised.

The country traversed was hilly and difficult to work in. The subtense bar method of ascertaining the direct horizontal distances between two traverse stations had to be freely resorted to, as chaining over such rough ground gave very indifferent results. The method which consists of measuring with the theodolite the angle subtended at the station of observation by a horizontal 10-foot bar plumbed over the station mark of the forward station is an accurate but tedious method of arriving at the true distance; for, in order to ensure accuracy, the angle has to be repeated from 20 to 50 times. The progress of the work was much delayed owing to this cause, but the late date of completing the programme was also due to wholesale desertions amongst the establishment. Most of these desertions were undoubtedly due to the unhealthiness of the tract under survey. Practically the whole of the establishment were under treatment for fever in the camp hospital for various periods from four to five times during the season and there were nine deaths.

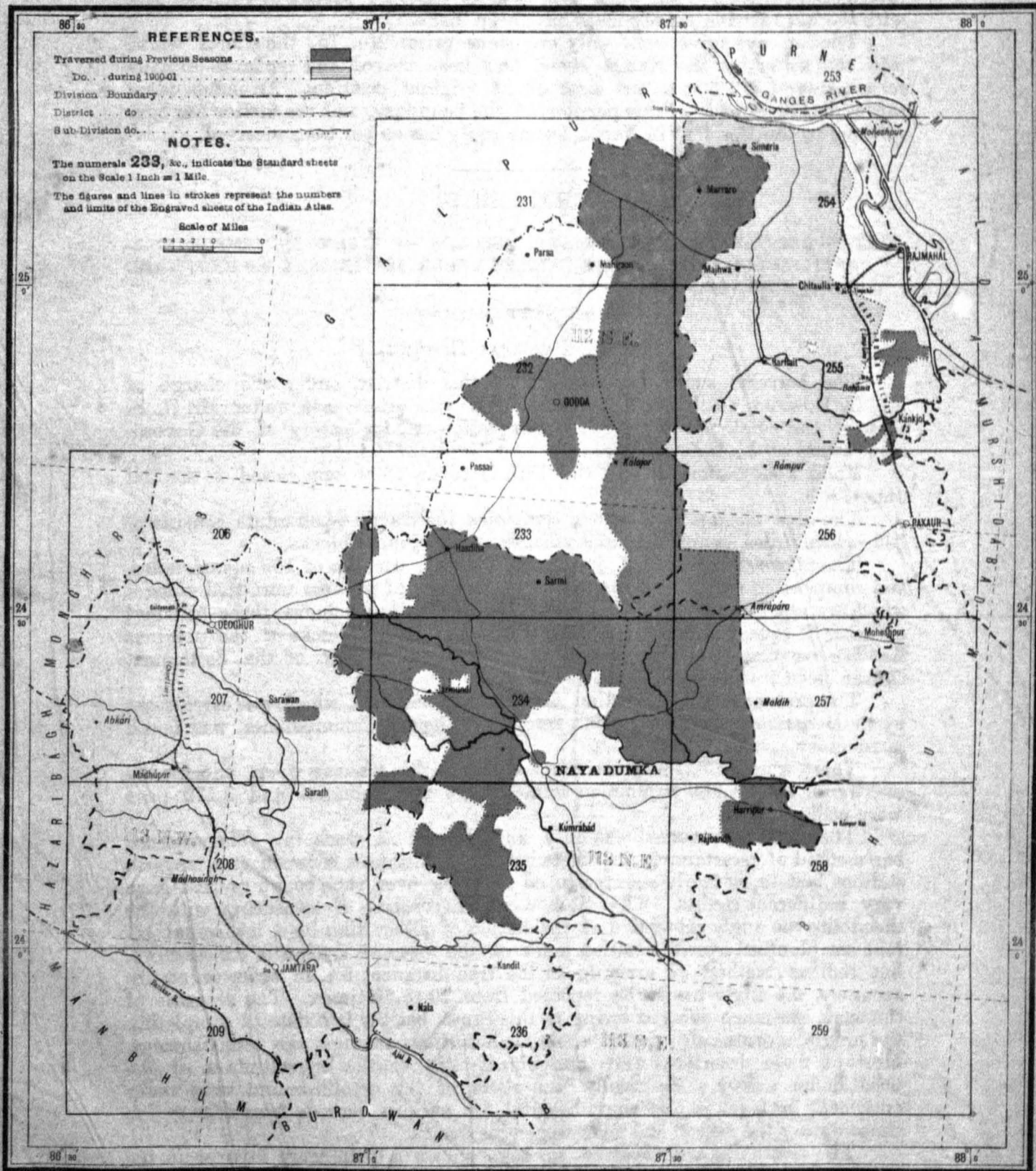
The Sonthalis are reported to have shown a little more interest in the survey proceedings, but the *Paharias*, through ignorance, gave trouble whenever the work touched on their boundaries. However, on the whole procedure being explained to them they permitted the surveyors to go on with their work.

BENGAL SURVEY.

INDEX TO THE TRAVERSE SURVEY IN DIST. SONTHAL PARGANAS.

1900-01.

DETACHMENT.



The plots of the whole season's work have been completed and made over to the Settlement Department. The records have been completed in every respect except that the co-ordinates of the main and sub-circuits have, by my orders, been left in pencil pending an attempt which will be made early next season to connect our traverse work with some stations of the Great Trigonometrical Survey which are situated across the Ganges river. If this attempt at a connection proves successful, we can apply any necessary corrections and close our work finally. If we cannot connect then the work must be inked up and stand on its own merits, as there are no nearer Great Trigonometrical stations available. The usual mathematical tables showing the values of the angular work and the chaining have been compiled and submitted to the Surveyor-General's office. All the work has proved to be well within the percentage of error allowed.

The mean magnetic variation derived from the result of the 140 azimuths observed is $1^{\circ} 46'$ east of the true meridian.

The whole establishment, with the exception of the temporary khalasis who absconded, has worked very well.

The expenditure and cost rates are given in the general remarks at commencement of the report.

PART II.—REPORTS ON SURVEYS AND RECORDS OF RIGHTS IN
PRIVATE ESTATES.

MAJOR SETTLEMENTS.

MONGHYR DISTRICT.

Traverse Survey.

The traverse operations in this district were in continuation of those of the previous season and comprised the traversing of the Ganges *diara* in thanas Tegra and Begusarai for immediate detail survey and the traverse in advance of an upland area in thana Gogri for next season's detail survey.

This programme was undertaken as a part of the work of the North Bihar traverse section under Captain Mears. Field work was commenced on 1st November and the whole establishment was put into the *diara* tract in order to supply the plots for the detail survey at an early date. As this work approached completion the establishment was gradually transferred to the upland tract and thence to Purnea.

The outturn accomplished comprises 453 villages and 747 square miles. Of this, 198 villages and 246 square miles represent the *diara* tract of thanas Tegra and Begusarai, and the balance is the upland area traversed in advance in thana Gogri. The area in thana Gogri excludes 78 square miles of Srinagar-Baneli Raj village which were surveyed in 1887-88, and therefore excluded from the current operations by Government Notification No. 1520L.R., dated 13th March 1901.

In the *diara* tract owing to difficulties in ascertaining the true position of the southern high bank of the Ganges the river circuit was run unnecessarily far in a southerly direction. The tract, afterwards found to have been thus unnecessarily traversed, covers 20 square miles which is included in the total figures of outturn, but the villages contained therein have not been taken credit for. Also an area of 23 square miles of thana Gogri, which the existing map showed as in thana Begusarai was traversed but not immediately surveyed in detail. As this tract is in the *diara* it is very probable that some revisionary work will be necessary therein before the detail survey camp can deal with it next season. The preliminary demarcation of village boundaries carried out by the inhabitants themselves was found to be in the upland tracts very satisfactory on the whole, and to agree well with the old revenue survey. In the *diara* tracts, however, the demarcation was not at all satisfactory. I have referred to this in detail in the general remarks at commencement of this report.

There were 11,790 new stations in the season's outturn of work. Of these, 726 were marked by trijunction stones, 7,892 by cylinder, and the balance of

3,172 by pegs. The pegs were used in the *diara* and on disputed boundaries pending settlement of the disputes. A line of permanent marks has been laid along the southern high bank of the Ganges. This has been effected by embedding trijunction stones at theodolite stations at average intervals of half a mile apart. This line of permanent marks should prove very useful for relaying boundaries hereafter in the *diara* tract.

To check the accuracy of the angular work, 85 observations for azimuth were taken.

The magnetic variation calculated from the results of all the foregoing azimuth observations is $2^{\circ} 03'$ east of the true meridian.

The angular work has proved well and the chaining, on its own merits, is well within the percentage of error allowed, but the results of comparison of the direct distances between three great trigonometrical stations, as given by the great trigonometrical survey and as computed from our traverses, works out to about 15 feet per linear mile which is rather higher than we generally expect. This error does not, however, in any way affect the 16" plots, nor therefore the subsequent detail survey. Nor is the error surprising, considering the inefficiency of a considerable portion of the chaining establishment at the commencement of the season. The programme was much larger than that of the previous season and experienced men were not available. The usual tables of mathematical results showing the value of the angular and chaining work have been compiled and submitted to the Surveyor-General's office.

The progress of the traverse work in Monghyr was slow, and the detail survey camp experienced some inconvenience from the consequent late delivery of plots. The causes of this delay were: firstly, difficulties experienced owing to defective demarcation in the *diara* tract; and secondly, inefficient establishment. I have dealt with both these causes in detail elsewhere in this report under the head of general remarks.

The whole of the computations have been completed and the plots supplied to the cadastral camp concerned. The cost and cost rates will be found in paragraph 3 of this report.

Cadastral Survey.

The cadastral survey with record-writing of thanas Tegra, Begusarai, with the exception of the villages of the Narhan Raj Estate and the Srinagar-Baneli Raj estate which had been previously surveyed in seasons 1895-96 and 1887-88 respectively, was ordered in Government Notification No. 1521L.R., dated 19th March 1901.

The cadastral section under Mr. A. W. Smart commenced field work on the 1st of November 1900 and returned to recess quarters on the 10th May 1901.

The outturn accomplished is given in the following tabular statement:—

Thana.	CADASTRAL SURVEY.			RECORD-WRITING.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Tegra	517	281,851	204	517	281,851	204
Begusarai	655	501,126	478	655	501,126	478
Monghyr	5	7,225	34	5	7,225	34
Lakhisarai	2	2,841	9	2	2,841	9
Surajgarh	1	239	4	1	239	4
Gogri	4	5,916	12	...	...	...
Total	1,184	799,198	741	1,180	793,282	729

The amount of work in above table against thanas Monghyr, Lakhisarai, Surajgarh, and Gogri refers to the *diara* of the Ganges river and was undertaken in order to comply with the instructions of Government to survey up to the southern high bank of the river. The four villages of thana Gogri

surveyed but not *khanapuried* were omitted from *khanapuri* at the request of the Settlement Officer. These four villages form a part of the area referred to in the report on Monghyr traverse as having been traversed under the impression that it belonged to thana Begusarai. The cadastral survey is mapped on 1,722 sheets on the 16"=1 mile scale, and for village site surveys on the 64"=1 mile scale, for which there was insufficient room on the margins of the 16" sheets, 570 extra sheets have been utilized.

The detail survey was checked by 2,131 linear miles of *partals* run by the Survey officers, and independently, and by 2,134 linear miles of *partals* by Inspectors. This gives a total of 4,265 linear miles and an average of 5.75 linear miles of test survey to each square mile of detail survey. In addition the village sites were tested by re-surveys of 435 portions and by 3,581 *partial* lines run through the main streets and alleys.

The demarcation throughout the area surveyed was found to be very imperfect, and in many cases the village boundaries appear to have been unknown to the landlords.

There were 416 boundary disputes in the area under survey, all of which have been decided by the Settlement Department. Disputes relating to entries in the record of rights amounted to 31,137. Of these, 30,604 have been settled and 533 remain over for disposal at the attestation stage.

In cases where there was reason to believe that the *raiyat* was being suppressed by his landlord, lists of the plots concerned, with traces, were submitted to the Settlement Department for orders. There were altogether 24,577 plots so affected, and of these, orders have been passed on 20,746 plots, and the remaining 3,831 plots will be dealt with during attestation. The Collectorate registers received from the Settlement Officer were prepared *mahalwar*, and the draft *khwats* had therefore to be compiled in the Survey office *mauzawar*. The existing Collectorate registers were found to be unreliable. Out of 1,180 villages, it was found only possible to identify the draft *khwats* of 814. The usual comparison with existing possession has been made, and all differences have been shown in red ink. There are 197 villages containing revenue-free lands, and for these lands no draft *khwats* were received. The Settlement Officer ordered that duplicate *khwats* according to claims should be prepared, and one copy be sent to the Collector for verification.

The record-writing, owing to the large number of petty landlords, who had to be dealt with, has been very intricate. In the 1,180 villages of the season's outturn, there were 68,237 landlords, 6,011 *tauzis* and 9,831 *pattis*. The smallest value of a proprietary share works out to one-twenty thousand four hundred and eighty millionth part of a rupee.

In a plot of land, area 0.57 of an acre, there are 1,582 shares. Thus each share represents $0.00036\frac{24}{11}$ of one acre. Another curious feature in the season's work occurs in the Government estate of Ramdiri, where the fields containing many co-sharers vary from 25 links to 5 chains in width and are $1\frac{3}{4}$ miles in length.

The attitude of the petty landlords to the survey operations was very hostile, their attendance was very bad, and they gave a lot of trouble by attempting to suppress their *raiyats*. The *raiyats*, on the other hand, showed considerable interest and were very anxious to get their *parehas*.

Notwithstanding the use of the form of notice for attendance which has given such good results during previous seasons, a considerable number of fines and process-fee notices had to be levied. All these were against the landlords. Particulars are given in paragraph 10 of this report.

In seven out of the 60 Narhan Raj estate villages, lying within the tract surveyed, but excluded from the current operations, it was found that only the Raj share had been surveyed. It was therefore necessary to complete the remaining portions of these villages. This has been done, and a fresh record prepared for the Raj portions. In three of these villages the corrections necessary, owing chiefly to partitions, were so wholesale as to make the maps almost illegible.

The health of the establishment, notwithstanding the prevalence of plague throughout the entire area, was particularly good. One man only died of plague, two of cholera.

The entire work of the season has been completed in every respect (with the exception of the inking up of village names on the maps, which will be done on receipt of lists from the Settlement Department), and the traces and records, &c., have been forwarded to the Settlement Department.

The cost and cost-rates are dealt with in paragraph 3 of this report.

Topographical Survey.

All villages lying in the Ganges *diara* and excluded from settlement under the Bengal Tenancy Act, have been surveyed topographically on the 16" = 1 mile scale.

The outturn accomplished comprises 13 villages, 26 square miles, distributed as follows:—Thana Begusarai 6 villages, 9 square miles, thana Monghyr 3 villages, 4 square miles, and thana Lakhisarai 4 villages, 13 square miles.

The mapping is contained on 39 sheets and the village sites were surveyed in blocks in position on the 16" plans. The survey was checked by 106 linear miles of test survey, which gives an incidence of 4.18 linear miles to each square mile of detail survey.

There was 10 boundary disputes with the adjoining cadastrally surveyed villages and three disputes between the topographically surveyed villages, all of which have been settled.

This survey was carried out by the Monghyr cadastral section, and all the remarks as to demarcation, attendance, &c., apply equally to the topographical area.

The expenditure and cost-rate are given in paragraph 3 of this report.

PATNA DISTRICT.

Traverse Survey.

By Government Notification No. 176T.R., dated 16th May 1901, a survey of all lands lying between the southern boundary of the district of Monghyr to the north of the Ganges river and that part of the southern high bank of the river in the Patna district was ordered.

The traverse survey was undertaken in connection with that of Monghyr by the Bihar traverse section, and comprised 22 villages in thanas Barh and Mokameh, covering an area of 60 square miles.

There were 352 new stations in the area under survey, and these have been marked by 48 stones, 10 cylinders and 294 pegs. The stones were used entirely on the continuation of the line of permanent marks referred to in the report on Monghyr traversing.

The remarks, as to demarcation, in the report on Monghyr traverse work apply equally here, as the Patna *diara* traverse was taken up as a part of the Monghyr work and the figures as to area and cost separated afterwards.

The computations have all been completed.

The cost and cost rates are noted in paragraph 3 of this report.

Cadastral Survey.

The cadastral survey with records, which was carried out by the Monghyr cadastral section in connection with the *diara* surveys in Monghyr and Patna comprises 18 villages and 8,476 fields, covering an area of 56 square miles.

The mapping on 16" = 1 mile scale has been done on 71 sheets.

The survey has been checked by 190 linear miles of *partals*, which gives an average of 3.39 linear miles of test survey to each square mile of detail survey.

In the records the entries against 3,249 plots have been checked, which gives an average of 38.3 per cent. on the total number of plots.

The village boundaries in the whole of this area were practically all disputed. There were 14 boundary disputes with villages of districts Monghyr and Darbhanga, and nine disputes within the area.

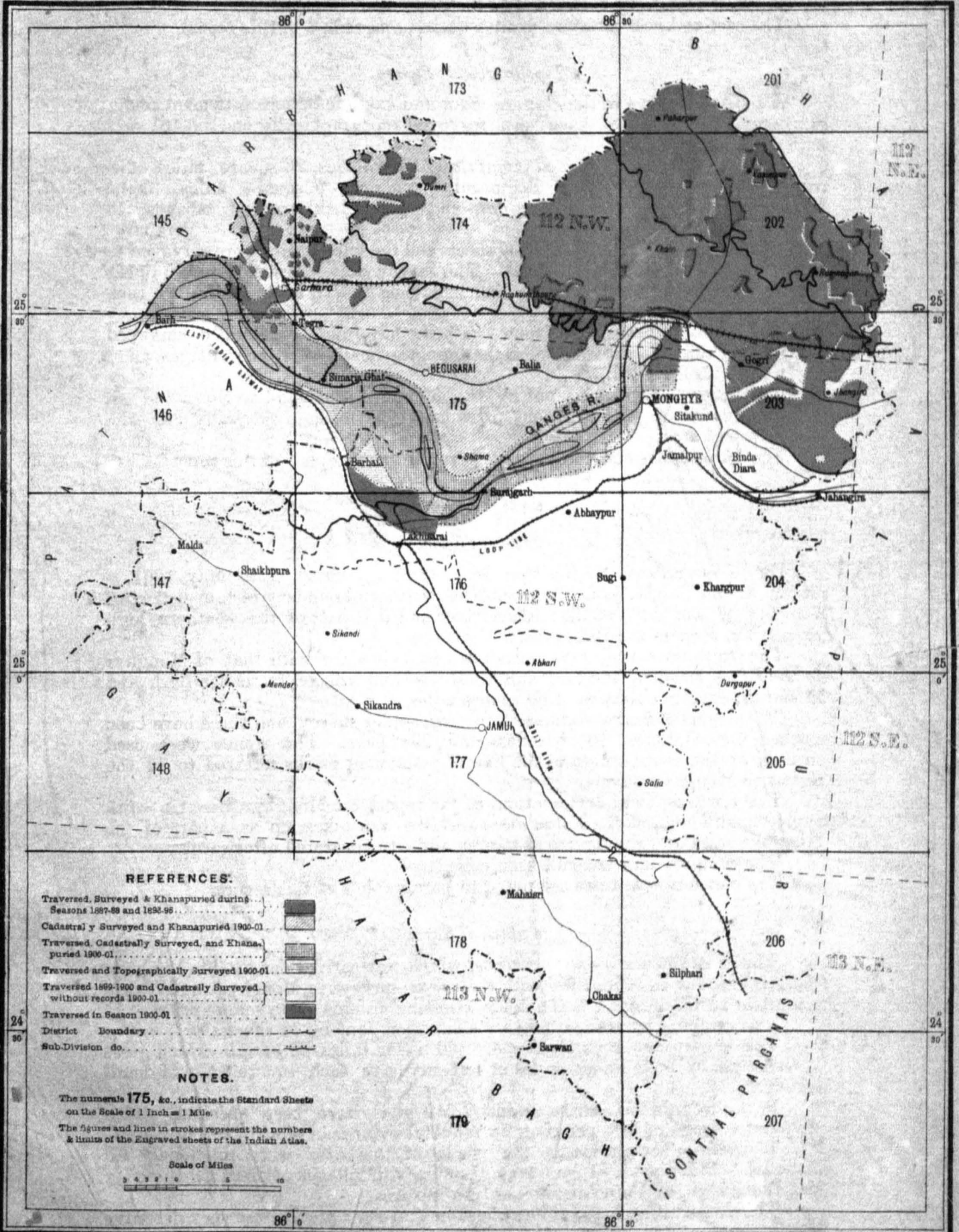
The demarcation here, as elsewhere in the *diara* tract, was very defective and inaccurate.

• BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DIST. MONGHYR & PATNA.

1900-01.

No. 4 PARTY.

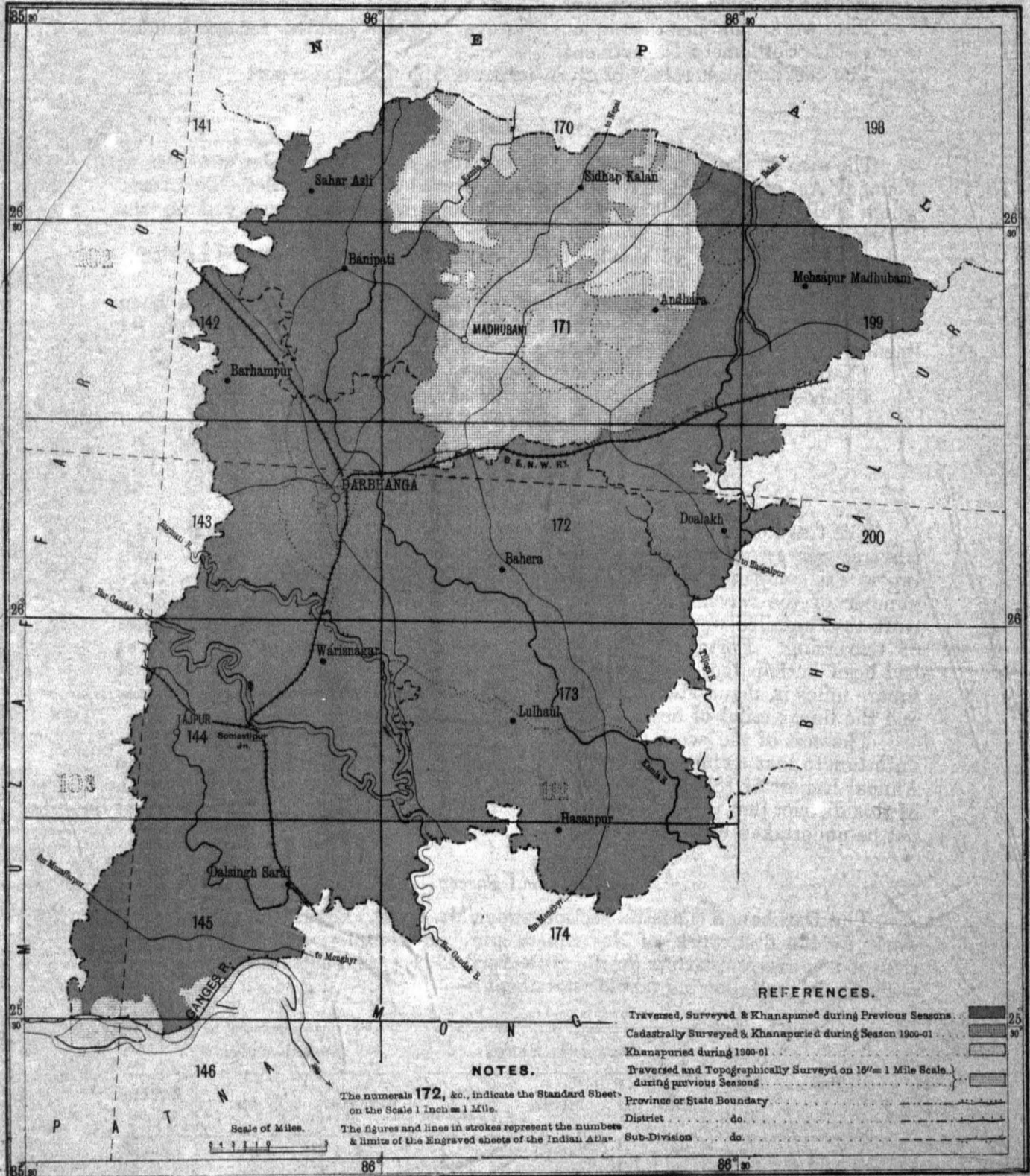


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REFERENCES.

- Traversed, Surveyed & Khanapuried during Previous Seasons 25
- Cadastrally Surveyed & Khanapuried during Season 1900-01 30
- Khanapuried during 1900-01 30
- Traversed and Topographically Surveyed on 18" = 1 Mile Scale, during previous Seasons 30
- Province or State Boundary
- District do
- Sub-Division do

NOTES.

The numerals 172, &c., indicate the Standard Sheet on the Scale 1 Inch = 1 Mile.
 The figures and lines in strokes represent the numbers & limits of the Engraved sheets of the Indian Atlas.

Of the 18 villages surveyed, nine are entirely Government estates, and in these villages in particular the attendance during the survey and record-writing stages was particularly bad. This was frequently brought to the notice of the authorities concerned, but it was not until the last week of April, when the work was practically completed, that a kanungo was appointed. The reason offered for the bad attendance was that the patwaris and headmen of the villages were required for the collection of rents.

The work has been completed in every respect and the records handed over to the Settlement Department.

The cost and cost rates are given in paragraph 3 of this report.

Topographical Survey.

The area in the Patna *diara* excluded from settlement under the Bengal Tenancy Act comprised four villages and covered 11 square miles. This tract, which is all in thana Mokameh, has been topographically surveyed on the 16" scale.

The survey covers 10 sheets, and the village sites are surveyed in blocks in position on the field plans.

The area surveyed is nearly all sand and water. The survey has been checked by 12 linear miles of *partial* survey, which gives an average of 1.1 linear miles test survey to each square mile of topography.

There were only three boundary disputes.

The cost and cost rates are given in paragraph 3 of this report.

DARBHANGA DISTRICT.

Traverse Survey.

The traversing proper of this district was completed in 1898-99, but as the traverse survey of the area under cadastral survey during the year under report was completed so long ago as 1895-96, it was anticipated that a large number of the traverse stations would not be forthcoming, and the amount of work thus entailed was roughly estimated to be equivalent to 100 square miles of traversing. Fortunately this revision work did not prove quite so heavy as had been anticipated, the revision work being confined to an area of 64 square miles in thana Madhubani. The theodolite was set up at 1,289 stations, and the linear miles of new chaining amounted to 177.

The cost of the work is given in Appendix II of the report. It was unfortunate that owing to the change of programme (*vide* paragraph 2 of the Annual Report of 1896-97) in 1896-97 on account of the famine in the north of this district that the cadastral survey of the area traversed in 1895-96 could not be undertaken until 1900-1901.

Cadastral Survey.

The Darbhanga cadastral section under Mr. C. S. Kraal commenced field work in the first week of November, and, on completion of its programme, returned to recess quarters on the 20th April 1901. The outturn of the season is shown in the following tabular statement:—

THANA.	CADASTRAL SURVEY.			RECORD-WRITING.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Madhubani ...	297	534,506	279	297	534,506	279
Khajauli ...	67	234,068	134	196	551,768	319
Total ...	364	769,574	413	493	1,086,274	598

The excess of record-writing over cadastral survey in thana Khajauli refers to the area surveyed during the previous season, but of which the record-writing was postponed.

The survey is contained in 629 sheets on the 16" scale, and there are 550 additional sheets for the 64" scale village site surveys.

The average size of the field was only 0.35 of an acre. The independent *partals* amounted to 932 linear miles, and the Inspector's *partals* to 1,091 linear miles. The total gives an incidence of 4.9 linear miles of test survey to each square mile of detail. In addition to the foregoing, 695 blocks in the village site were resurveyed and 1,461 *partal* lines run through the streets and lanes. In the record-writing the entries against 18,377 fields were checked by the European Survey officers and 371,938 by the Inspectors. The total of 390,315 gives an average of 36 per cent. of the total number of plots.

There were altogether 207 boundary disputes, all of which have been decided by the Settlement Department.

There were 33,093 disputes regarding entries in the record. The settlement kanungoes have decided all but 102, which remain over for the attestation stage.

The preliminary demarcation carried out by the inhabitants themselves was found to be generally satisfactory. The attendance afforded at the survey and record-writing stages by the villagers was also satisfactory. The form of notice for attendance was used with good results, and only a few fines had to be inflicted and a few process-fee notices issued.

Copies of the Collectorate registers were received in good time, and all unrecorded mutations have been shown in red ink in the draft *khewats* compiled therefrom.

There were not nearly so many *pattidari* tenures in the season's work in this district as in Monghyr, and consequently the record-writing has not been nearly so intricate in its nature, although the small size of the fields made this work very heavy.

In this district the same procedure, as followed in Monghyr as regards the submission for orders to the Settlement Department of all cases where there was any doubt as to *bakast* claims, was also adopted.

The health of the establishment has been very good throughout the season. Only two deaths from fever occurred.

The records of the entire season's work have been completed, with the exception of 43 villages, the records of which will be ready early in October.

PURNEA DISTRICT.

Traverse Survey.

The survey of the Surjapur pargana of district Purnea was ordered in Government Notification No. 2170T.R., dated 22nd October 1900.

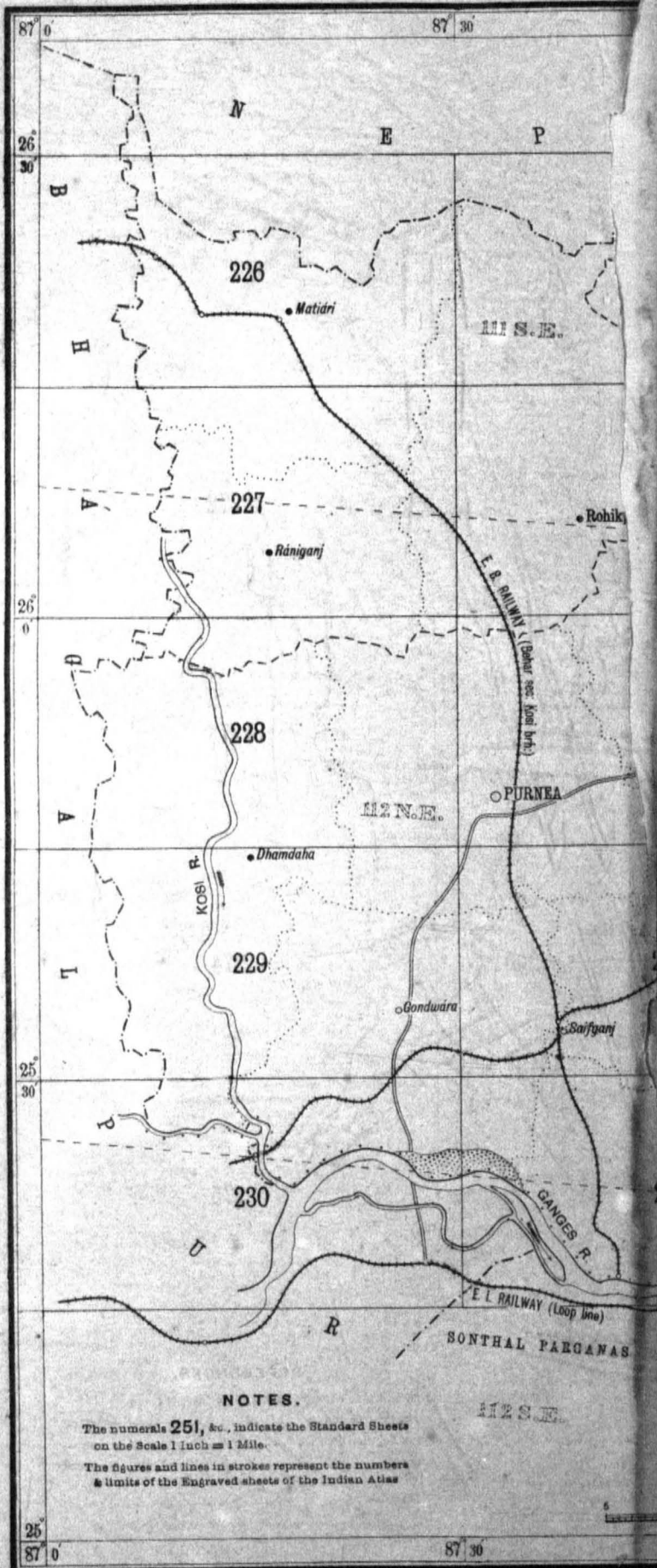
The North Bihar traverse section, as its work in Monghyr and Patna approached completion, moved its establishment into Purnea, and the work in this district may be said to have fairly started on the 1st January 1901.

The outturn of work accomplished comprises 854 villages covering an area of 728 square miles. One village of the Srinagar-Baneli Raj was found to lie within the Surjapur pargana, and as this had been previously surveyed, it was excluded from the current operations.

The origin of survey selected was the intersection of N. Lat. 25°50' and E. Long. 87° 40'.

To check the accuracy of the angular work, 109 observations for azimuth were taken. The mean magnetic variation calculated from the results of the azimuths was 2° 04' east of the true meridian. There were 12,584 new theodolite stations in the season's work, and these were marked by 1,743 stones, 10,716 cylinders and 125 pegs.

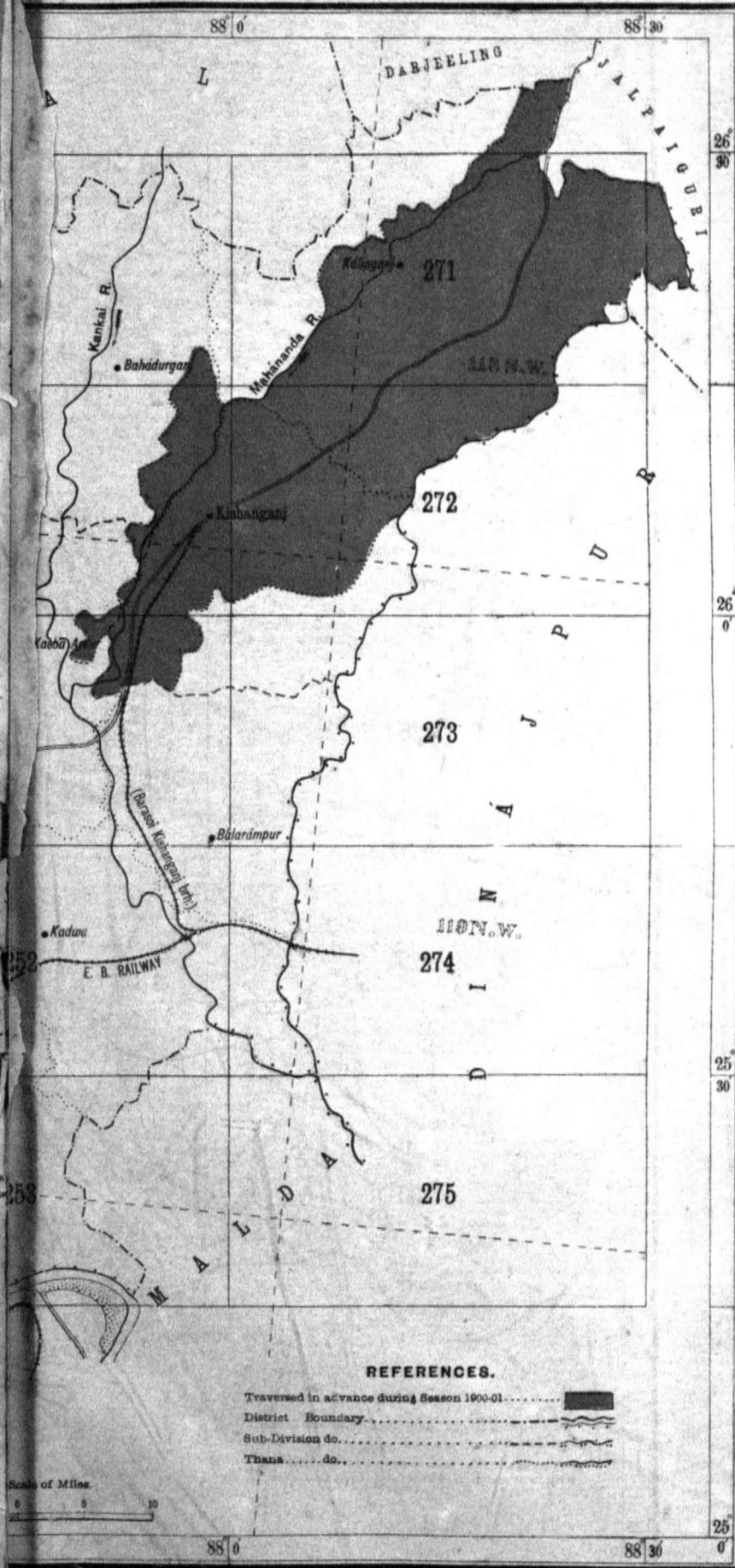
The preliminary demarcation of village boundaries supposed to be done by the inhabitants themselves was found at the commencement of the operations to be practically non-existent. Captain Mears reports that the District officers informed him that as the *gutch* was the local village, it was useless to expect the inhabitants to demarcate according to the old revenue



NOTES.

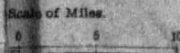
The numerals 251, &c., indicate the Standard Sheets on the Scale 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers & limits of the Engraved sheets of the Indian Atlas



REFERENCES.

- Traversed in advance during Season 1900-01.....
- District Boundary.....
- Sub-Division do.....
- Thana do.....

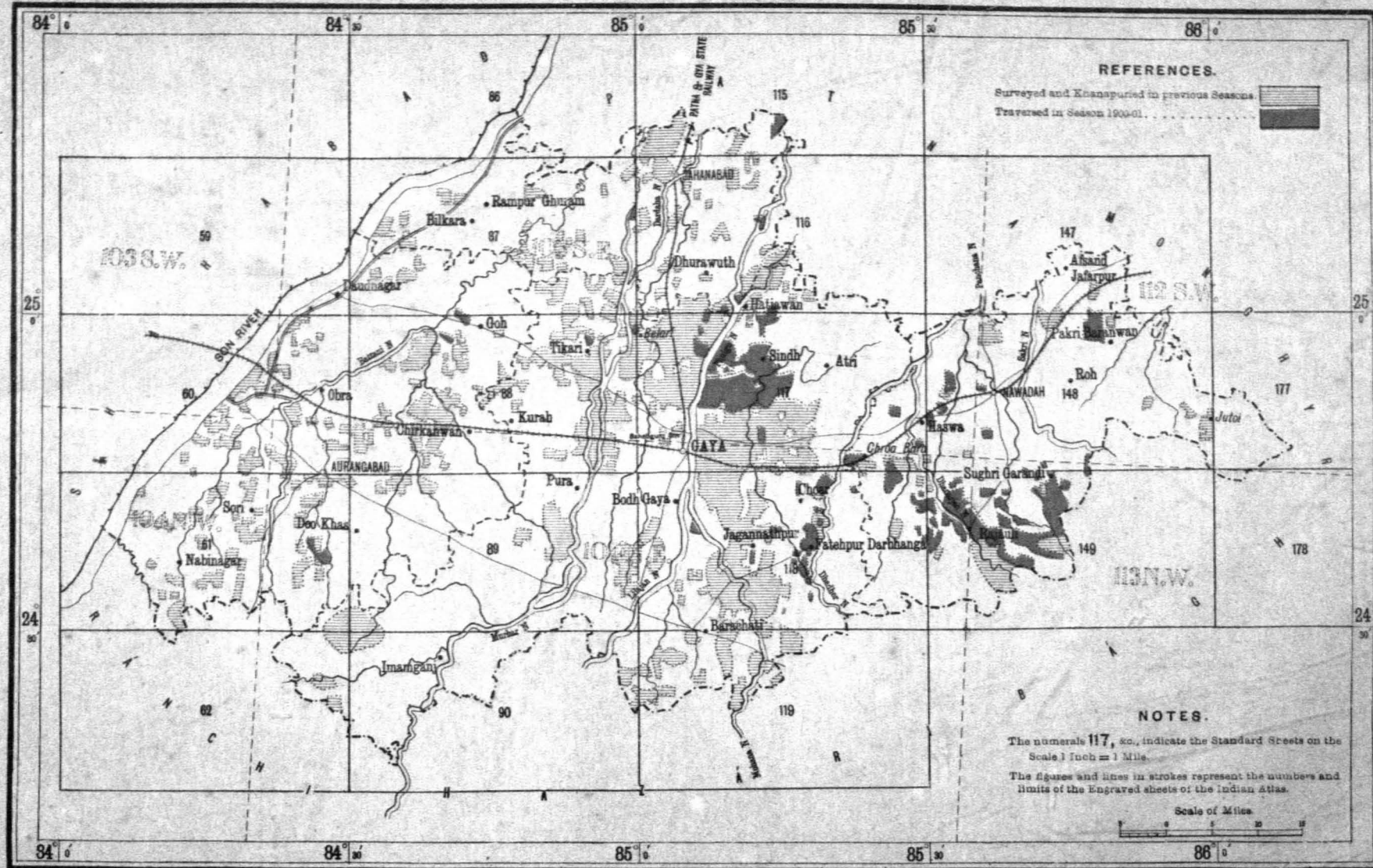


BENGAL SURVEY.

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survey. This Captain Mears found to be a fallacy, for as soon as the inhabitants were really forced to attend, they at once pointed out their boundaries according to the revenue survey, and a comparison of the present traverse survey with the old maps of the revenue survey proved most satisfactory. This conclusively proves that the want of demarcation was not due to ignorance but to laziness.

Owing to the delays at the commencement of the operations in this district from the foregoing cause, Mr. Causley was transferred from one of the cadastral camps to aid in field inspections.

The Kissenganj subdivision, in which pargana Surjapur is situated, is notoriously unhealthy, except perhaps for the months of January, February and March. During April and May the establishment suffered severely from fever. About half the entire establishment were on the sick list during these months, and even of those still on duty a great portion suffered considerably and were unable to give a full outturn of work. The computing establishment, even after the move to the recess quarters at Mussoorie, suffered from fever for several months.

All the computations have been completed and the plots made over to the cadastral camp for detail survey next season. The usual computations showing the mathematical value of the angular work and chaining have been forwarded to the Surveyor-General's office. The work has proved remarkably well. The chaining in this district has also proved very well, the error per mile being only about 6 feet. This is no doubt due to the experience gained by the newly trained men while employed in Monghyr and Patna.

Captain Mears reports that he is much indebted to Mr. Rolt, the Manager of the Khagra estate, for ready assistance during the traverse operations, and particularly for lending the services of the estate peons to accompany the surveyors, thereby ensuring the attendance of the inhabitants to point out their boundaries.

The cost and cost rates are noted in paragraph 3 of this report.

GAYA DISTRICT.

Traverse Survey.

The survey of the Maksudpur estate was ordered in Government Notifications Nos. 3225L.R. and 3226L.R., dated 18th September 1900, and again in Notification No. 4150L.R., dated 24th December 1900. The villages of this estate are scattered all over the district, and there was very great trouble in locating the same, owing to the very indifferent demarcation and defective lists provided. The first lists received gave 171 villages with a total area of 150 square miles as the programme, but this list was frequently amended as the work proceeded and the Survey and Settlement Departments were in a position to make local enquiries.

The actual outturn accomplished as part of the programme of the Bihar traverse section under Captain Mears was 156 villages with a total area of 128 square miles, and this, with the exception of one village just lately reported as unsurveyed, is believed to represent the extent of the entire estate. The remaining village will be seen to next season.

The surveyors were directed to make careful enquiries on the ground before traversing a village, but notwithstanding this, about 12 villages were traversed which proved afterwards not to be the property of the estate. The lists were most confusing, and gave the names of several villages, which local enquiry proved to have been already traversed in 1897, as part of the Tikari ward's estates. Several villages not mentioned in the lists were ascertained by the surveyors and Settlement Department to belong to the Maksudpur estate, and were accordingly noted in the revised lists.

This confusion appears to exist in the records of all estates of which the villages are scattered. We have had exactly the same difficulties in the Tikari and Narhan estates in Gaya and Monghyr and other estates elsewhere.

As no use could be made of such scattered work for the purposes of compilation of new district maps, no attempt has been made to connect the traverse polygons by connecting traverse lines, and each village or block of villages has been plotted on its own magnetic bearing.

There were altogether 3,503 theodolite stations, and these have been marked by 966 stones, 2,342 clay cylinders and 195 pegs.

The plots on the 16" scale and the rough plots on the 4" scale were forwarded in batches to the Settlement Department for immediate cadastral survey as soon as the villages were proved and plotted.

The whole of the traverse records have been completed. All the work has proved well except in a few villages, in which the error passed is slightly above the usual percentage. These errors, which will not affect the accuracy of the plots, were due to the hilly nature of the country traversed.

The cost and cost rates are noted in paragraph 3 of this report.

BACKERGUNGE DISTRICT.

Traverse Survey.

The traverse survey of thanas Bauphal, Nalchiti, Barisal and Backergunge was ordered in Government Notification No. 1959L.R., dated 2nd October 1900, and subsequently the traverse and cadastral survey of the Bamna estate in thana Math Baria was sanctioned by Notification No. 448L.R., dated 19th January 1901.

Mr. E. F. Berkeley was appointed to the charge of the new detachment which had to be formed for this survey. Field work commenced on the 2nd November 1900, and closed on the 15th June 1901. The following tabular statement shows the outturn accomplished :—

Thana.			Number of villages.	Area in square miles.
Barisal	...	...	241	176
Nalchiti	...	...	197	90
Backergunge	...	...	169	146
Bauphal	...	...	132	160
Math Baria	...	...	47	36
		Total	786	608

The origin of survey adopted was the intersection of N. Lat. 22° 30' 00" by E Long. 90° 30' 00". It was decided to employ an entirely local or Bengali establishment for this survey, and all the surveyers and computers selected were Bengalis, but as no *khalasis* could be obtained locally, it was found necessary to import 250 from Hazaribagh.

The preliminary demarcation which had been done during the previous season had to be practically redone immediately before the traverse survey proper commenced.

There were 19,431 theodolite stations in the area traversed. Of these, 16 were old pillars and the remainder were marked by 1,250 stones, 17,256 cylinders and 909 pegs.

To check the angular work, 82 azimuth observations were taken, and the mean magnetic variation calculated from the results of these azimuths is 1° 36" east of the true meridian.

The plots and computations have all been completed, and the usual table of mathematical results compiled and submitted to the Surveyor-General's office. The work has all proved well.

The difficulties in this survey have been considerable and necessitated working in the field well into the usual recess season. The country traversed presents many natural difficulties, for, although absolutely flat, it is intersected by tidal rivers and narrow winding creeks, which make communications difficult. In the early part of the season before the rain-water subsided, and also during the latter portion owing to the high flood tides, the daily outturn of work was small. The health of the establishment was, on the whole, fairly good, except for an epidemic of cholera amongst the newly imported *khalasis* on their arrival and again during March and April. These epidemics were the cause of a considerable number of desertions from an establishment very difficult to replace.

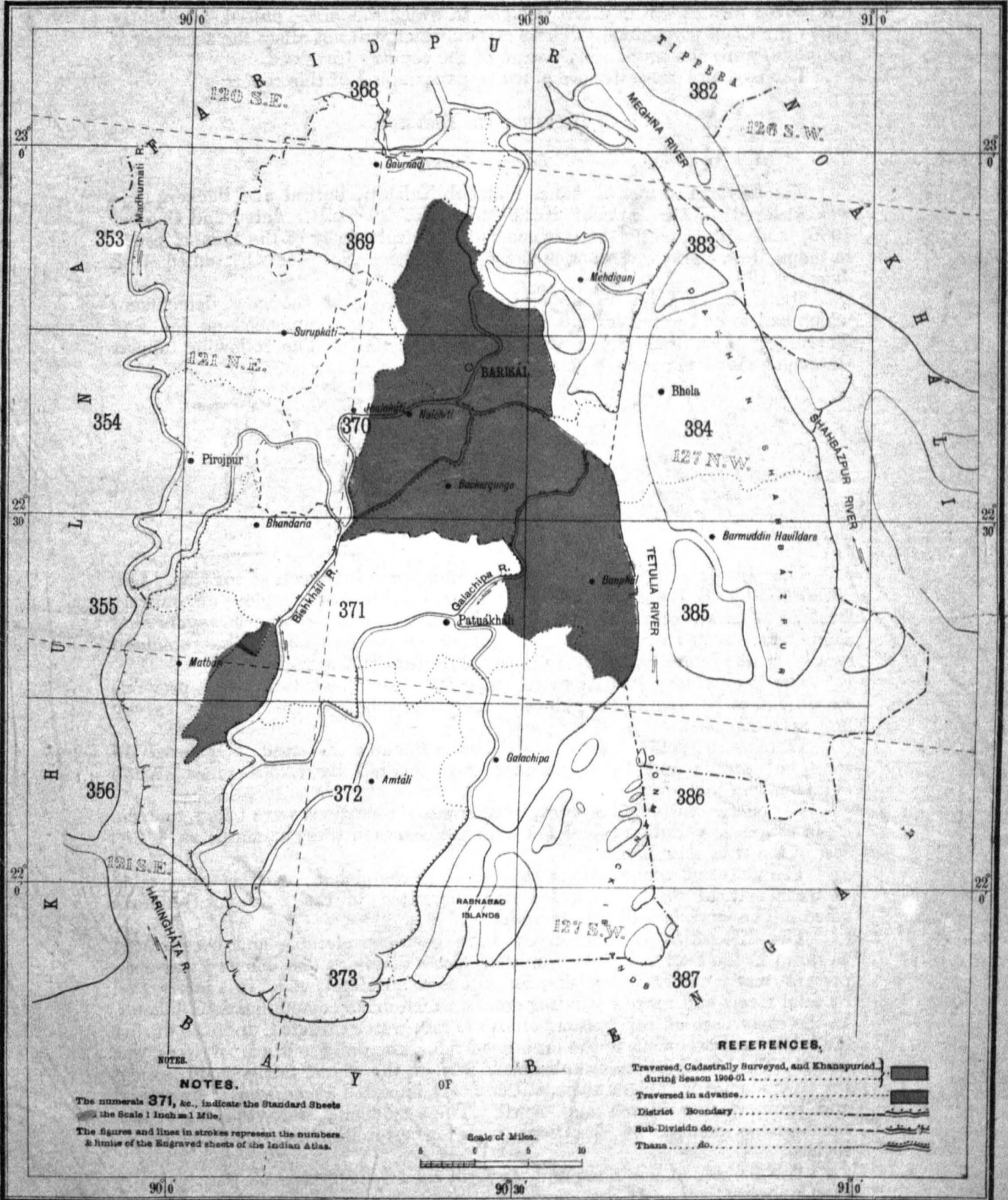
The attitude of the inhabitants towards the survey operations was generally extremely apathetic. At the commencement some opposition was offered to the line-clearing establishment, but as the precaution had been taken to employ only

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT BACKERGUNGE.

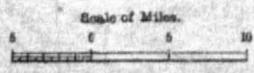
BACKERGUNGE DETACHMENT.

1900-01.



NOTES.

The numerals 371, &c., indicate the Standard Sheets
the Scale 1 Inch = 1 Mile.
The figures and lines in strokes represent the numbers
& limits of the Engraved sheets of the Indian Atlas.



REFERENCES.

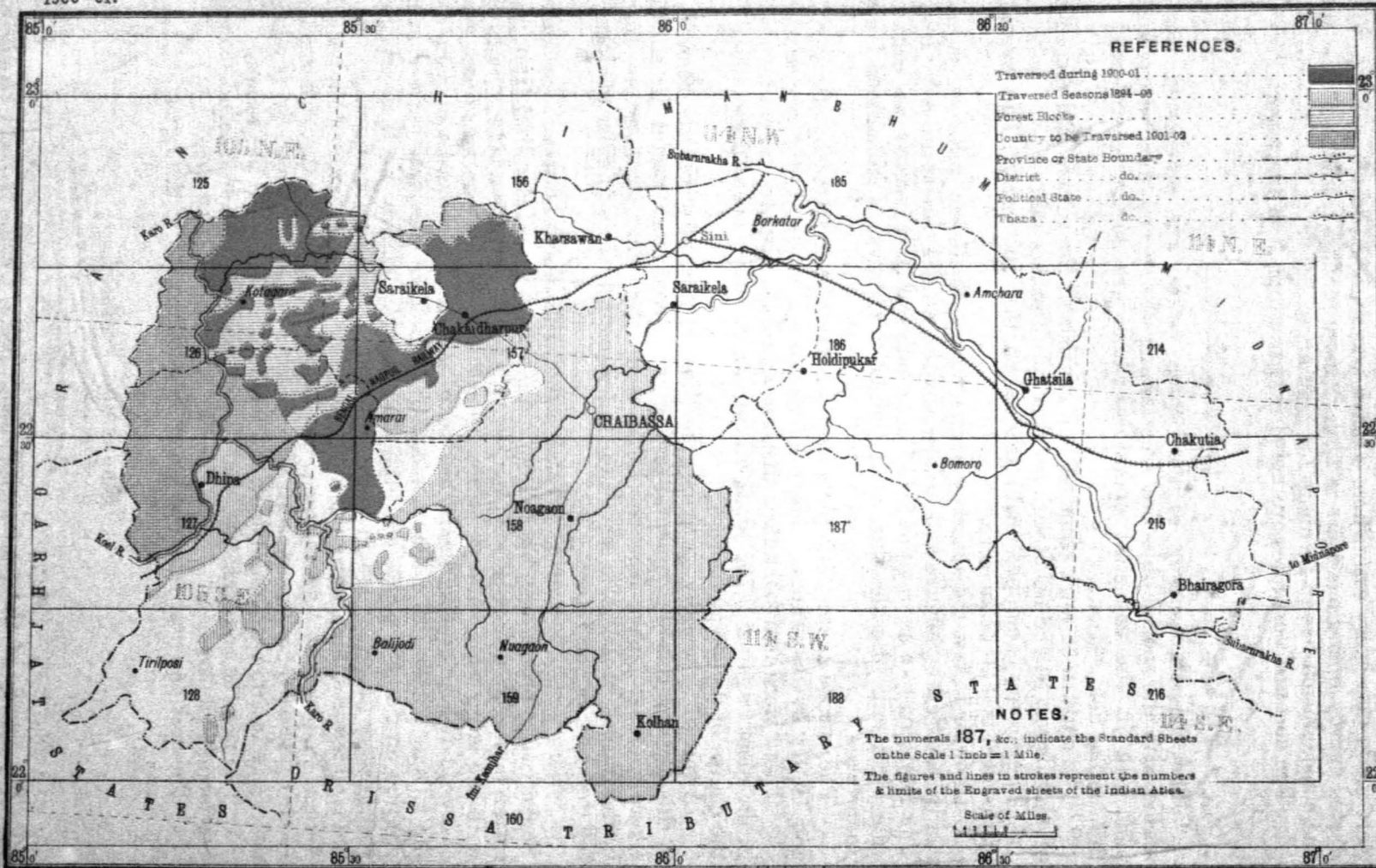
- Traversed, Cadastrally Surveyed, and Khanspuried during Season 1900-01.
- Traversed in advance.
- District Boundary.
- Sub-Division do.
- Thana do.

BENGAL SURVEY.

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1900-01.

DETACHMENT



local *amins* as line-clearers, and not the ordinary imported *khalasi*, these *amins* were able to explain the objects of their work and were allowed to proceed. A considerable number of survey marks were uprooted and replaced roughly. These cases were generally owing to inquisitiveness, but in other cases where the mark was not replaced, there is no doubt the removals were due to private funds and were effected in the hopes of getting the owner of the field concerned into trouble. Also some of the marks were probably found useful for domestic purposes and for fishing operations. Enquiries were made into every case where a mark was reported missing, but in all newly started survey operations there is always more or less trouble of this sort, and due consideration has to be made for ignorance.

The cost and cost rates are noted in paragraph 3 of the report.

Cadastral Survey.

The cadastral survey of the Bamna estate was sanctioned late in the season with the special object of ascertaining the special difficulties likely to be met with in the cadastral operations which are to be commenced during the coming field season.

The outturn of work accomplished consists of the survey and record-writing of 44 villages, 34,588 fields with an area of 33 square miles.

The survey is mapped on 111 sheets on the 16" scale. The average size of the field is 0.60 of an acre.

In order to test the accuracy of the survey, 89 linear miles of *partals* were run by the Survey officers and independently, and 144 linear miles by Inspectors. The total gives an average of 7.15 linear miles of test survey to each square mile of detail. Besides this, independent resurveys of homestead lands were undertaken.

The entries against 497 plots in the records were tested by Survey officers, and 10,071 by Inspectors. The total gives an average of 30.6 per cent.

There were four boundary disputes and 941 disputes affecting the entries in the record against 2,795 plots, all of which have been disposed of during the course of the operations.

Although, generally speaking, the Bihar system of work has been followed in this district, this experimental survey has proved most useful in showing us where we must depart from the Bihar rules and what changes are necessary in the forms. It has also served to train a considerable number of local *amins* for the work of the future.

There are, of course, several minor differences between the Bihar and Backergunge procedures, but the main differences are—(a) In Backergunge, owing to the non-existence of closely, packed village sites we have been able to dispense with the large scale surveys on the 64"=1 mile scale. The huts (each surrounded by its own homestead lands) are scattered all over the area contained within the village boundaries. The homestead lands have therefore been surveyed in position on the 16" plans, and the huts merely shown in their approximate positions by the usual conventional signs. (b) Owing to the intricate nature of the land tenures in Backergunge it has been found necessary to draw up a tenure-holder tree to enable us to trace the landlords through the different grades. In this tree each different sort of tenure is numbered, and it is then only necessary to enter the number in the landlord's column of the *khasra*.

The records and traces have all been completed and handed over to the Settlement Department.

The cost and cost rates are noted in paragraph 3 of the report.

SINGHBHUM DISTRICT.

Traverse Survey.

The survey of the estates of Porahat, Kera, Chainpur and Bandgaon was sanctioned by notifications Nos. 1169T.R., and 770L.R., dated, respectively, 30th June 1900 and 11th February 1901. The survey of the Anandapur estate was sanctioned by the Government of India's letter No. 2131-136, dated 23rd October 1900.

Mr. T. W. Babonau was placed in charge of the survey operations in the district, and the establishment was recruited by means of transfers from other Bengal survey parties, and by training a number of new men. Field work commenced on the 1st November 1900, and closed on 7th May 1901, when the survey detachment proceeded to recess quarters at Mussoorie.

The outturn of work accomplished consists of 518 villages, area 540 square miles. All the above work is in the estates of Porahat, Kera, Chainpur, and Bandgaon. The survey of the Anandapur estate could not be taken up during the season under report for the reasons noted in paragraph 2.

The origin of survey was the same as that of seasons 1894=96, viz., the intersections N. Lat. $22^{\circ} 30''$ and E. Long. $86^{\circ} 00''$.

To check the angular work, 134 observations for azimuth were taken. The resulting mean magnetic variation is $1^{\circ} 42''$ east of the true meridian.

The usual precaution of supplying each surveyor with a spare test chain to ensure good chaining was taken, but a considerable portion of the area traversed was very hilly and jungly (the hills vary on an average from 1,000 to 3,000 feet in height and are covered by protected and reserved forests), and in this tract two chains were run and the use of the subtense bar had to be freely resorted to. The computations have all been completed with the exception of transliteration of the village names which remains to be done after consultation with the Settlement Department.

The usual table of mathematical results showing the value of the angular work and chaining has been computed and submitted to the Surveyor-General's office. The plots of 393 villages were submitted during the field season to the Settlement Department for immediate field cadastral survey, and the remaining villages have been plotted during the recess season.

As there had been no previous revenue survey in this district, the unit for traverse survey was necessarily the village as demarcated locally. The preliminary demarcation is reported to have been good, and the attitude of the inhabitants towards the survey operation has been very satisfactory.

There were 14,405 survey stations in the season's work. All the trijunction points have been marked by 919 stones locally picked up, cut flat at the top with a triangle and dot in centre chiselled thereon. For the intermediate points a stock of 10,000 clay cylinders, which had been ordered before the commencement of the operations, was used up, and then the remaining points marked by local stones with a "broad arrow" cut thereon.

The health of the establishment was very bad throughout the field season. Approximately 50 per cent. of the entire establishment was on the sick list suffering principally from malarial fever.

To complete the programme sanctioned by Government, about 100 square miles of Porahat and the whole of Anandapur, amounting to another 160 square miles, remain for survey. In Porahat however, the main circuit work has been completed in advance, although not taken credit for in this report as it gives no return in village areas.

The whole establishment has worked well and for the reasons given in paragraph 2 of this report, I do not think a larger outturn could have been expected.

The cost and cost rates are noted in paragraph 3 of the report.

PART III.—REPORTS ON MISCELLANEOUS SURVEYS.

CHAMPARAN DISTRICT.

Traverse Survey.

The traverse survey in this district was undertaken for the purpose of the small scale topographical survey necessary to complete the district, and thereby to enable new standard maps to be compiled.

Owing to the extreme unhealthiness of this part of the Champaran district early in the season, the survey detachment was not formed until the 1st January 1901.

Mr. C. S. Gasper was placed in charge, and field work commenced on the 8th of January and was completed on the 30th April.

The area accomplished comprises 84 square miles of the Ramnagar forest. There were 676 theodolite stations in the season's outturn, and these have been marked by pages.

The angular work was checked by 18 observations for azimuth.

The mean magnetic variation calculated from the results of these azimuths is $2^{\circ} 12'$ east of the true meridian. Connections have been made with the great trigonometrical survey and with the previous traverse survey.

The work was plotted as it proceeded on the $2''=1$ mile scale on plane table sections for immediate topographical survey. The computations have been completed and despatched to Calcutta.

Topographical Survey.

The topographical survey followed immediately on the traverse work and was based on the traverse stations supplemented by points fixed by interpolation on a plane table by an experienced topographical surveyor. The work was checked by constant inspections of the plane table sections in the field, and also by 57 linear miles of independent *partals*.

The hilly nature of the country necessitated a considerable amount of contouring, and an overlap survey has been carried into the area surveyed by Colonel Tanner in 1883-84-85. The maps have been completed in every respect and despatched to the Bengal Drawing Office.

There is no more work remaining to be done in the Champaran district, and the compilation of the standard sheets is being proceeded with in the Bengal Drawing Office.

There have been considerable difficulties experienced in this small survey. The establishment suffered considerably from fever, and there were a good many desertions. The nature of the country is hilly and jungly and very thinly populated which made it almost impossible to obtain any assistance locally.

The cost and rates of this survey, both traverse and topographical, are noted in paragraph 3 of this report.

Survey and demarcation of the Bhabsa River.

In 1898-99 a survey of the Bhabsa river, which formed the subject of a dispute between the Bettiah and Ramnagar Rajes, was made and a trace thereof submitted to the Settlement Department. Both parties having agreed to abide by the old revenue survey boundary, the Collector of Champaran desired that this boundary should be permanently demarcated.

This work, which is being paid for by the Rajes concerned, was undertaken in connection with the Champaran topographical survey.

The course adopted was as follows:—Firstly, the traverse stations of 1898-99 were opened up, and relaid where necessary, from Bhalu Asthan great trigonometrical survey station to the village of Mahadewa, the starting and closing points of the line under dispute. Secondly, the jungle was cleared along the main lines in the forest area. Thirdly, a field-book showing the measurements of the offsets from the traverse lines to the old revenue survey boundary was compiled. The field-book was made over to a surveyor who erected wooden posts at all bends of the boundary. The surveyor was accompanied by the Bettiah and Ramnagar Raj amins, and masonry pillars will be erected on the spots marked. No demarcation marks were necessary along the main stream of the Bhabsa river which formed part of the line in dispute because the river formed the boundary at the time of the old revenue survey.

The cost of this work has been Rs. 307.

Owing to a misunderstanding, a dispute between two villages which forms a continuation of the Bhabsa river dispute was not dealt with during the season under report. This will be seen to next season.

DARBHANGA DISTRICT.

Survey of the Madhubani Municipality.

The municipal authorities having asked for a large scale survey with record of occupancy the Board directed that the work be undertaken under my control.

This survey was carried out by Mr. C. S. Kraal in charge of the Darbhanga Cadastral Section, and completed on the 20th May 1901.

The detail survey was based on 444 theodolite points. Such of these points as of necessity were in the middle of roads were marked by iron pegs driven in flush with the surface.

The entire area of the municipality is 1,164.43 acres of which 489.80 acres (the true urban area excluded from the general operations under the Bengal Tenancy Act) has been surveyed on the 64"=1 mile scale on 16 sheets. The balance of 674.63 acres is *raiyati* area and was surveyed on the 16" scale in connection with the general operations.

The large scale portion of the work was tested by 214 linear chains of *partal* (approximately 2.7 linear miles) and by independent resurveys of 33 blocks.

There were 7,357 plots in the urban area, and the average size of a plot works out to .068 of an acre.

The entries against 1,176 of these plots in the record of occupancy have been tested by the survey staff.

In addition to the 16 sheets on the 64" scale of the urban area, a wall map on 4 sheets on the 16"=1 mile scale has been compiled of the entire municipal area by means of transfer from the 16" sheets of the *raiyati* area, and reduction by blocking of houses of the 64" work.

The record of occupancy for the entire municipal area in one serial numbering has been compiled from the *khassras* of the *raiyati* area and from the record written up in the urban area. All the original field sheets and wall map have been completed in every respect, and the traces of the 64" work and a trace on bank-post paper of the wall map, together with the record of occupancy, handed over to the Settlement Department.

The cost of this work, inclusive of shares of control and charge for instruments, is Rs. 1,804, which is met by the municipality.

JALPAIGURI DISTRICT.

Relaying boundary of the Baikantapur Estate.

In consequence of a dispute between the Baikantapur estate and the adjoining Government estate, orders were received under Bengal Government letter No. 906L.R., dated 26th February 1900, to relay the boundary according to Mr. Pemberton's survey of 1858-59. Two theodolite surveyors under the orders of Captain Mears were deputed for this work, and reported themselves to the Deputy Commissioner on the 5th of November.

As none of the traverse stations of 1858 could be found, it was necessary to run a small circuit starting from Dharampur Great Trigonometrical station, and following generally the direction of the 1858 traverse lines. This circuit was then plotted on a sheet on which the 1858 stations had already been plotted, and by this means the measurements of the offsets necessary to relay some of the old stations were obtained. Both banks of the Teesta river were then traversed, for, although the left bank was the boundary between the estates, only the right bank had been traversed in 1858. The traverses were plotted on sheets on the 4" scale, and the position of the left bank of the river, according to the survey of 1858, was then accurately transferred to these sheets, and the measurements of all offsets (formed by the bends of the old boundary) from the present traverse lines carefully scaled off. The bends of the old boundary were then marked on the ground as sites for boundary pillars. Altogether the sites of 110 pillars have been fixed. Of these 22 had to be fixed by reference pillars, owing to the sites lying in the present course of the river. There are 397 theodolite stations and 97 linear miles of chaining in the work necessary for the relaying of the boundary. To check the angular work of the traverses, eight azimuths were observed, and to check the chaining, two chains of different lengths were run. On the 20th April Lieutenant Hirst was deputed to proceed to Jalpaiguri to test the accuracy of the work, and his report was most favourable. The actual length of the boundary affected by the dispute, and which has been relaid, is 37 miles.

The Rani of Baikantapur had purchased a large stock of iron pillars, and the Deputy Commissioner reported that the Rani was anxious to utilize

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the surplus stock of 220 iron pillars by marking supplementary points along the boundary. I have pointed out that, although in my opinion the number of sites already marked is amply sufficient, still by the erection of 51 more pillars, every bend, however trivial, will have been marked, and as it will be necessary in any case to send a surveyor next season to remark the sites of some of the reference pillars, the surveyor can also mark these extra 51 points.

The work of the surveyors was completed on the 21st May, and it is much to be regretted that permanent marks were not erected at the sites of the reference pillars, even if time did not permit of permanently marking the sites of the other pillars along the boundary.

There was a misunderstanding between the Deputy Commissioner and the Survey Department as to the responsibility for the erection of the permanent marks. I pointed out to the Deputy Commissioner on the 23rd April that the detailed estimate submitted for the work did not provide for permanent marks, and that in all similar demarcation operations the work of the Survey officers had been to mark the points where permanent marks should be erected, but that for the Survey officers to attend to the erection of the masonry pillars (work which could quite well be done by a local and cheaper agency) would be a waste of power. This misunderstanding was no doubt the reason why no suitable arrangements had been made beforehand for the erection of the permanent marks, but still there was time before the flooding of the river to erect the necessary marks. Lieutenant Hirst, who inspected the work of the surveyors, was accompanied along the boundary by an *amin* deputed by the Deputy Commissioner to note the positions of the survey marks. This *amin*, who was evidently most inefficient, as he was unable afterwards to locate the marks, has been reported to the Deputy Commissioner.

The work of refixing lost sites of reference pillars and fixing supplementary sites next season will be easy as the necessary traverse has been done.

The cost of the work which is met by the Baikantapur estate, was Rs. 4,266.

PART IV.—REPORT ON THE BENGAL DRAWING OFFICE.

During previous seasons the Bengal Drawing Office formed a section of the head-quarters Drawing Office of the Survey of India, and was under the direct control of the Assistant Surveyor-General. From the 10th of January 1901 the direct control has, under the orders of the Surveyor-General and of the Bengal Government, been made over to the Superintendent of Provincial Surveys, Bengal.

Mr. A. B. Smart was in charge from the 1st to 31st October 1900, and Mr. W. H. Penrose for the remainder of the period under report. In addition to the general or supervising section, which deals with the correspondence and accounts, and the cost of which is distributed rateably over the other sections, there are five different sections in the Bengal Drawing Office, viz., (a) The 2" standard mapping, (b) Bihar Badar section, (c) Thana mapping, (d) Reproduction of village maps, and (e) Orissa Badar section. Of these, (a) and (b) are Imperial charges and the rest Provincial.

I will deal with these sections in the above-named order.

The 2" Standard Mapping Section.

The work of this section consists of the reduction by pentagraph of the 16" sheets and the fair drawing on the 2" scale on quarter sections for subsequent reduction by photography to the 1"=1 mile standard maps.

The districts being dealt with are Orissa, Bihar and Chittagong.

In Orissa there are altogether 32 standard sheets, of which six sheets had been previously published, and during the year under report three more sheets were submitted for publication. There are thus remaining 23 sheets which will not be published until the village names have been corrected in accordance with the thana lists received from the Settlement Department. All the quarter sections had been previously drawn, and the work of correction is being proceeded with. If the sheets already published are to agree with the thana lists, a second edition thereof will be necessary.

Of the special publication of 26 sections on the 2" scale called for by the Under-Secretary to the Government of Bengal in the Irrigation Department

in his letter No. 853L., dated 31st July 1893, 18 sheets were previously published and despatched, and the balance of eight sheets has been published and despatched during the year under report. The cost of this special work is met by the Government of Bengal.

In Bihar, comprising the districts of Saran, Champaran, Muzaffarpur and Darbhanga, there are 40 standard sheets. During the year under report 866 cadastral sheets have been received, and at the close of last year there remained 1,853 sheets to be dealt with, making a total of 2,719 sheets, of which 2,171 have been reduced to the 2" scale during the year under report. The reduction of 2,662 cadastral sheets have been examined, and 1,542 have been transferred to the 2" quarter sections.

None of the standard sheets of Bihar have been published previous to the year under report. During the year 12 standard sheets containing Muzaffarpur district only have been submitted for publication. These sheets have not been brought into final accord with the thana lists and traces received from the Settlement Department, and another edition will be necessary as soon as the sheets containing portions of the adjoining districts have been completed to margin, and have all been finally corrected to agree with the thana lists and traces which are not yet finally complete or correct in themselves.

In district Saran six standard sheets, and in Champaran four standard sheets, corrected in final accord with the thana lists have been submitted for publication. All the remaining sheets of Saran and Champaran have been completely drawn, except three in the north of Champaran, which await the incorporation of the topographical survey just accomplished, and three in Saran, in which the *diara* tract is not yet complete.

In Darbhanga a start has been made in the 2" mapping. Twenty-six new 2" sections have been projected and some have been partly plotted.

Had it not been for the necessity of comparing the 2" quarter sections of Bihar with the thana lists and traces, many more sheets could have been published during the year. The comparisons reveal errors also in the thana lists and traces, and all such discrepancies have to be referred back to the Settlement Department for reconciliation.

In Chittagong there are 15 standard sheets, of which six were reported as previously drawn. The remaining nine have been drawn during the year under report, and the whole 15 typed and completed and eight finally examined. None of the Chittagong sheets are, however, ready for publication, as they all contain unsurveyed gaps of jungle and hills, which remain to be filled up from surveys on the 1" scale of 1861 to 1866. These old surveys show no village or other fiscal boundaries, and when incorporated there will no doubt be considerable difficulties in reconciling the old and new compilations with the thana lists and traces which have yet to be supplied.

Bihar Badar Section.

This section deals with the *badars* or corrections necessary to be made in the original cadastral sheets and area statements in accordance with alterations notified by the Settlement Department.

Since all *badars* of the attestation stage are dealt with by the field parties, which retain the sheets until after attestation for this purpose, the amount of *badar* work left to be done in the Bengal Drawing Office is not much. At the close of last year there were 123 *badars* in hand, and during the year 390 were received. The whole 513 have been completed. This section also dealt with 52 out of 84 *badars* of Chittagong. The remaining 32 are, by order of the Director of Land Records, not to be dealt with.

The correction of original cadastral sheets, area statements, traverse volumes and alphabetical lists of previous season's work in Bihar, in accordance with the thana lists is also being dealt with by this section. This is a heavy item of work, and 2,132 villages with 3,288 sheets, also area statement, &c., have been corrected during the year under report.

Thana Mapping Section.

The work of this section consists of the compiling of separate maps on the 1" = 1 mile scale of each thana from the reduced prints of the 2" standard

sheets. The progress in this section consequently depends on that of the 2" mapping.

There are altogether 76 thanas to be dealt with, viz., 24 of Orissa, 39 Bihar and 13 Chittagong. Of these, 18 (seven of Orissa and 11 Bihar) have been completed, but only 5 of Bihar sent to the Photo. office for reproduction. The progress of this section has been much hampered by the delays in publication of the standard sheets. These delays being due, as already stated, to the comparisons and consequent corrections with the thana lists and traces. In the Muzaffarpur work, for instance, the printed thana lists were received on the 25th of February 1901, but were found to be full of discrepancies. These discrepancies were shown in red on the lists, which were then returned by order of the Director of Land Records to the Settlement Officer. Nine thana lists were despatched, but only three have been received back, and these now show further new corrections. This illustrates the difficulty of this work, which requires constant references between the Settlement and Survey Departments.

In addition to the work already completed, it is expected that by the close of the current financial year 26 more thana maps will be ready, and of these, 18 at least published. By 30th September 1902 the whole of the thana maps of Bihar, with the exception of those of the Darbhanga district, should be published. The thana maps of Chittagong cannot be completed before the end of financial year 1903-1904, because, as already stated, the standard sheets are not complete and the thana lists have yet to be received.

The thana maps of Orissa should also be ready by 30th September 1902.

Reproduction of village maps.

The work of this section consists of tracing from the original cadastral sheets, the village maps of Orissa and Chittagong and submitting the traces to the Photo-Zincographic office of the Survey of India for reproduction of 10 copies of each by the new direct zinc process lately invented by Mr. Vandyke.

In letter No. 1258, dated 11th March 1901, sanction was received to the reproduction of some 21,950 sheets, viz., 14,500 of Orissa, 4,500 of Khurda and 2,950 Chittagong. Of these, 358 only of Khurda had been previously reproduced by the old photographic process, and during the year under report 8,810 sheets have been traced and 8,260 reproduced. Ten copies of each sheet, amounting in all to 89,690 copies, viz., 12,120 Orissa, 42,590 Khurda, and 34,980 of Chittagong, including a special issue of 15 copies of 366 sheets of Chittagong, have been despatched to the Collectors concerned.

During the year under report the Surveyor-General notified that he would be unable to reproduce more sheets in the Photo-Zinco. offices than had been accepted under the original contract (about 8,000 sheets). Therefore, under the orders of the Board, I inspected the new process of reproduction and, after consulting Mr. Vandyke, submitted proposals and estimates for taking over the part of the work as a branch of the Bengal Drawing Office. I pointed out to the Surveyor-General that if the reproduction work were stopped in November 1901, by which date the existing contract would be completed, considerable inconvenience and loss would result as suitable arrangements for the necessary plant and accommodation could not be made in time. The Surveyor-General has agreed to allow the work to proceed at the usual rate of progress until the close of the current financial year, by which date the Bengal Drawing Office will be ready to take over the work.

Orissa Badar Section.

At the close of last year the badars of 2,310 villages remained to be dealt with, and during the year under report 215 more were received, making a total of 2,525, out of which 2,368 have been completed during the year.

In last year's report it was stated that the balance of 2,310 villages remaining on 30th September 1900 would be completed in two months, but as the previous average outturn per month was only 600 villages, it is evident that

completion in under four months should not have been expected. As a matter of fact, the work was not completed by 30th November, but the establishment was nevertheless reduced from 43 men to 10 men, and a further reduction to two men only was effected from the 1st April 1901. There is still a good deal of work in this section, for not only have the traverse records to be corrected in accordance with the thana lists, but it was found that a good many boundary corrections had only been carried out in one village and the adjoining village had not been touched. This has been seen to during the year under report.

CHAPTER III.

PART I.—PROGRAMME OF THE BENGAL SURVEYS FOR 1901-1902.

The following is the programme in square miles for the coming season according to orders received up to date:—

District.	Traverse survey.	Cadastral with records.	Topographical.
Sonthal Parganas—Private estates	... 1,069	...	...
Monghyr ... ..	... 178	609	41
Patna—Government estates	... 55	...	...
Gaya—Deo Raj ... ..	... 100	...	...
Shahahad—Hathwa Raj estates	... 2	...	...
Purnea ... ..	... ..	710	...
Bhagalpur ... ..	... 1012	...	...
Singhbhum—Porahat and Anandapur	... 260	...	...
Maubhum—Nagarkhari estate	... 50	...	...
Ranchi ... ..	... 710	...	...
Backergunge ... ..	... 629	574	16
Kalimpong—Government estate	... 180	180	...
Total	4,245	2,073	57

The area in the Sonthal Parganas comprises 840 square miles for subsequent cadastral survey, and 229 square miles of traversing of trijunction points only, in order to connect Mr. Craven's surveys for 2" standard mapping purposes. The traverse area in Monghyr is exclusive of sub-traverses which will have to be run in the portion of the revenue survey mauzas (omitted last season from survey as Srinagar-Baneli villages) of which portions only have been surveyed as the property of the Sringar-Baneli Raj.

PART II.—TOURS OF SUPERINTENDENT, PROVINCIAL SURVEYS.

I have been in the field and on tour for 216 days. I visited every camp and detachment of the Bengal surveys from two to three times in the field and again once at their recess quarter during my monsoon tour in July and August. In addition to the inspections of the surveys under my control, I inspected and tested on the ground a number of Mr. Craven's maps in the Sonthal Parganas and reported to the Surveyor-General their suitability for incorporation in the standard maps. By order of the Bengal Government I visited the survey class of the Behar School of Engineering at Arrah and submitted a report which showed a marked improvement since I last inspected this school five years ago. I also, with the sanction of the Board, accompanied the Deputy Surveyor-General to Azamgarh to see the system adopted in the North-Western Provinces Provincial Surveys.

PART III.—SERVICES OF OFFICERS.

Captain A. Mears, Officiating Deputy Superintendent, has been in charge of the Behar traverse section. He has brought a large programme of work to a successful issue and has in every way afforded me all possible assistance. Lieutenant F. C. Hirst, Assistant Superintendent, was appointed for instruction by order of the Surveyor-General. He has been employed principally in the North Behar traverse section both on field work and computations. He has also been put through a two-months' course of practical cadastral surveying and record-writing, and during April and May inspected the work in Jalpaiguri. Lieutenant Hirst has done very good work and takes Captain Mears' place as

the latter officer proceeds shortly on leave. Of the services of the other officers in charge of sections, viz., Messrs. H. Dowman, A. W. Smart, C. S. Kraal, E. F. Berkeley, T. W. Babonau, C. S. Gasper and Mr. W. H. Penrose in charge of the Bengal Drawing Office, it is difficult to speak too highly. Mr. A. W. Smart has accomplished an exceptionally large cadastral programme with records with complete success.

The Sub-Assistants with the field parties, viz., Messrs. Hanby, Causley, Hardinge, Lears, Hart, Judd and Babu Nilmoni Chatterji have all worked well and given complete satisfaction to the officers in charge of their sections. One native Sub-Assistant Superintendent was discovered submitting false returns and suspended by my orders, and after enquiry dismissed from the Department by the Surveyor-General.

Several members of the native establishment are deserving of special mention, and I will bring their services to the notice of the Board in a supplementary letter.

I have the honour to be,

SIR,

Your most obedient servant,

R. T. CRICHTON, CAPT., I.S.C.,

Superintendent of Provincial Surveys in Bengal.

APPENDIX I.

Summary of the outturn of work of the Survey Parties in Bengal for 1900-1901.

DISTRICT.	TRAVERSING.						CADASTRAL SURVEY.				RECORD-WRITING.		TOPO-GRAPHICAL SURVEY.			
	Number of villages.	Area in square miles.	Linear miles of chaining.	Number of stations at which theodolite was set up.	Number of azimuths.	Number of sub-traverses.	Number of villages.	Fields.	Area in square miles.	Linear miles of test survey.	Number of sheets.	Number of villages.	Fields.	Area in square miles.	Number of villages.	Area in square miles.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>Temporarily-settled and Government Estates.</i>																
Sonthal Parganas (Damin-i-koh.)	(a)1,001	735	2,451	18,880	140	646	...	...	...	...	...	...	...	...	...	...
<i>Private Estates.</i>																
Monghyr	468	747	2,766	14,882	85	855	1,184	799,198	741	4,371	2,331	1,180	798,262	730	13	26
Patna	22	60	(b)...	442	(b)...	23	18	8,476	56	203	81	18	8,476	56	4	11
Darbhanga ... ..	...	64	177	1,289	...	...	364	768,374	413	2,023	1,243	493	1,080,274	597	...	...
Furna	854	728	2,981	15,904	109	896	...	...	...	...	...	...	...	...	...	...
Gaya (Maksudpur estate) ...	156	128	606	4,107	...	148	...	...	...	...	...	...	...	...	...	...
Backergunge	786	608	2,701	22,313	82	623	44	34,588	33	233	111	44	34,588	33	...	...
Singbhum (Porahat, Kera, Chainpur and Bandgaon).	518	540	1,553	16,109	134	396	...	...	...	...	...	...	...	...	...	...
<i>Miscellaneous.</i>																
Champaran ... ..	...	84	37	684	18	...	...	...	...	...	...	...	...	...	...	84
Darbhanga (Madhubani town)	...	1	18	444	1	...	1	7,357	1	3	16	1	7,357	1	...	...
Jalpaiguri (Baikantapur boundary).	...	...	97	397	8	...	...	...	...	...	...	...	...	...	...	...
Total ...	3,791	3,695	13,387	95,151	677	3,497	1,611	1,618,193	(c)1,244	6,832	3,781	1,736	1,929,977	1,416	17	121

(a) Includes 22 jungle blocks.

(b) Included in Monghyr figures above.

(c) Exclusive of resurveys and test surveys in village sites.

R. T. CRICHTON, CAPTAIN, I.S.C.,
Superintendent of Provincial Surveys in Bengal.

Statement showing the sums expended on each descrip

DESCRIPTION OF WORK.	TEMPORARILY SETTLED AND GOVERNMENT ESTATES.																PRIVATE	
	BHAGALPUR DIVISION.				BHAGALPUR DIVISION.				PATNA DIVISION.				BHAGALPUR					
	SONTHAL PARGANAS (DAMIN-I-KOH).				MONGHYR.				PATNA.				DARBHANGA.				PUR	
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.
1	2			3				4				5				6		
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Stone embedding	2,128	180	92	2,400	800	23	36	940	...	...	...	...	...	...	...	...	1,640	140
Traversing	34,001	2,877	1,475	38,353	18,758	1,639	816	21,213	1,400	118	60	1,578	818	69	35	922	23,118	1,955
	36,129	3,057	1,567	40,753	19,648	1,662	852	22,162	1,400	118	60	1,578	818	69	35	922	24,767	2,095
Survey, cadastral ... ..	...	...	...	...	37,431	3,166	1,624	42,221	589	50	26	665	22,222	1,580	964	25,066	...	...
Completion of field map ... ..	...	...	...	...	2,609	220	113	2,942	135	11	5	151	3,482	295	151	3,928	...	...
Area extraction ... ..	...	...	...	...	5,529	469	240	6,238	158	14	7	179	8,799	744	382	9,925	...	...
Traces ... ..	...	...	...	...	3,535	299	153	3,987	144	12	6	162	5,373	455	233	6,061	...	...
	...	...	...	...	49,104	4,154	2,180	55,388	1,026	87	44	1,167	39,376	3,374	1,730	44,980	...	...
Record-of-rights (khanapuri) ... ..	...	...	...	...	23,427	1,952	1,016	26,425	323	27	14	364	27,441	2,321	1,191	30,953	...	...
Completion of records ... ..	...	...	...	...	11,864	1,004	515	13,383	215	18	10	243	17,899	1,488	763	19,841	...	...
Statistics ... ..	...	...	...	...	4,469	378	194	5,041	157	13	6	176	5,349	453	232	6,034	...	...
	...	...	...	...	39,760	3,364	1,725	44,849	695	58	30	783	50,380	4,262	2,186	56,828	...	...
Topographical survey ... ..	...	...	...	...	359	30	16	405	163	15	8	186	...	...	...	...	...	...
"Badar" establishment ... ..	...	...	...	...	...	...	...	...	...	...	...	...	3,608	304	157	4,069	...	...
Arrears ... ..	...	...	...	...	...	...	...	...	...	...	...	...	238	21	10	269	...	...
Bengal Drawing Office... ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	359	30	16	405	163	15	8	186	3,846	325	167	4,333	...	...
Total	36,129	3,057	1,567	40,753	1,08,871	9,210	4,723	1,22,804	3,284	278	142	3,704	94,920	8,030	4,115	1,07,068	24,767	2,095

DIX II.

tion of work in each district in Bengal during season 1900-1901.

ESTATES.

DIVISION.		PATNA DIVISION.																			
NRA.		GAYA—MAKSUPUR ESTATE.					GAYA—TIKARI WARD'S ESTATE.					GAYA—DEO RAJ ESTATE.				SARAN.					
Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.				
					7						8					9					10
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.			
71	1,860	633	54	27	714			
1,005	26,076	3,884	328	169	4,381	51	4	...	55				
1,074	27,936	4,517	382	186	5,095	51	4	...	55				
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...				
...				
...	80	7	...	87	10	10				
...				
...				
...	80	7	...	87	10	10				
1,074	27,936	4,517	382	186	5,095	80	7	...	87	51	4	...	55	10	10				

APPENDIX

Statement showing the sums expended on each description of work

DESCRIPTION OF WORK.	PRIVATE ESTATES—concl.								MISCELLANE			
	DACCA DIVISION.				CHOTA NAGPUR.				PATNA			
	BACKERGUNGE.				SINGHBHUM.				CHAMPARAN TOPOGRAPHICAL.			
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.
	11				12				18			
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Stone embedding	8,080	683	350	9,113	848	72	...	920	...	...	...	...
Traversing	32,457	2,746	1,408	36,611	26,970	2,281	...	29,251	3,577	303	...	3,880
	40,537	3,429	1,758	45,724	27,818	2,353	...	30,171	3,577	303	...	3,880
Survey, cadastral	5,945	503	258	6,706	...	...	...	...	...	...	...	...
Completion of field maps	362	31	16	409	...	...	...	...	...	...	...	...
Area extraction	338	29	14	381	...	...	...	...	...	...	...	...
Traces	49	3	2	54	...	...	...	...	...	...	...	...
	6,694	566	290	7,550	...	...	...	...	...	...	...	...
Record-of-rights (khanapuri)	5,160	437	224	5,821	...	...	...	...	...	...	...	...
Completion of records	1,112	94	48	1,254	...	...	...	...	...	...	...	...
Statistics	168	14	8	190	...	...	...	...	...	...	...	...
	6,440	545	280	7,265	...	...	...	...	...	...	...	...
Topographical surveys ... ..	...	...	...	...	...	...	...	...	4,746	401	...	5,147
"Badar" establishment ... ..	...	...	...	...	...	...	...	...	...	...	...	...
Arrears ... ..	...	...	...	...	...	...	...	...	...	...	...	...
Bengal Drawing Office... ..	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	4,746	401	...	5,147
Total	53,671	4,540	2,328	60,539	27,818	2,353	...	30,171	8,323	704	...	9,027

II—continued.

in each district in Bengal during season 1900-1901—continued.

OUS.

DIVISION.				RAJSHAHI DIVISION.				POLITICAL DEPARTMENT.							
CHAMPARAN BAKSA RIVER DISPUTE.				MADHUBANI MUNICIPALITY.				JALPAIGURI-BAIKANTAPUR BOUNDARY.				TRAINING OF KUMAR PALDEN.			
Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.
14				15				16				17			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
272	23	12	307	147	12	6	165	3,782	320	164	4,266
272	23	12	307	147	12	6	165	3,782	320	164	4,266
...	1,453	123	63	1,639	47	10	2	59
...
...
...
...
...
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272	23	12	307	1,600	135	69	1,804	3,782	320	164	4,266	47	10	2	59

APPENDIX

Statement showing the sums expended on each descrip

DESCRIPTION OF WORK.	BENGAL DRAW											
	IMPERIAL CHARGES.								PROVINCIAL			
	2" MAPPING.				BIHAR BADARS.				RE-PRODUCTION OF VILLAGE MAPS.			
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.
	18				19				20			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Stone embedding	
Traversing	
Survey, cadastral	
Completion of field maps	
Area extraction	
Traces	
Record-of-rights (khanapuri)	
Completion of records	
Statistics	
Topographical survey	
'Badar' establishment	
Arroers	
Bengal Drawing Office	6,095	516	...	6,611	1,077	91	...	1,168	24,997	2,115	...	27,112
	6,095	516	...	6,611	1,077	91	...	1,168	24,997	2,115	...	27,112
Total	6,095	516	...	6,611	1,077	91	...	1,168	24,997	2,115	...	27,112

II—concluded.

tion of work in each district in Bengal during season 1900-1901—concluded.

ING OFFICE.								TOTAL.			
CHARGES.											
THANA MAPPING.				ORISSA BADARS.							
Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.
21				22				23			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	14,229	1,153	676	15,058
...	1,40,235	12,675	5,148	1,67,058
...	1,63,463	13,827	5,724	1,83,014
...	67,687	5,732	2,037	76,356
...	6,588	557	245	430
...	14,824	1,256	643	16,723
...	9,101	769	394	10,264
...	98,200	8,314	4,259	1,10,773
...	56,351	4,767	9,445	63,563
...	30,781	2,604	1,336	34,721
...	10,143	858	440	11,441
...	97,275	8,229	4,221	1,09,725
...	5,268	446	24	5,738
...	5,608	304	157	4,069
...	328	28	10	366
730	62	...	792	3,300	279	...	3,579	36,199	3,063	...	39,262
730	62	...	792	3,300	279	...	3,579	45,403	3,641	191	49,435
730	62	...	792	3,300	279	...	3,579	4,04,941	34,211	14,395	4,52,947

R. T. CRICHTON, CAPTAIN, I.S.C.,
Superintendent of Provincial Surveys, Bengal.

REVENUE DEPARTMENT.

LAND REVENUE.

CALCUTTA, THE 18TH MARCH 1902.

RESOLUTION—No. 1780.

READ—

Letter No. 65A., dated the 20th January 1902, from the Board of Revenue, submitting with a note, the Survey and Settlement Reports for the year ending 30th September 1901.

THE Survey and Settlement Reports for the year ending 30th September 1901, are more concise than the Reports for the preceding year. Remarks will be separately communicated to the Board of Revenue with a view to the further curtailment of these Reports; and mistakes in the Appendices to the Settlement Report will be pointed out.

2. Important surveys and settlements were in progress during the year under the Superintendent of Provincial Surveys in nine districts situated in four Commissioners' Divisions, and under the Director of Land Records in ten districts contained in six of the Divisions.

The outturn of traverse survey for the year was 3,695 square miles, and of topographical survey 121 square miles. There were some changes of programme under this head, and larger areas were traversed, especially in Monghyr and Patna, than had been originally provided for, while in other districts the programme was not quite fulfilled. The outturns generally obtained, in spite of difficulties occasioned by sickness of the surveyors in unhealthy tracts, and also by the indifference of the people at the beginning of the work in the preliminary demarcation of new areas, are sufficient and satisfactory. With reference to paragraph, 17 of the Board's remarks, the Lieutenant-Governor wishes to know whether the District Officer of Purnea was called to account for not giving the required help in the survey work, and what explanation he may have given. Cadastral maps were made under the direction of the Superintendent for 1,244 square miles, and records were written for 1,416 square miles. The programme under these heads was fully attained or exceeded in all districts. The Settlement Report does not show for all districts how far the programme for the year was fulfilled, but good general progress was made in attestation of records for 1,212 villages and in publication of draft and final records respectively for 2,309 and 1,309 villages.

3. The Board have furnished some useful comments on the cost—rates of survey and settlement in the various districts. The cost of traverse survey ranged from Rs. 29·4 a square mile in Monghyr and Patna to Rs. 75·2 in Backergunge; in the latter district the work has been newly started, labour is expensive, and on account of the nature of the country boats have to be kept for the surveyors. For cadastral survey and record-writing, the rates of cost were Rs. 129·1 to the square mile in Monghyr and Patna, and Rs. 189·2 in Darbhanga. The Board consider that "the aim of the Survey Department should be to reduce the cost to Rs. 160 for all survey work, or 4 annas an acre." This view, however, loses sight of the fact that the rate of cost must depend on the area under survey, the size of the fields, the number of tenancies to the square mile, and other matters which vary from district to district. The Lieutenant-Governor will have another opportunity of examining the question of the incidence of survey and settlement cost in Bengal operations, as compared with cost in other Provinces in connection with a special report which is to be submitted to the Government of India on this subject. Sir John Woodburn can at once say, however, that he would not be prepared to consent to a decrease of supervision which would

jeopardise the efficiency of the survey and settlement work of which the value depends upon its accuracy and honesty.

4. Among other interesting subjects dealt with in the two Reports, the Lieutenant-Governor desires to notice the following matters :—

- (1) *The difficulty of demarcation of villages in deara tracts.*—This matter is dealt with by the Superintendent of Surveys in paragraph 5 of his Report and by the Board in paragraph 14 of their note. Captain Crichton's proposals for the traverse work in such areas appear to be sensible, but they do not meet the whole difficulty; and the Lieutenant-Governor will await the Board's proposals as to the necessity of amendment of the law with regard to the definition of a village contained in section 3(10) of the Bengal Tenancy Act.
- (2) *The maintenance of boundary marks.*—(Paragraph 9 of the Settlement Report and paragraph 19 of the Board's note.) Legal questions on this subject have been referred by the Board to the Legal Remembrancer. The Government of India have pressed for a report on the subject, and it will be dealt with as early as possible.
- (3) *The lasting value of Mr. Finucane's settlement of 1878 in the Alapur Pargana of Darbhanga.*—(Paragraph 35 of the Settlement Report and paragraph 21 of the Board's note). The Settlement Officer reports that in this area the settlement staff found practically no rent disputes, that the rents recorded by Mr. Finucane had remained unchanged to the present day, and that disputes regarding other matters were not numerous, and were easily settled to the satisfaction of all concerned by a reference to Mr. Finucane's papers. The Lieutenant-Governor agrees in the Board's remark that these results are evidence of the value of settlements, even without Government revision.
- (4) *Recovery of cost of Survey and Settlement.*—(Paragraphs 48 and 103 to 105 of the Settlement Report and paragraph 22 of the Board's note). The recovery work in Darbhanga, where only Rs. 198 now remains due out of a demand of Rs. 4,37,880 payable by nearly half a million landlords and raiyats, has been extraordinarily successful. This work has not been so successful in Chitragong, no doubt because of the greater intricacy of the tenures in that district, and because the work was undertaken some time after the records had been finally published.
- (5) *The record of Proprietor's private land in Darbhanga.*—The Lieutenant-Governor has been struck with the small number of parcels of "proprietor's private land" recorded in Darbhanga (Appendix IV of the Settlement Report). In 983 villages in Darbhanga for which records were attested in 1900-1901, only eight such parcels of true *sir* land were recorded as against 9,016 parcels of land recorded as held by the proprietor but not private land. It is desirable that the principles on which this classification has been made should be examined, and the Lieutenant-Governor will await a report from the Board on this subject.
- (6) *The settlement of rents on the private estates in the Sonthal Parganas.*—The Lieutenant-Governor has read with interest the extracts from Mr. H. McPherson's Report (contained in pages 15 to 17 of the Settlement Report), with regard to transfers, and with regard to the rents settled in the Sonthal Parganas zamindari estates. The Settlement Officer's action in the matter of cancellation of transfers appears to have been careful and considerate, but there are other questions which need separate reference and discussion.

5. The Lieutenant-Governor thanks Mr. Lyon and Captain Crichton for their zealous and capable supervision of the survey and settlement operations of the Province. He also notices with pleasure the commendations which these officers have recorded of the work of the officers of the Survey and Settlement staff.

ORDERED that this Resolution be published in the *Calcutta Gazette* and that a copy of it with copies of the two Reports be submitted to the Government of India.

By order of the Lieutenant-Governor of Bengal,

W. C. MACPHERSON,

Offg. Secretary to the Govt. of Bengal.

No. 1781.

COPY, with a copy of the Survey Report, forwarded to the Deputy Surveyor-General in Charge, Revenue Branch, Survey of India, for information.

No. 1782.

COPY, with a copy of the Settlement Report, forwarded to the Appointment Department of this Government for information, with special reference to paragraph 5 above.

No. 1783.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board, with special reference to paragraphs 2, 4(1) and 4(5) above. A separate letter will be addressed to the Board with reference to paragraph 4(6) of the Resolution.

By order of the Lieutenant-Governor of Bengal,

L. E. B. COBDEN-RAMSAY,

Under-Secretary to the Govt. of Bengal.

CALCUTTA,
The 18th March 1902.

ANNUAL REPORT
ON THE
SURVEY OPERATIONS IN BENGAL
DURING THE YEAR
1900-1901.

From 1st October 1900 to 30th September 1901.



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