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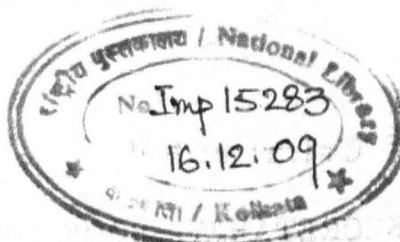
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NOTE.

THE situation regarding the items dealt with in paragraph 14 of this report changed considerably between the writing of the report in October 1908 and its publication, but it has been found impossible, without serious delay, to make the necessary corrections in the report.

F. C. HIRST, CAPTAIN, I.A.,

*Offg. Superintendent of Provincial Surveys, Benga..*



ANNUAL REPORT

OF

THE SUPERINTENDENT OF PROVINCIAL SURVEYS, BENGAL

ON THE

SURVEY OPERATIONS IN BENGAL (OTHER THAN  
CADASTRAL SURVEYS)

DURING THE YEAR 1907-08.

---

No. 4758  
R-7.

FROM CAPTAIN F. C. HIRST, I.A.,

*Offg. Superintendent of Provincial Surveys in Bengal,*

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

*Dated Hazaribagh, the 15th December 1908.*

SIR,

I HAVE the honour to submit my report on the Survey operations in Bengal during the past survey year, namely from 1st October 1907 to 30th September 1908.

2. I have been in charge for the whole period under report.

## CHAPTER I.

## GENERAL REMARKS.

3. The outturn of the year, namely 5,107 square miles of traverse survey, and 1,311 square miles of topographical survey, is considerably less than last year; the main reason for this deficit is the final transfer, which culminated in handing over the cadastral portion of No. 4 Party (Bihar) to the Settlement Department, on 1st October 1907, of all Cadastral survey to the control of the Director of Land Records.

The programme assigned to me was, in all cases, completed.

*Changes during the year.*

4. On 1st October 1907 the two cadastral sections of No. 4 Party (Bihar) were handed over bodily to the Settlement Department. The change was made with the utmost smoothness; there were two reasons for the absence of any hitch; first the fact that the transfer was deliberately and not hastily made (as was the case of a similar transfer of No. 5 Party's cadastral sections on 1st October 1905); the result of deliberation was that I was able to make use of the experience obtained when No. 5 Party was reduced and was able to give Mr. N. Bedford, who was in charge of No. 4 Party, a definite procedure which was to be followed in each of the many items of organization which had to be handed over to Mr. Murphy, I.C.S., the Settlement Officer of Bihar. I lay no claim to credit for this, and am glad to have this opportunity on placing on record the thorough way in which Mr. Bedford, assisted by his staff, carried out the transfer. The second reason for smoothness was that Mr. Murphy had the experience of the Chota Nagpur incident behind him, and I feel certain that his hearty co-operation with us on all points, and his free consultation with Mr. J. Reid, I.C.S., Settlement Officer of Chota Nagpur, was a very important item in the settlement of many of the difficulties which must crop up on an occasion such as that reported on here. I consider that the Settlement Department has every reason to be grateful to Mr. Bedford, and that we, on our side, have much reason for gratitude to Messrs. Murphy and Reid.

5. The traverse sections of Nos. 4 and 5 Parties were amalgamated with the head-quarters sections of those parties at the beginning of this survey year; these amalgamations were the first steps in the direction of the placing of all Traverse work in Bengal under one executive officer. Numbers 4 and 5 Parties are now in process of being formed into one charge, the final organization of which will be completed by November 1st, 1908. I acknowledge that the change just referred to might have been made at one time; it was, however, considered best to use caution, and now that we know that the preliminary steps proved advantageous administratively and economical executively, there remains no reason for postponing the final move.

6. In paragraph 3(f) of my last year's report, I mentioned that our accounts system was receiving considerable attention. In that report I was over sanguine and the changes I expected did not take place until a new system, based on the principles on which the Settlement Department works its accounts, was introduced in my own office and that of No. 4 Party during the recess of 1908. The new system already existed in the Bengal Drawing Office, and at present all the Bengal Survey accounts, with the exception of those of No. 5 Party and the Calcutta Surveys, are similar in principle. The amalgamation of Nos. 4 and 5 Parties will only leave one section which works under the old principles; and I do not propose any alteration in its case at present. The work of the Calcutta Surveys is in many ways unusual and it appears to be best to leave its case undecided until Major Crichton returns to India.

I must acknowledge the cordial help given by all ranks in the introduction of the new system; Mr. Picachy, who was kindly lent me by the Accountant-General, Bengal, has throughout given all possible help and his services have been of the utmost value.

At present, since the Eastern Bengal Survey work is still under my control, and since the old system of accounts still exists in the Eastern Bengal

Surveys, there are two sets of accounts in vogue in my office; some confusion necessarily results, but the relief given by the new system more than compensates for any discomfort which we are experiencing.

One result of the new system is a considerable reduction in establishment.

7. During the year attempts have been made to wipe off many outstanding advances of pay, etc., which our accounts had, for sometime past, shown. The Accountant-General has been kind enough to help us by advice and co-operation, and I am glad to be able to report a practically clear sheet. The outstandings were really the result of our employing a temporary staff with too small a stiffening of pensionable labour, and in addition, were caused by the possibility of laxness in audit which the old system of accounts permitted. I do not think it possible for a similar situation to arise again. I should mention here that Major Crichton inaugurated the campaign against the outstandings and all that I have done has been to complete his plans.

8. Frequent transfers amongst executive officers and the changes caused by the giving up of the cadastral survey by the Survey of India have necessitated a complete examination of our instrumental and other equipment. Such discrepancies, as were found, have been adjusted, and our equipment is now fully accounted for. Pending the reorganization of local surveys, which I understand, is just ahead of us, the whole equipment has been overhauled and improved as far as is possible; there is, however, still room for improvement.

9. Suggestions have been forwarded to the Board of Revenue for fixing my powers; at present, in some cases I have less power than an officer in charge of a Party of the Survey of India, serving directly under the Surveyor-General; in other cases powers in excess of those which I really need have, in the past, been assumed to be permissible. It is hoped that the suggestions recently put forward will result in such clearly defined powers as will give accounts officers a proper control of our spending powers, and will stop that hampering of the Superintendent which at present is unavoidable.

10. The future of Bengal Surveys has, during the year, been freely discussed. It is proposed that Bengal and Eastern Bengal and Assam shall each have its own Survey Department, but nothing definite has yet come of these proposals. The brief statement above gives no idea of the very considerable amount of work which the proposals have thrown on me; this work has included the practical formation of two new departments in addition to my ordinary work, since it is hoped that the partition will take place from the beginning of the next survey year. My arrangements more or less are complete, and on the arrival of Major Crichton a few weeks hence, it should be possible for the two departments to be working independently within a very short time. The present basis of organization is that nothing should be done which would in any way militate against efficiency should the proposed change not take place, and that such changes as Major Crichton may wish to make should be permissible after his return. It will be understood that the necessity for the two provisos given above has not tended to simplify my work, but it is clear that those provisos were essential under the circumstances.

11. In the Board's letter No. 4978A., dated the 18th December 1907 sanction was given for the prosecution of a *diara* survey on a new system and on a somewhat large scale of operations. The details of arrangements had been written out and such preliminary work as should have been done in the latter half of this survey year was about to commence, when it was decided to postpone the work. Because the scheme is based on my own suggestions, I am leaving full notes for Major Crichton's information, as this work, when taken up, will be administered by him.

12. The head-quarters of my office have been moved from Dinapore to Hazaribagh. Numbers 4 and 5 Parties also keep their permanent head-quarters at Hazaribagh. This move has tended to reduce correspondence and has certainly simplified accounts difficulties. A second reason for this move was to see if it was not possible to avoid camp offices in the field; the working of the field-season under review has proved that field offices under existing circumstances can be dispensed with, and the result will be a considerable saving of money; this saving should show itself in the next survey year.

13. It had been hoped that the Bengal Drawing Office would be relieved of work for Eastern Bengal by the end of the survey year; the hope was premature, but it seems probable that the end of the financial year will see the Bengal Drawing Office working only for Bengal. I am about to submit final plans for buildings and estimates for plant, etc., to the Eastern Bengal and Assam Government.

14. Proposals have been put forward for a new system of making Thana maps; greater accuracy is aimed at and the proposals embrace:—

- (a) The abolition of Standard mapping in the Local Drawing Office.
- (b) The abolition of Traverse charts as now prepared for the Surveyor-General.
- (c) The preparation of Thana maps on a proper projection and the publication of them in colours. The scheme allows for similar details as those now shown on Standard maps being shown on Thana maps.
- (d) The providing of the Surveyor-General 1" detailed maps by thanas for supplementary survey purposes.
- (e) In (d) is included the showing of all permanent marks left on the ground and the provision separately of a co-ordinate index to those marks.

The Surveyor-General has accepted the above proposals and I only await the wishes of the Eastern Bengal and Assam Government to put forward detailed rules for the preparation of the maps and indices in the new style.

15. Steps are at present being taken to take over and store in the Bengal Drawing Office, the Revenue Survey maps of the province; these are at present racked in the head-quarters office of the Survey of India.

16. The index maps in this report have been reproduced in the Bengal Drawing Office instead of in the head-quarters office of the Survey of India and I have practically completed estimates for submission to the Board for the taking over, by the Bengal Drawing Office, of the printing of maps and the charts for all the annual reports of heads of departments in Bengal.

17. Practically all the theodolites in Bengal surveys have been sent to the Mathematical Instruments Office to be converted to the railway pattern of stand; the result should be a more rapid outturn in the future.

18. The Sunderbans survey having been completed the Topographical Section of No. 6 Party is being broken up.

19. A considerable number of minor changes have been introduced during the year, but they are not of sufficient importance to be entered here.

#### *Miscellaneous.*

20. Attention is drawn to the remarks made in paragraph 49, regarding the comparison of direct distances obtained from traverse work with those obtained by triangulation.

21. The approximate programme for the next year is:—

- (1) 1,600 square miles of the Shahabad district.
- (2) 296 square miles of the Manbhum district.
- (3) 1,400 square miles of the Hazaribagh District.
- (4) Several miscellaneous surveys.

22. Lieutenant R. Foster, I. A. was deputed to Bengal surveys for training at the beginning of the survey year; he is making good progress.

23. The cost-rates and expense figures quoted in this report must not be looked upon as final. Under the existing system of accounts it is impossible to give final figures immediately after the close of a survey year. The introduction of the new system of accounts will, I hope, permit of accurate figures being given in future annual reports.

24. I have made every possible attempt to keep this report within the space allowed for it. Owing, however, to the importance of various subjects reported on, and to the extension of the Drawing Office programmes, I fear that the report may slightly exceed its page limit.

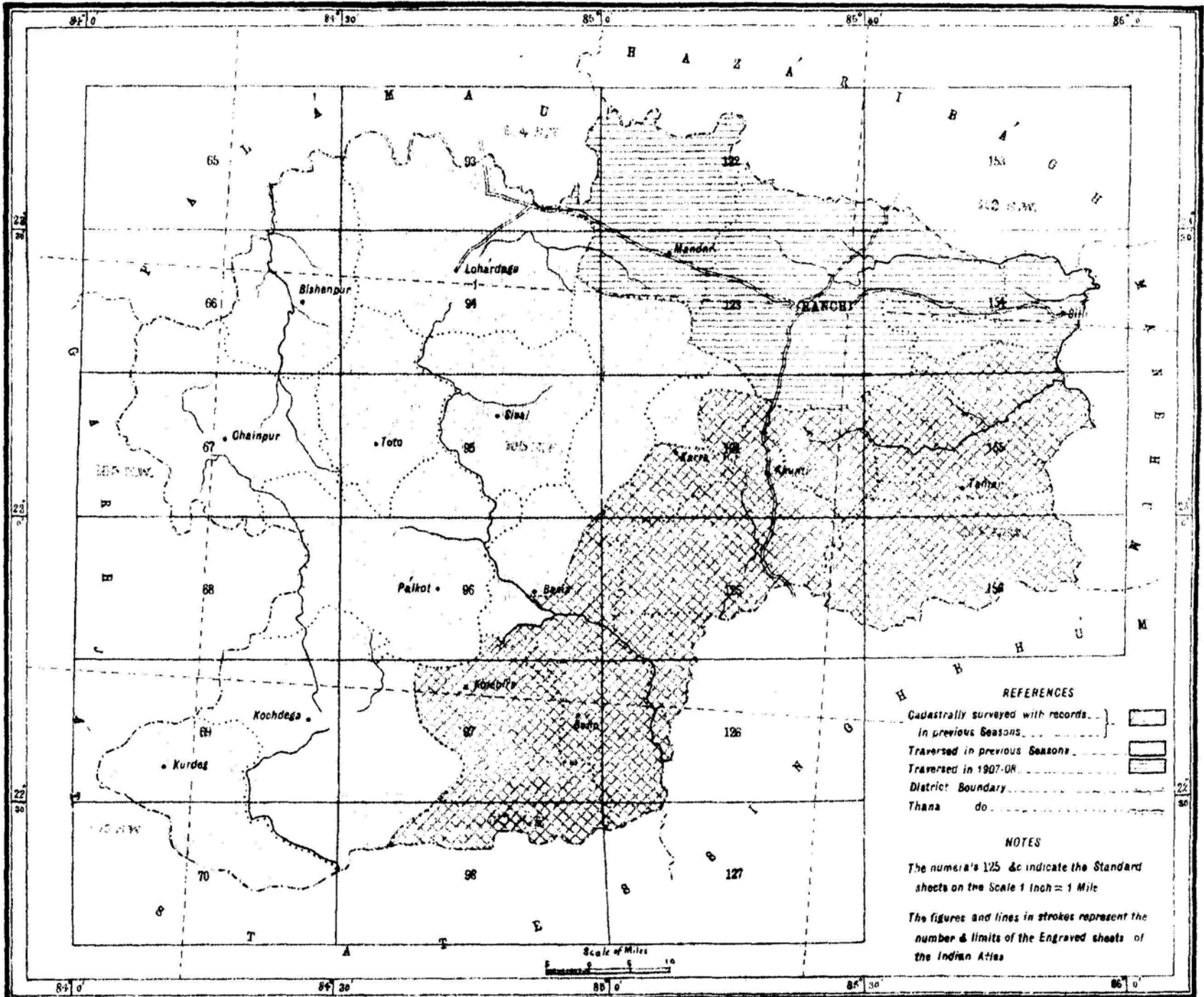


# BENGAL SURVEYS

## INDEX TO THE TRAVERSE & CADASTRAL SURVEYS IN DISTRICT RANCHI

1907 08

No. 5 Party.

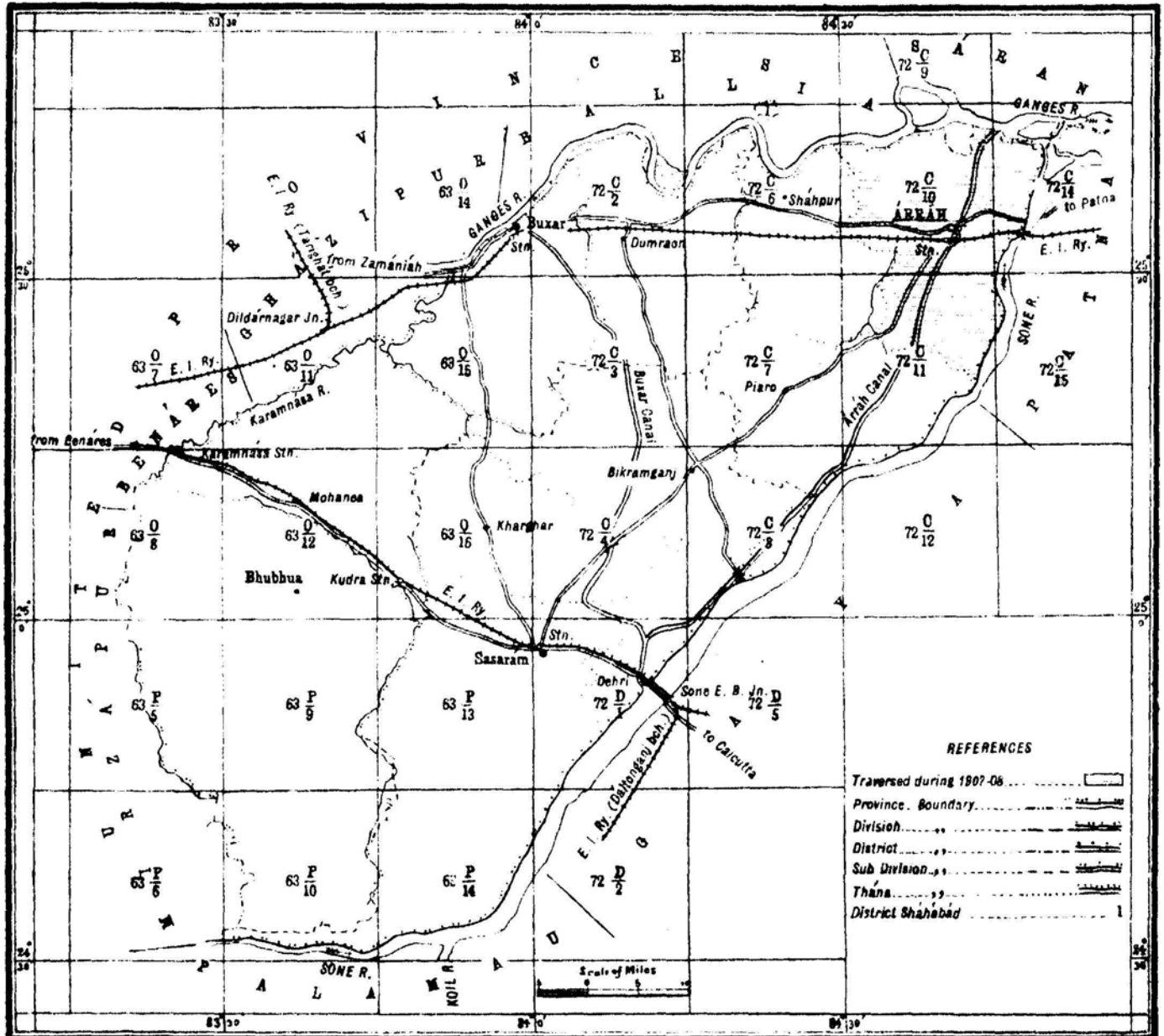


# BENGAL SURVEYS

## INDEX TO THE TRAVERSE SURVEYS IN DISTRICT SHAHÁBÁD

1907-08

No. 4 PARTY



**REFERENCES**

Traversed during 1907-08	
Province Boundary	
Division	
District	
Sub Division	
Thana	
District Shahábád	

**NOTES.**—The Longitudes are referrible to the Greenwich Meridian.  
 The numbers 63  $\frac{P}{10}$ , &c. indicate the 15X15 Standard sheets on the Scale 1 Inch = 1 Mile.

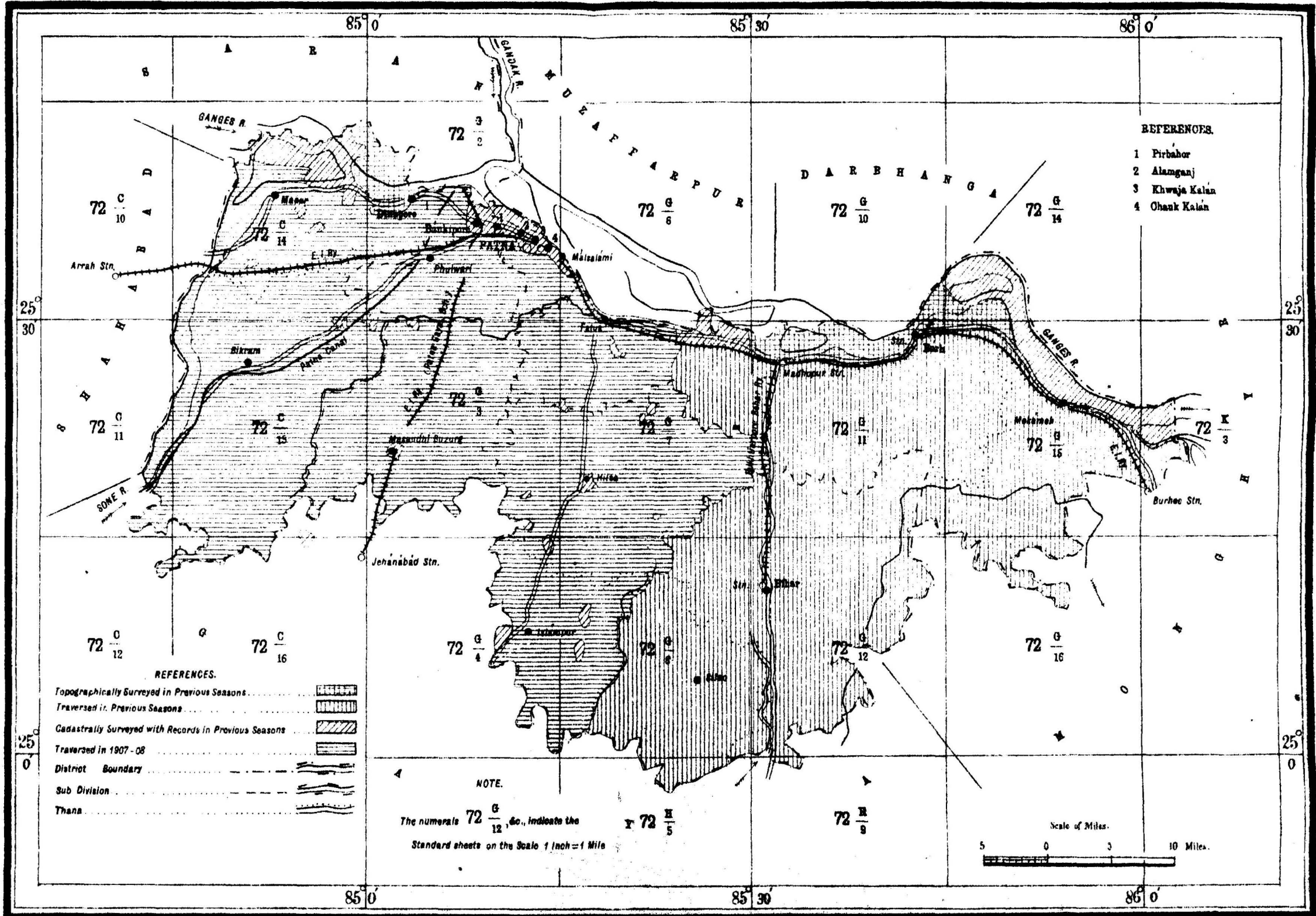
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# BENGAL

1807-08

## INDEX TO THE TRAVERSE & CADASTRAL SURVEYS IN DISTRICT PATNA

No. 4 Party.



### REFERENCES.

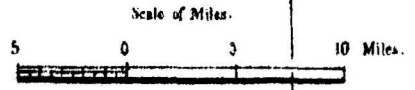
- 1 Furbahar
- 2 Alamganj
- 3 Khwaja Kalan
- 4 Ohank Kalan

### REFERENCES.

- Topographically Surveyed in Previous Seasons
- Traversed in Previous Seasons
- Cadastrally Surveyed with Records in Previous Seasons
- Traversed in 1907-08
- District Boundary
- Sub Division
- Thana

### NOTE.

The numerals 72  $\frac{G}{12}$ , &c., indicate the Standard sheets on the Scale 1 inch = 1 Mile



## CHAPTER II.

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

## PART II.—REPORTS ON SURVEYS IN PRIVATE ESTATES.

## PATNA DISTRICT.

25. An area of 1,141.72 square miles falling in thanas Islampur, Hilsa, Fatua, Patna, Phulwari, Dinapur, Maner, and Bikram was traversed for cadastral survey. This area includes 23.90 square miles of Government and Tikari Estates as well as the Dinapur Cantonment; credit has been taken for this 23.90 square miles in this report as it is made up of small scattered areas.

26. There are 24,757 new theodolite stations in the area, and these were marked with 4,021 stones, 19,644 clay cylinders and 1,092 pegs.

27. Two great trigonometrical stations were connected with and 107 azimuths observed and computed. The direct distance between these stations by traverse, as compared with the distance by triangulation, is 8.8 feet per mile in defect.

28. The mean magnetic variation is  $1^{\circ} 15'$  East.

29. The plots of the area fall on 2,478 sheets. These together with 4" plots and 2" reductions for "thana" maps have been despatched to the Settlement Officer of Bihar.

30. The origin adopted was the same as last year *viz.* the intersection of North Latitude  $25^{\circ} 30'$  with East Longitude  $85^{\circ} 30'$ .

31. The demarcation was well done, and the comparison with the Revenue Survey maps shows little difference between the old and new boundaries.

32. The whole work proved well mathematically, and all the computations are complete.

## SHAHABAD DISTRICT.

33. An area of 347.15 square miles falling in thana Arrah, was traversed for cadastral survey; this includes 2.26 square miles of the municipal lands already surveyed. The *diara* areas of the thana were omitted and will be surveyed later.

34. Of the 762 villages traversed some were very small in extent; the smallest was about a quarter of an acre; it would appear to be advisable that such small villages be amalgamated with their neighbours for they are very apt to become lost altogether. The Settlement Officer will deal with this point next year.

35. There were 7,057 new theodolite stations in the area; 1,291 were marked with stones, 5,358 with clay cylinders, 119 with bricks, 34 with iron pegs and 255 with wooden pegs.

36. As no great trigonometrical stations exist close to this area, no connections were made. Thirty-one azimuths were observed and computed.

37. The mean magnetic variation is probably  $1^{\circ} 15'$  East. This district is abnormal and any variation should be accepted with great caution.

38. The plots fall on 701 sheets; these with 4" and 2" reductions have been sent to the Settlement Officer of Bihar.

39. The origin adopted was the intersection of North Latitude  $25^{\circ} 15'$  with East Longitude  $84^{\circ} 15'$ .

40. The demarcation by the inhabitants was good.

41. The whole work proved well mathematically and all computations are complete.

## RANCHI DISTRICT.

*Traverse Survey.*

42. In this District an area of 1,208 square miles remained for completion. This area was traversed during the year; it covers thanas Barma,



Mander, Ranchi (including Urumanjhi), Argara and portions of Rahe and Silli. About one-third of the area consists of high hills covered with jungle; the balance is open and undulating.

43. Practically no demarcation was done by the inhabitants and the traversers were guided by lists of villages obtained from the Deputy Commissioner. Although demarcation was not attempted by them, the inhabitants freely gave help in other directions.

44. The origin used was that adopted in previous years, viz.,—the intersection of North Latitude  $22^{\circ} 30'$  with East Longitude  $86^{\circ}$ .

45. One hundred and eighty-nine azimuths were observed and the mean magnetic variation is  $1^{\circ} 15'$  East.

46. In the hilly area the substense bar was frequently used; here the health of the establishment was indifferent; seven men died of malarial fever and its effects, and one from snake-bite.

47. As heretofore local stones were used to mark traverse stations. In all there were 24,612, new stations. Of these 19,671 were marked with stones (trijunctions having a triangle and dot cut in them and other stations a broad arrow), 3,112 with pegs and 1,802 had marks cut on rocks *in situ* and 27 backed clay cylinders.

48. Double chains of different lengths were used on all main and sub-circuit work, and on village work in the hilly area.

49. Five great trigonometrical stations were connected with; the average error in direct distance per mile of traverse work, as compared with the triangulated distances was 7.7 feet per mile; the traverse work, generally, however, proves within a much smaller percentage of error; our method of comparing is the only one possible, and it is unfortunate that it often tends to give an erroneous idea of the accuracy of the measurements. It is interesting to note that triangulated distances take no account of irregularities in the earth's surface while the Traverser is compelled to take the surface as he finds it. Personally I do not consider the comparison of direct distances between great trigonometrical stations, as arrived at by traverse, with those obtained by triangulation to be of any great value, and I think that the true test is the amount of correction applied to the traverse work to make it prove. It is a peculiar thing that the more round about the course from which direct traverse distances are arrived at the better the result; the comparison we use is that by the *shortest* available routes and how far it is fair to compare work from its *worst* point of view with a triangulation which has served as a model of accuracy to the world is, at first sight, distinctly open to question. It practically never occurs that a direct distance derived from traverse work is as long as that obtained by triangulation and all the past reports of Revenue Surveys bear this fact out; the error is made up of the stretching of chains and surface inequalities and on the average errors of several years past, the correction needed is  $\frac{1}{2}$  to  $\frac{3}{4}$  of an inch per 66 feet. I have written at length on this point so as to disarm criticism in the future; the results of comparison as we show them are not absolutely true guides to the accuracy of the traverse work and they should not be taken as such. If then we used chains of known inaccurate length (one-half to three-quarters of an inch short in a 66 foot chain), we should obtain better results by the *shortest* route, but worse by longer route of traverse; to adopt such a course is therefore of no advantage.

50. The entire work has proved well mathematically and the plots and records are, at the time of writing, practically ready for despatch.

51. The area has been plotted on 1,705 sixteen-inch sheets, and 52 two-inch sheets; the last are to form the basis of the Thana maps.

#### MIDNAPUR DISTRICT.

##### *Traverse Survey.*

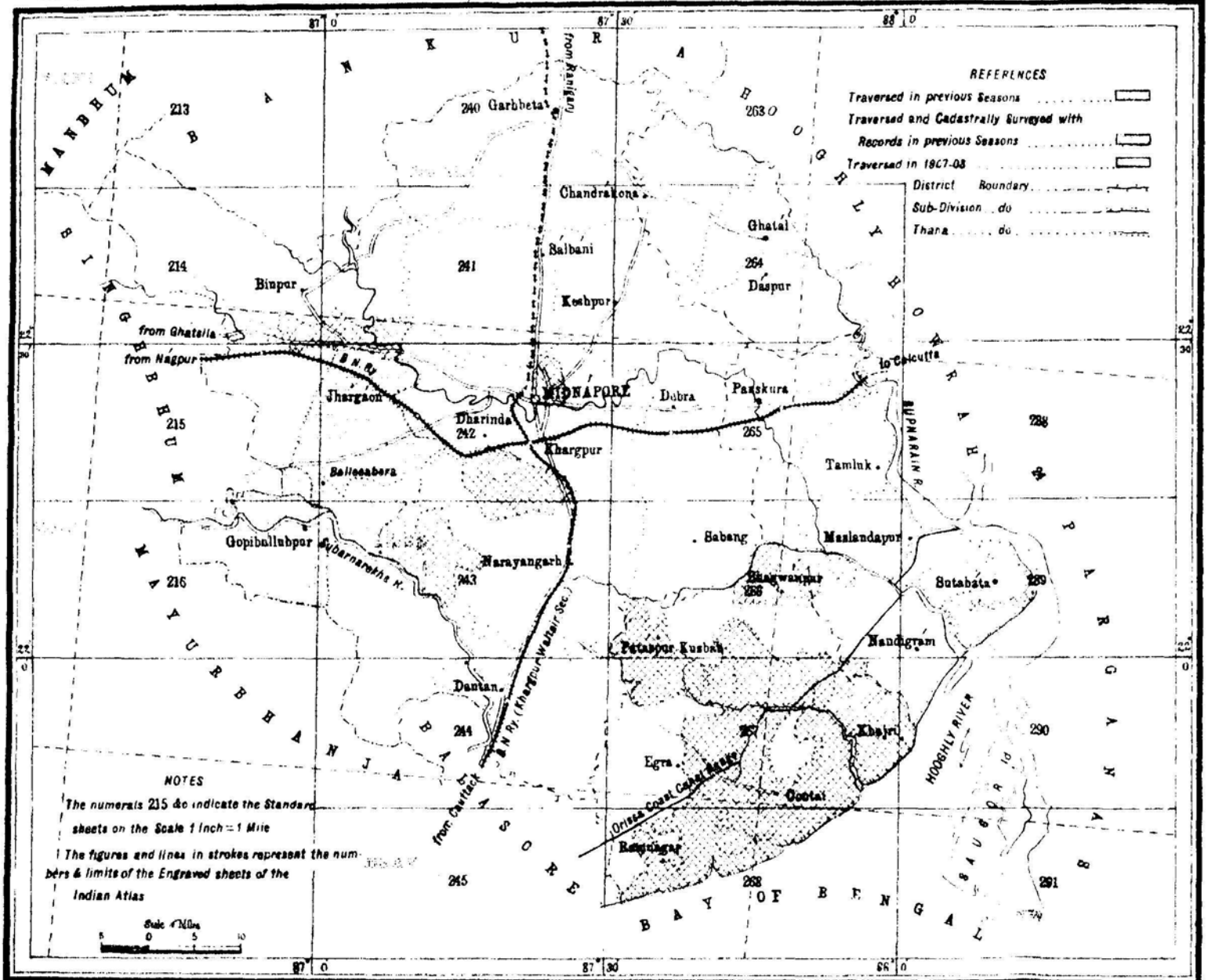
52. The Jhagram and Chiara Estates, falling in thanas Jhagram and Gopiballabpur respectively, covering an area of 210.59 square miles were traversed for cadastral survey in the same year.

# BENGAL SURVEY.

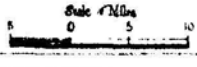
## INDEX TO THE CADASTRAL SURVEY IN DISTRICT MIDNAPORE

1907-08.

No. 5 PARTY



**NOTES**  
 The numerals 215 do 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

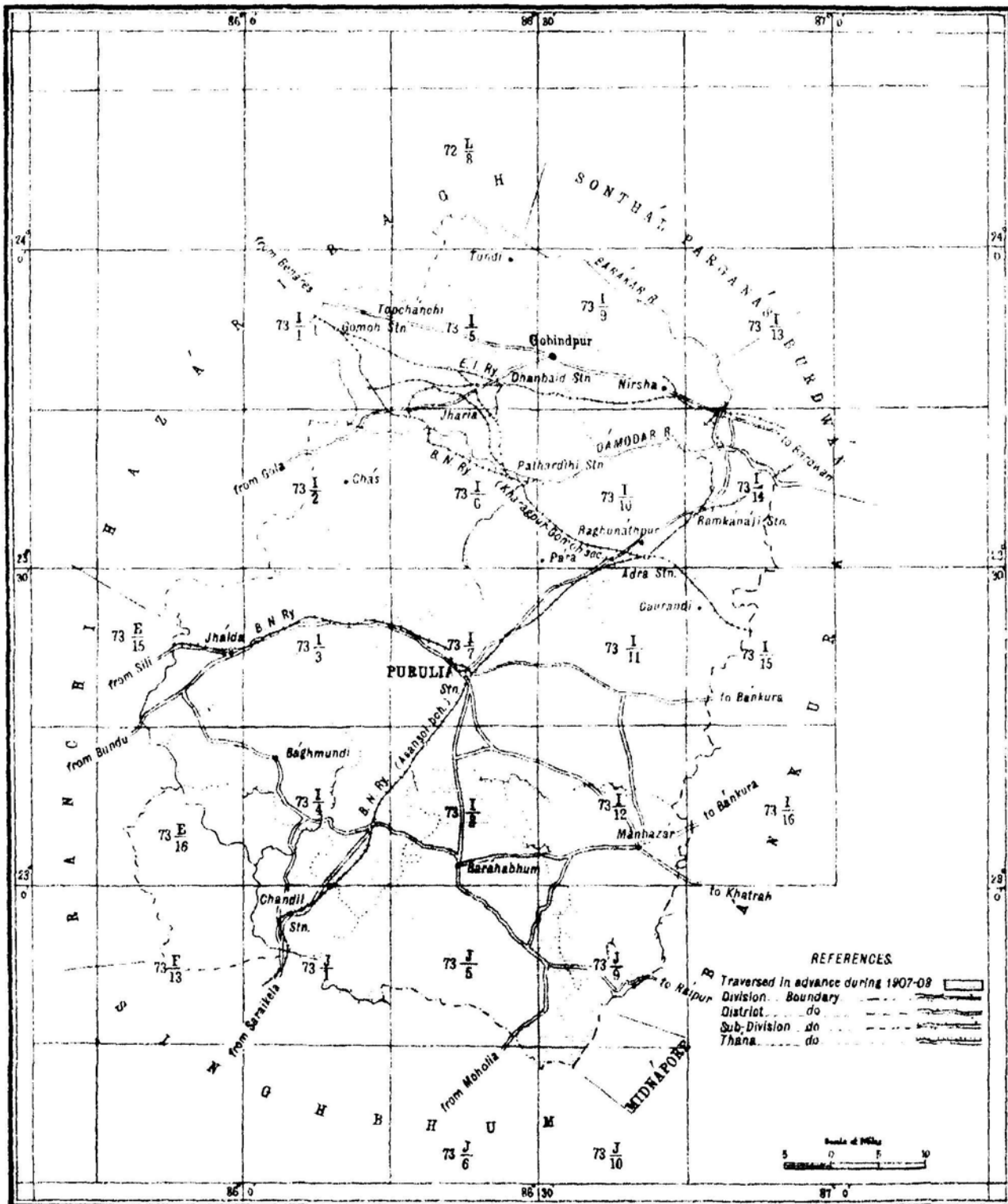


# BENGAL SURVEYS

## INDEX TO THE TRAVERSE SURVEYS IN DISTRICT MANBHUM

1907-08.

No. 5 PARTY



Printed in B.D.O.

NOTES: The Longitudes are referable to the Greenwich Meridian.

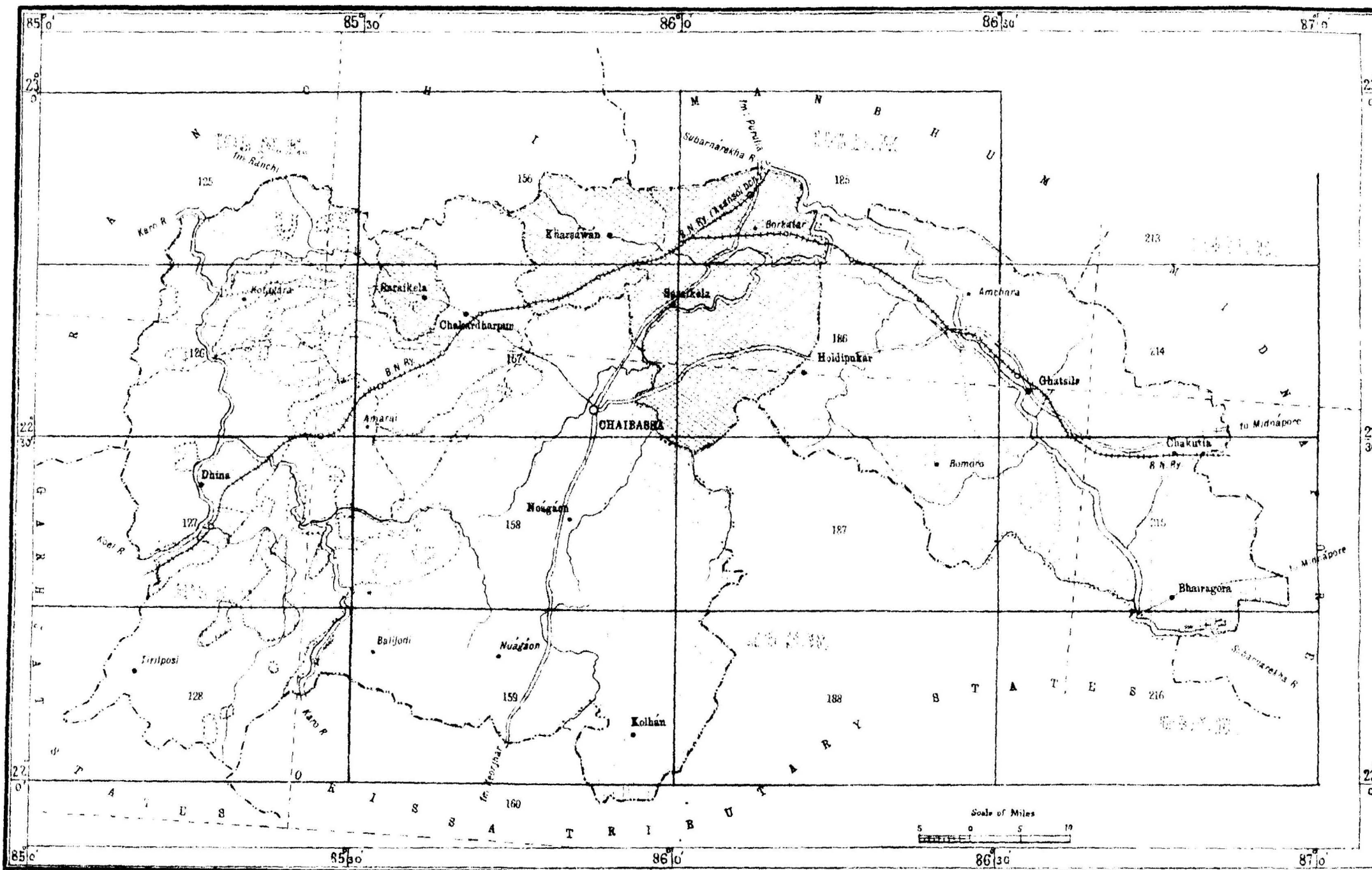
The numbers 73 J/10 &c., indicate the 15x15 Standard sheets on the Scale 1 Inch=1 Mile.

# BENGAL SURVEY

## INDEX TO THE CADASTRAL SURVEY IN DISTRICT SINGHBHUM.

1907-08

No. 5 PARTY



### REFERENCES

State	Boundary	
District	do	
Political State	do	
Thana	do	

### NOTES

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

### REFERENCES

Traversed and cadastrally Surveyed	}	
during previous Seasons		
Traversed during previous Seasons	}	
Traversed during 1907-08		

### NOTES

The numerals 215, &c., indicate the Standard sheets on the Scale 1 inch=1 Mile

53. In spite of a considerable portion of the area surveyed being covered with jungle the area embraced 595 villages.

54. The demarcation was carried out by a kanungo appointed by the Collector; in open country it was well done, but in the jungle it was, not unnaturally, defective. The inhabitants gave a reasonable amount of voluntary help.

55. The health of the establishment was very fair.

56. The origin used was the intersection of North Latitude  $22^{\circ} 30'$  with East Longitude  $87^{\circ} 30'$

57. Twenty-seven azimuths were observed and the mean magnetic variation is  $1^{\circ}$  East.

58. The substense bar was used occasionally.

59. The system of marking survey stations was mainly that adopted throughout Bihar. In all there were 5,392 marks embedded; of these 1,084 are trijunction stones, 3,915 earth on cylinders, 141 galvanized cylinders (used for satellite stations on the outer limits of the area), 228 wooden pegs, 23 country stones and one mark cut on a rock *in situ*. The first two kinds of marks were adopted in places where the others were unsuitable, and the stones were marked as in Ranchi.

60. As the plots had to be sent in batches during the field season to the Settlement Officer (Mr. Hodgson) it was found necessary, so as to avoid, as far as was possible, the chances of linear errors which would have delayed the issue of the plots, to use two chains of different lengths.

61. Two great trigonometrical stations were connected with and the traverse work compared with the triangulated distances, averaged in error 4.7 feet per linear mile.

62. The work was plotted on 664 sixteen-inch and 15 four-inch sheets. All computations are complete, and only a little binding remains to be done.

#### SINGHBHUM DISTRICT.

##### *Traverse Survey.*

63. In the Bengal Government's Notification No. 2684T.—R., dated the 29th October 1907, orders were issued for the survey of the following villages, which in area cover 14.18 square miles and fall in the tenure of Babu Abhiram Taung, in Thana Monoharpur:—Duribuli, Nandapur, Manharpur, Dukurdih, Patharbassa and Sarigidi.

64. The country is very rough and jungly and the frequent use of the substense bar was necessary.

65. The preliminary demarcation was not good.

66. The origin used for the rest of this district, viz., the intersection of North Latitude  $22^{\circ} 30'$  and East Longitude  $86^{\circ}$  was adopted.

67. Two azimuths were observed; the mean magnetic variation is  $1^{\circ}$  East.

68. The health of the establishment was fair.

69. The villages were plotted on 18 sixteen-inch sheets and on 1 two-inch sheet and these are about to be sent to the Settlement Officer.

70. The work proved well and is connected with our former work in the district.

71. In all there were 339 stations embedded. Of these 13 are trijunction stones, 321 stone prisms and 5 wooden pegs.

#### MANBHUM DISTRICT.

##### *Traverse Survey.*

72. The programme comprised the traverse survey of Pargana Barabhum and covered an area of 638 square miles. More than half of this area consists of hills with a maximum height of 3,060 feet; the remainder comprises undulating plains; the country is wild and the scenery is, in places, magnificent.

73. Demarcation by the inhabitants was conspicuous by its absence; although at a later stage some help was given, the attitude of the people was almost hostile.



74. The health of the establishment was good; two men died, but their deaths were probably due to general debility caused by previous service in Ranchi.

75. The origin adopted is the intersection of North Latitude  $23^{\circ} 30'$  with East Longitude  $86^{\circ} 30'$ . All the longitudinal values of stations of the adjoining district of Singhbhum (closed with old values), as well as those of all great trigonometrical stations connected with, have been reduced by  $2' 27.18''$  so as to bring them into terms of the latest value of the Madras Observatory.

76. Four great trigonometrical stations were connected with; the average error per mile by traverse, compared with that per mile by the triangulation, is 10.98 feet. Dalma hill station (3,060 feet) is within reasonable distance of the Bengal-Nagpur Railway, and seems to afford possibilities for a small hill resort; it would be very accessible from Calcutta and the vicinity is healthy.

77. One hundred and five azimuths were observed and the mean magnetic variation is  $1^{\circ} 15'$  East.

78. The subtense bar was frequently used and in the hilly portions line clearing was exceptionally heavy.

79. In all there are 13,998 theodolite stations in the area; these were marked with 1,074 stone prisms (in open tracts), 8,361 local stones (in hilly country), 3,081 baked earthen cylinders, 1,130 wooden pegs and 352 marks cut on rocks.

80. Two chains of unequal length were used in all main and sub-circuit work.

81. The area is mapped on 956 sixteen-inch and 20 two-inch sheets. Most of them have already been sent to the Settlement Officer and the balance will follow shortly. A certain amount of binding work remains to be completed; this will be finished before the field is taken again.

82. Barabhum Pargana was dealt with in the Revenue Survey of 1865-66, but village boundaries were not surveyed; as far as possible then, with the help of lists of villagers supplied by the Deputy Commissioner, present possession boundaries have been traversed.

#### PART II (a).—TOPOGRAPHICAL SURVEYS.

##### DISTRICT KHULNA (SUNDERBANS).

###### *Traverse Survey.*

83. The programme, which coincides with the Topographical programme reported in paragraph 92 *et seq.* consisted of the completion of the survey of the Government Reserved Forests in the Khulna (Sunderbans) on the 2" scale, and the survey of Lot 165 of district Khulna on the 4" scale. The area traversed was 1,311 square miles, of which 310 represent water. The remainder consists of forest land intersected by innumerable *khals* or water channels.

84. The camp took the field on October 28th, and started work, with Rampal as head-quarters, on the 16th November 1907. The field season closed on April 10th, 1908.

85. No great trigonometrical stations were connected with, as there were none in or near the area; all attempts at connecting with the work of seasons 1904-05 along the Haringhata river failed, as the old stations could not be located. As the traverse work proved well the co-ordinates were continued from the work of the previous season, which was connected with the East Coast Series.

86. Seven thousand nine hundred and fifteen new theodolite stations were used; of these 3,398 were trunks of trees (the tops of 260 were encased with galvanized iron) and the remainder, 4,517, were pegs.

87. Two hundred and twenty azimuths were observed and the mean magnetic variation was deduced from them and found to be  $1^{\circ} 7' 42''$  East. I do not assign much value to this result and the magnetic survey party has not yet observed in this tract.

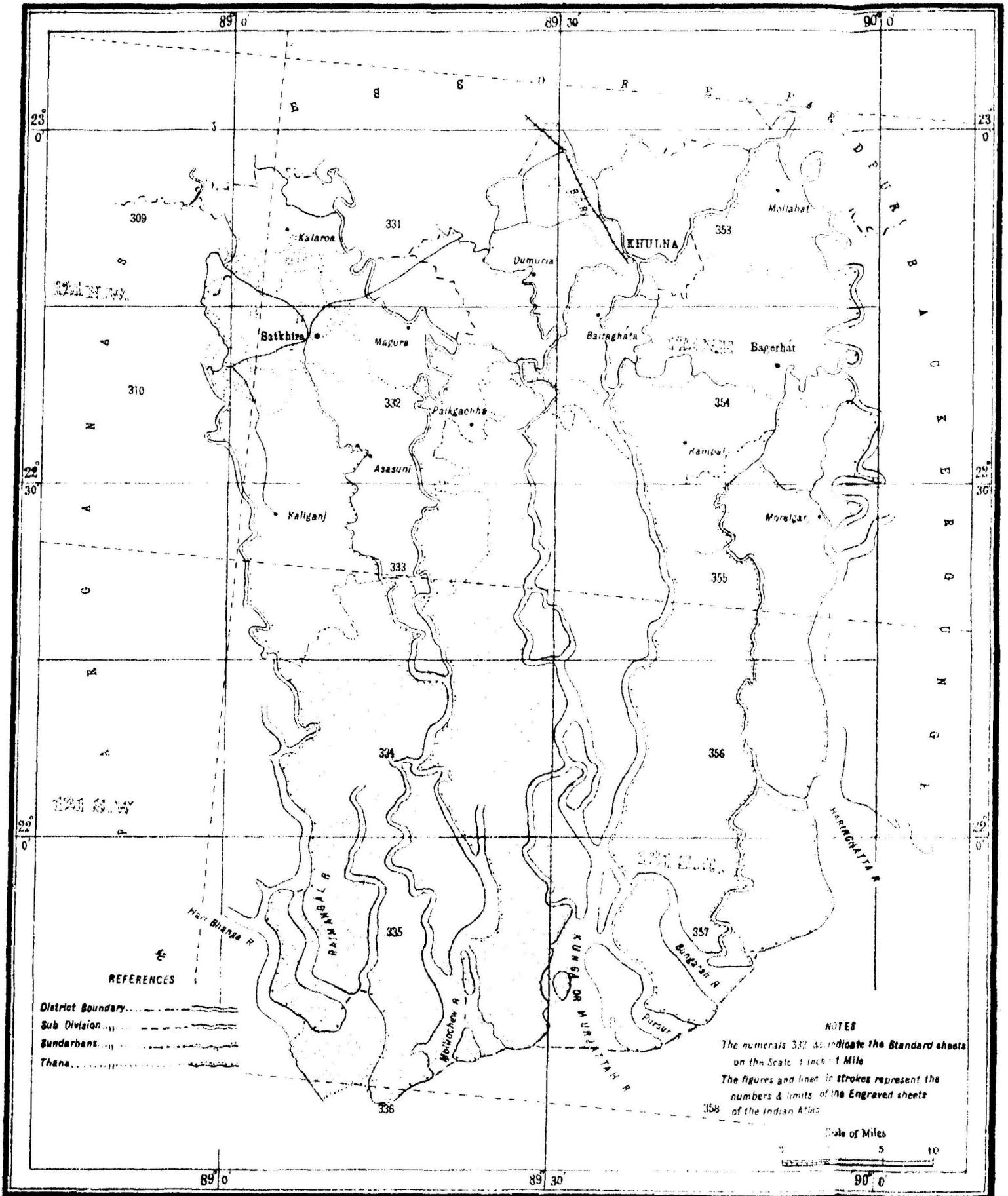
88. The system adopted in previous seasons, *vis.*, that of traversing rivers and streams by zigzags, distances being obtained by the subtense bar, was

# BENGAL SURVEY.

1907-08

INDEX TO THE TRAVERSE AND TOPO SURVEY IN DISTRICT KHULNA

No 6 PARTY



REFERENCES  
 District Boundary .....  
 Sub Division .....  
 Sundarbans .....  
 Thana .....

NOTES  
 The numerals 332 &c indicate the Standard sheets on the Scale of 1 Inch = 1 Mile  
 The figures and lines in strokes represent the numbers & limits of the Engraved sheets of the Indian Atlas

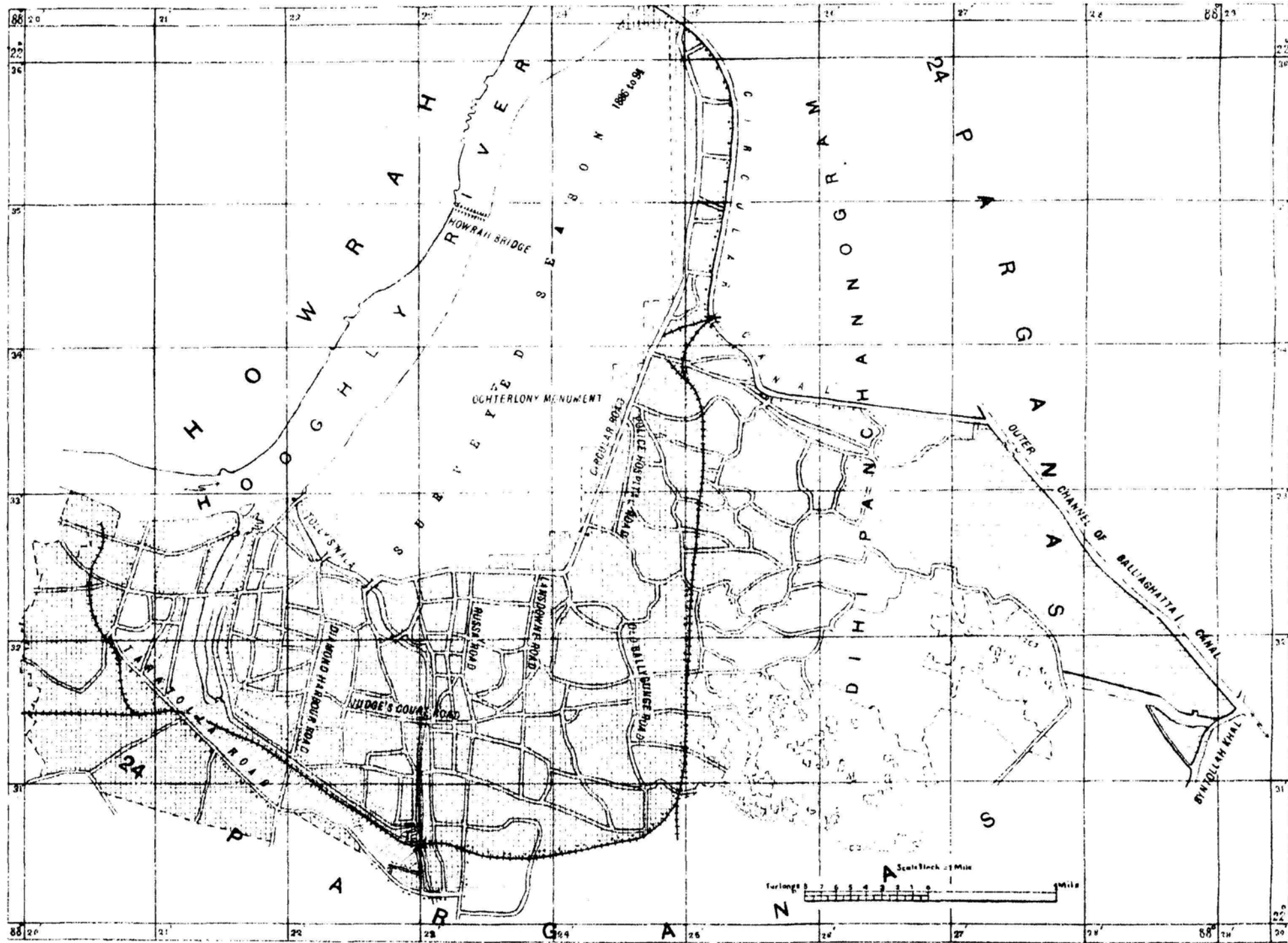
Scale of Miles  
 0 5 10

Cadastrally Surveyed in Season 1895-06 .....  
 Traversed in Season 1905-06 .....  
 Topographically Surveyed previous seasons .....  
 do do 2 Inches to 1 Mile 1907-08 .....  
 do do 4 Inches to 1 Mile 1907-08 .....

Printed in B.D.G.

INDEX TO THE SURVEY  
OF  
THE TOWN OF CALCUTTA AND ITS SUBURBS

1907-08



Season 1902 to 07

- Surveyed on Scale 50 feet = 1 Inch & records prepared
- Surveyed on Scale 50 feet = 1 Inch
- Surveyed on Scale 32 Inches = 1 Mile & records prepared
- Surveyed on Scale 32 Inches = 1 Mile

Season 1907-08

- Surveyed on Scale 50 feet = 1 inch & records prepared
- Surveyed on Scale 32 inches = 1 Mile
- Topographically revised on Scale 50 feet = 1 Inch
- Records prepared for Port Commissioner Acquisition
- Municipal Boundaries
- Dihl Panchannogram Boundary

Printed in B. D. O.



continued. The results proved well. In all there were 1,752 linear miles of new chaining.

89. The flotilla employed on this work consisted of 2 steam launches 2 flats and 86 country boats. All fresh water and all food had to be carried, for the whole establishment (about 500 men). One boat foundered in nine fathoms of water in a storm, but the occupants were saved, although they lost all they had with them.

90. The difficulties experienced in previous seasons were encountered, but in a much smaller degree. This was partly due to the establishment having become more accustomed to the circumstances attendant on work in the Sunderbans.

91. Cholera carried off six men and there were six other deaths from fever and dysentery. On the whole the establishment kept good health; this was perhaps due to the streams carrying more fresh water than those met with in previous seasons.

#### *Topographical Survey.*

92. The area referred to in the preceding paragraphs was topographically surveyed on the 2" scale (excepting Lot 165). The maps fall on 41 sheets and cover 1,257 square miles.

93. One thousand one hundred and nineteen linear miles of check survey were run and, in addition, 13 blocks were re-surveyed. The work checked was found to be well done.

94. Trace maps of the entire area have been prepared for the Deputy Conservator of Forests.

95. Lot No. 165 was traversed and topographically surveyed on the 4" scale at the request of the Settlement Officer. The area was 54 square miles and it adjoins the work reported on in my last report. Four hundred and sixty-two new theodolite stations were used, and these were marked with 1 *pucka* pillar, 6 galvanized iron cylinders and 455 pegs.

96. The area is comparatively high-lying and out of the 54 square miles only two represent water. Fifty-eight linear miles of check survey were run with excellent results.

97. The Settlement Officer has been provided with a trace map of the area.

98. The survey of the Sunderbans forest reserves has now been finished and this camp is being broken up; it has been a work of very great difficulty accompanied by considerable danger. This is the first accurate survey made in this area and for various reasons it would be advisable that a special report be published; this I hope to be able to take in hand shortly and the report will be submitted to the Board of Revenue, in due course. It will be sufficient to say here that the completion of the work reflects the very highest credit on the whole establishment employed and particularly on Mr. A. W. Smart as the officer in charge of No. 6 Party, and Mr. P. F. Delaney as his chief assistant. Although food and water have had to be carried for several seasons to an establishment of about 500 men, it is pleasant to be able to record that not a single man has died by failure in this most intricate *bandobast* and that only on one or two occasions has any member of the establishment been reduced to anything approaching a serious shortage of supplies. The Military Hospital Assistant, Roshan Ali is deserving of very special mention and I hope that the Board will see its way to recommending him for special promotion or for some suitable reward for his zeal and efficiency under most trying circumstances.

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#### PART III.—REPORTS ON MISCELLANEOUS SURVEYS.

##### *Calcutta Surveys.*

99. The work done during the year falls under the following heads:—

- (a) Preparation of fair maps of the suburban area on receipt of attested records.

- (b) Preparation of Revenue maps in skeleton form by sub-divisions and grand divisions of the Panchannogram Estate.
- (c) Completion of records so far not despatched to the Collector for attestation purposes.
- (d) Settling boundary disputes outside the Calcutta Municipality and the giving of attention to miscellaneous references regarding boundaries.
- (e) Completing the survey required for the Land Acquisition operations going on under Mr. Duval, I.C.S. This includes the demarcation of holdings both inside and outside municipal limits as well as the demarcation of the holdings in 1,400 bighas lying within municipal limits. The last mentioned area was not included in the original estimates.
- (f) Preparation of maps of the sheets drawn up to margin of the area outside municipal limits for the Chief Engineer to the Port of Calcutta.
- (g) Tracing old maps of Simm's survey for the Collector of Calcutta; the traces were required to save the old maps from total destruction.
- (h) Surveying the area known as the square mile, situated in Dhappa, and the area acquired by the Corporation outside and adjacent to the square mile.
- (i) Preparation of a wall map on the scale of 16" to 1 mile by municipal districts of the suburban area.

100. It was hoped that during the year considerable way would have been made in the revision survey of Calcutta town; unfortunately orders have not been received to take up this work; the case has been under discussion for many months; sometime back I sent to the Board a detailed note on the existing situation of the Calcutta Surveys; the note was intended to show how very miscellaneous and intricate this section of Bengal Surveys had become, and was also intended to show what further expenditure was absolutely essential if full results were to be obtained from the work already completed.

No such operations such as those carried out can have any lasting value unless the following items are arranged for:—

- (a) The publication of maps prepared.
- (b) The maintenance of those maps, both fiscally and topographically.
- (c) The maintenance of all records prepared.

Previous surveys of Calcutta have met with disapproval within a short time of their completion for the following reasons:—

- (a) They have been mainly topographical and not fiscal as well as topographical maps.
- (b) Records have been conspicuous by their absence or by inaccuracy or insufficiency in detail.

I will take this opportunity of placing on record the fact that the work which we have recently done in Calcutta will be of little value in the very near future unless provision is made to meet the points I have mentioned in the earlier part of this paragraph; if the provision is not made it cannot be said hereafter that a remedy for the recurring re-surveys of Calcutta has not been pointed out by the surveyors to whom Government entrusted the work we have all but completed in the suburbs of Calcutta. In the past surveyors have been blamed for producing maps which were only found to be of a temporary advantage. No work in Calcutta hitherto has been carried out in anything like the detail of that now under completion, and the warning conveyed in this paragraph applies with very much greater force to-day that it would have applied in the past. I can only hope that the Calcutta Corporation will see its way to prevent the expense of re-surveys in the future by insisting on a proper maintenance scheme at a moderate annual expenditure; for I firmly believe that the yearly cost of maintenance will be less than the interest calculated at the existing borrowing rate of the Calcutta Corporation, on the capital involved in the work now reported on.

The remarks above apply with equal force to both the suburban and the town areas of Calcutta, and for that matter, to any large town in India or elsewhere.

101. The only traverse work done was that involved in the splitting up into minor blocks of the area under acquisition by the Port Commissioners, and the work required to carry out item (h) of paragraph (99) above.

102. The detail survey done was as follows:—

- (a) Boundary correction in the Panchannogram made necessary by attestation proceedings.
- (b) In the area exterior to municipal limits surveyed on the scale of 32" to 1 mile, it was suggested by Mr. R. B. Smart sometime back that the detached lands should be marked with stones; the Collector first vetoed this proposal on the score of expense, but was later on convinced that the expenditure would be warranted by the result; some progress has been made during the year under report, and it is hoped to complete it shortly after the rains cease.
- (c) Two thousand seven hundred and seventy-three bighas were surveyed for the Port Commissioners on the scale of 50 feet to 1 inch.
- (d) The Dhappa work embraced the detail survey of 1,715 acres.

#### *Demarcation.*

103(a) The demarcation of the whole area of the suburban survey was completed by the end of May, but all the records and maps have not yet been made over to the Special Land Acquisition Officer (Mr. Duval).

(b) In the Dhappa area much trouble has been experienced by the Corporation in pointing out its boundaries; the difficulties of the Corporation were reflected on the Surveyor, and the work was completed much later than it should have been. It is very essential that all land acquired should be properly marked with permanent boundary pillars at the time of acquisition; if this had been done the difficulties mentioned above would not have been experienced.

#### *Comparison of old and new maps of the Port Commissioner's acquisition area.*

104. The acquisition notification gives the names of whole and portions of villages to be acquired; in order to identify these a 4" congregated plan was made from the Revenue Survey volumes, and the amins were ordered to keep separate *khasras* of each village as given by the owners; the result was far from satisfactory, and it may be remarked here that when the cadastral survey of 24-Parganas is taken up difficulties in regard to village boundaries must be expected because the zamindars pay much respect to *tauzi*-holdings and little or none to village limits; recent changes in the Bengal Tenancy Act will doubtless reduce the troubles anticipated here but I doubt if those changes will minimize the troubles of the traverse officer to any great extent.

#### *Boundary disputes.*

105(a) In the suburbs the work of adjusting these was completed in the last year, but owing to appeals further adjustment was found necessary; again applications were often received for reviews of judgment; these latter have been a source of considerable worry.

(b) In the Port Commissioner's acquisition area there were a certain number of disputes. These were shown on the trace made over to the Land Acquisition Officer, and have been presumably dealt with by that officer.

#### *Attendance of owners.*

106. The interest of owners in our work has apparently increased; this was anticipated in my last report, and it is very satisfactory to find that such copies of the maps made, as we have been able to issue, have been bought up with avidity. The sales to be expected from the published maps, when

they are published, will be greatly in advance of the sales resulting from previous surveys.

*Area calculation.*

107. The work done inside the municipal limits to be acquired by the Port Commissioners is as follows:—

The areas of the holdings of 1,440 bighas (480 acres) were extracted. The extraction was very complicated owing to the demands of Mr. Duval, caused doubtless by the high value of the interests with which he is dealing. In 654 holdings, 1,524 minor divisions were found necessary; in these minor holdings the areas of 4,092 huts, walls, drains etc. had to be calculated. If these details show nothing else, they emphasize the intricacy of the acquisition now proceeding.

Outside the municipal area of the Garden Reach and South Surbarban Municipalities, the areas of 2,427 holdings were extracted for the Port Commissioners. These holdings again had to be greatly subdivided.

*Fair Mapping for the Corporation.*

108. Out of 397 maps, 297 are ready for the press and the balance will be ready very shortly. At present there are no orders regarding the publication of these maps, but it is hoped that there will now be little further delay. Constant applications are received for copies of the maps, but these can seldom be supplied; the demand for the maps is certain to be considerable, and this is only to be expected because they are the first real fiscal and topographical maps that have been made of this area.

*Fair Mapping of Revenue Maps.*

109. Last year I reported that there were 469 of these maps to be dealt with on the 50-foot scale, and 29 on the 32-inch scale; the former is now increased to 480. The reason is that the 50-foot sheets are to be in skeleton form whereas the 32-inch maps must show full details. In addition an extra 32-inch sheet has been produced by the location of extra detached lands. The total number of sheets is therefore 510 and to these must be added the 14 index maps of the several grand and subdivisions of the Panchannogram Estate. We must, therefore, be ready for the printing of 510 sheets in colours and 14 in black.

Of the 510 sheets all are drawn and about half have been examined, and the 14 index maps are at present in hand.

Orders regarding the printing of these maps should be issued at once because it will be necessary to obtain the paper on which they are to be printed from England, since the size we require is not stocked in India except in paper not suited to these maps.

*Wall Map of Calcutta.*

110. The so-called wall map is really a 16" map of the suburbs, it was commenced last year and according to the wishes of the Corporation at that time the pentagraphing is completed; the Corporation now wants further details shown and so 12 of these maps will require further pentagraphing work. It is a pity that the first wish of the Corporation could not be adhered to, or that its secondly expressed wish could not have been expressed originally; a result of the change is that delay will occur in production of these maps.

*Attestation in the Panchannogram Estate.*

111. The 27 *khasras* left over at the end of the last year were received back from the Attestation Officer in due course, and final comparison has now been made with the maps and the municipal registers. Owing to the difficulties of attestation, a special officer was employed. The last *khasra* was received on the 6th June 1908.

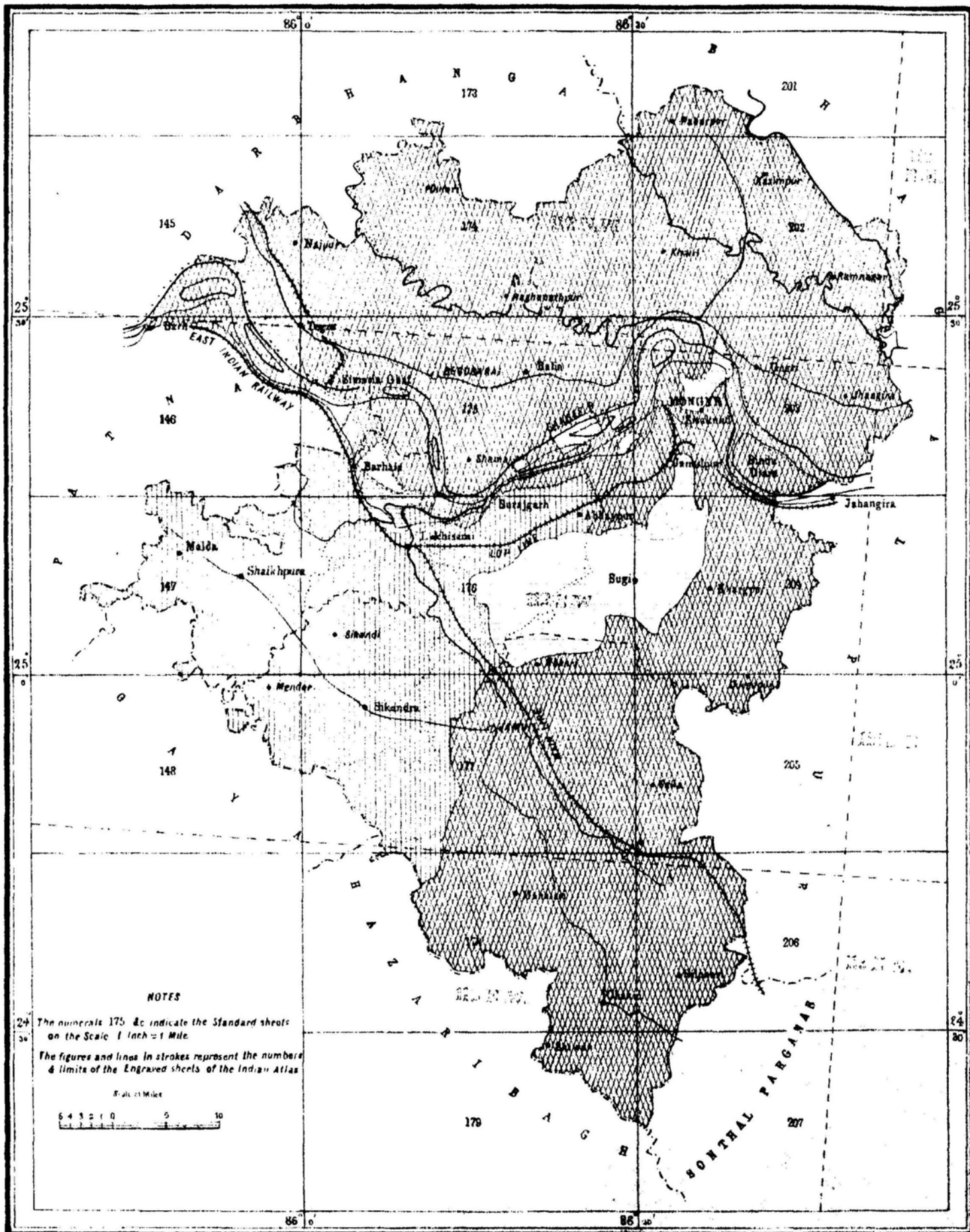
112. Mr. R. B. Smart, who has been in charge of the work detailed above throughout the year, suggests that the limits of all holdings in Subdivision S,



# BENGAL.

## INDEX TO THE CADASTRAL SURVEY IN DIST MONGHYR

No 4 PARTY



### NOTES

The numerals 175 &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.

Scale of Miles



Printed in B. D. O.

Topographically surveyed during 1907-08 ..... [Cross-hatched box]  
 Cadastrally surveyed with record during previous seasons ..... [Diagonal lines box]  
 Topographically surveyed during previous seasons ..... [Dotted box]  
 Traversed in 1907-08 ..... [Dotted box]

Traversed during previous Seasons ..... [Diagonal lines box]  
 District ..... Boundary ..... [Dotted box]  
 Sub-division ..... do ..... [Dotted box]  
 Thana ..... do ..... [Dotted box]

Division 5 of the Panchannogram Estate should be marked with stones. It was in this area that attestation troubles were most serious. I approve of Mr. Smart's suggestion, and will estimate for the work if required to do so.

SINGHBHUM (DALBHUM)-CUM-MOURBHANJ BOUNDARY.

113. The work required to be done consisted of such survey work as was necessary to enable Mr. J. Reid, I.C.S., Settlement Officer of Chota Nagpur, to decide, as Boundary Commissioner, a dispute, of several years' standing, between the Dalbhum Syndicate and the Mourbhanj State.

114. Traces showing portions of about 17 miles of the disputed boundary as demarcated sometime back by Mr. Craven were received, but unfortunately by reason of absence of *data* common to Mr. Craven's work and that done by us in the traverse (for cadastral survey) of Dalbhum, it was found to be impossible to compare Mr. Craven's boundary with that of either of the disputing parties. Mr. Reid then asked us to place the topographical boundary by the last survey on the 16" village plots used in the Dalbhum cadastral survey; as the topographical boundary was on the 1" scale, this plan had to be discarded. The only way we could give any help to the Boundary Commissioner was to traverse the claims of both parties, stations being embedded where possible, close to such of Mr. Craven's marks as were found. Mr. Reid will then settle the dispute on the basis of the resulting traverse plots, being guided when possible by the 1" topographical map and Mr. Craven's plans.

115. Considerable delay took place in the Dalbhum Syndicate pointing out its supposed boundary; it was stated by Mr. V. Pigott, the Manager, that since the Mourbhanj authorities had magisterial powers in their own lands, and that since they had pointed their own boundary out in such a way that Mr. Pigott would have to cross their boundary to mark what he considered to be his own, he would be placed in a very difficult position if he attempted to demarcate his boundary. The result was that the linear survey of a boundary about 18 miles long took from the 6th February 1908 to the 17th April of the same year to complete; it is difficult to blame anybody for this delay and I may state here that we found Mr. Pigott ready to give all reasonable help as soon as he was able to demarcate his claim.

MINING CLAIMS IN BRITISH SIKKIM.

116. At the request of the Political Agent a Surveyor and squad were deputed to make a survey of the limits of mining claims of Mr. Gleadowe Newcomen, C.I.E., and Messrs. Burn & Co. of Calcutta. The necessary maps have been prepared and the cost is borne by deposits from the claimants.

RANCHI MUNICIPALITY.

117. The necessary traverse, for a detail survey by the Settlement Officer, was carried out during the year; the work commenced on May 23rd and was completed in a little over three months.

118. The area involved is 6.7 square miles and the plots fall on 32" sheets, and on one 2" sheet; this last is simply an index to the 32" sheets.

119. Six hundred and eleven new theodolite stations were used, 255 being iron nails (2" square heads), 276 baked earthenware cylinders, 77 country stones and 3 marks on rock *in situ*.

120. The cost has been met from the budget grant for the operations for the whole district of Ranchi.

MONGHYR DISTRICT.

JAMALPUR HILLS.

*Topographical Survey.*

121. One hundred and eighty-three square miles of the above hills were surveyed in detail on the 2" scale to supplement Standard Sheets No. 72<sup>K</sup><sub>6</sub>, <sup>K</sup><sub>8</sub>, <sup>K</sup><sub>11</sub> and <sup>K</sup><sub>12</sub>. The area falls in thanas Monghyr, Jamui, Kharagpur and Surajgarha.

122. This small tract of country is most inhospitable; what water exists, except certain hot springs, is generally unfit to drink; there are very few inhabitants, the hills are of quartzite and very unpleasant to climb over even for those who wear boots, and fever of a very virulent type exists. Beyond timber cutting (chiefly male bamboos) and slate quarrying, the hills seem to be of little value economically.

Two khallasies died of fever and the whole establishment had to be frequently changed. The origin of the fever appears to be the decay of leaves in such water as exists, and it is particularly noticeable just after the bamboos begin to shed their leaves; it almost seems as if the decayed bamboo leaves have a peculiar effect on the water into which they fall.

123. It is interesting to note that the inhabitants of these hills are said to know of a certain antidote for snake-bite. I made several efforts to obtain the prescription two years ago, but without success. It is said that the cure is kept secret and is not allowed to be divulged to outsiders.

124. The fair mapping of the area will be done in the Bengal Drawing Office.

125. The whole area was triangulated and traversed in the year under report. The detail work was checked by 172 *in situ* fixings and by 15.25 miles of chain "*partal*"

126. Considerable credit is due to Mr. J. H. Johnson, Sub-Assistant Superintendent, for the way in which he carried out the work although suffering constantly from fever himself.

127. The Settlement Officer of Bihar has been supplied with traces showing water courses, paths and the limits of cultivation. He required these traces to help him in the attestation of the area.

#### MONGHYR DISTRICT.

##### *Ganges Diara.*

128. An area of 42.5 square miles, lying between the area previously surveyed and the southern high bank of the Ganges, lying in thana Surajgarha, was traversed for cadastral survey at the request of the Settlement Officer of Bihar. The 16" plots were not in the Settlement Officer's hands until April 1908, and the Settlement Officer decided that it was then too late to carry out the cadastral survey of the area. It is probable that the area will have to be re-traversed early in the next field season. No blame can be attached to anybody for this failure; it is simply an example of what must be occasionally occur in the surveying of large river beds.

#### SHAHABAD DISTRICT.

##### *Re-laying the boundary between Bhedia and Taufir Bhedia (Pargana Bhojpur).*

129. This work was done at the request of of the Collector of the district. The late Maharani of Dumraon claimed that 500 bighas of land of Taufir Bhedia (temporarily-settled) fell within the limits of Bhedia (permanently-settled) according to the Revenue Survey of 1845 and she wished to avoid assessment for those 500 bighas.

Mahal Bhedia comprises the Revenue Survey villages of Dulha, Gangauli, Mohanpur and Kharhataur and these touched on the Ganges in 1845; the Ganges subsequently moved eastwards and land formed alongside the four villages; this land is Mahal Taufir Bhedia and it has been assessed from time to time and settled with the Dumraon Raj.

130. The area traversed was 7.6 square miles and in it there were 168 new theodolite stations, of which 37 were marked with stones 128 with clay cylinders and 3 with pegs.

131. The expenditure is met from a deposit made by the Dumraon Raj.

#### MONGHYR DISTRICT.

##### *Demarcation of the boundary between parganas Haveli and Sakrabadi.*

132. This work was done at the request of the Commissioner of the Bhagalpur Division; the Commissioner was appointed arbitrator between the

disputants (the Maharaja of Darbhanga and the Raja of Banali). The demarcation to be done was that according to the award of the Commissioner.

133. The work was supervised by a European Assistant in the presence of representatives of both parties and 273 permanent pillars have been erected on the ground. They now mark a boundary which had been in dispute for about sixty years.

134. The Commissioner was supplied with three copies of the maps (8"=1 mile) of the boundary and of the field-books. One he keeps as a record in his own office, and one set was given to each disputant. Copies were also sent to the Settlement Officer of Bihar to enable him to show the final boundary on the cadastral sheets.

135. The expenditure has been met by deposits.

#### HOOGHLY DISTRICT.

##### *Traverse Survey of the Chinsura Khas Mahal.*

136. An area of 1.05 square miles was traversed (for detailed survey on the 32-inch scale by the Settlement Officer of Bihar). It consists mainly of lands covered with houses.

137. Three hundred and forty-eight theodolite stations were embedded, for 321 stations bricks were used, and for 27 iron pegs; the latter were placed along the municipal boundary. All these stations should later on be replaced by masonry pillars.

138. Three azimuths were observed and computed.

139. The 32-inch plots, 5 in number, and an 8-inch rough plot, have been despatched to the Settlement Officer of Bihar, who is to undertake the cadastral survey.

140. The original estimate was exceeded because the traverser sent was idle in Chinsura for 14 days awaiting the gazetting of the area concerned for survey. Technically this enforced idleness was correct, but I think that it might have been avoided, since it was very unlikely that the inhabitants would have raised objections to a traverse survey, which in no way affects possession.

#### NEPAL-CUM-PURNEA BOUNDARY.

141. The Kosi river enters British territory at a point close to the trijunction of Nepal, Bhagalpur and Purnea, and owing to the extreme uncertainty of the movements of the river the Provincial boundary near this point has for many years past been a source of trouble; as fast as marks have been put down by surveyors, they have been swallowed up by the river and the constantly recurring work of many years past has been wasted. Some three or four years ago I suggested to the Commissioner of Bhagalpur Division that constant re-demarcations were a waste of money, and the only way to prevent them was a change in the boundary by which we should cede to Nepal a few square miles of sand and water. I still hope that some such arrangement will be found possible.

142. During the last cold weather reference pillars to *pucka* pillars Nos. 9, 10 and 11 were fixed and embedded. For the present the Collector of Purnea thinks that no further action should be taken and I agree with him that it will be best to wait until the Kosi river shows more tendency than it does at present to adopt a semi-permanent bed in this neighbourhood or until the boundary can be compromised.

#### PATNA DISTRICT.

##### *Relaying the boundary of the Government Estate, Chaparsan 1250.*

143. At the request of the Collector of Patna the boundary of Chaparsan, 1250 with Raspur Patasia was laid down according to the Ganges Diara Survey of 1865-66; and the boundary of Chaparsan 1250 with Mahamadpur (pargana Gyaspur) according to the Revenue Survey of 1842-43.

144. It was found that most of Chaparsan 1250 was under water, and what actually existed consisted of two sand islands; all that remained of Mahamadpur was a narrow strip of sand on its north side.



*Bengal Drawing Office.*

145. The work of the office falls under the following main sections :—

- (1) General (supervision).
- (2) Standard mapping which includes District mapping on the scale of 4 miles to 1 inch.
- (3) Traverse charts.
- (4) Thana and Trijunction Mark Maps.
- (5) Map reproduction.
- (6) *Badar* (map correction).
- (7) Map record.

*Standard Mapping Section.*

146. This section has been doing work for Bengal and Eastern Bengal; its total outturn has been very satisfactory indeed. Out of a total of 20 standard maps (scale 2"=1 mile), consisting of 50 sections, submitted for publication during the year, 14 maps belong to Bengal; these are as follows :— Nos. 72 $\frac{N}{3}$ , 72 $\frac{N}{4}$ , 72 $\frac{N}{7}$ , 72 $\frac{N}{8}$ , 72 $\frac{O}{1}$ , 72 $\frac{O}{2}$ , 72 $\frac{O}{3}$ , 72 $\frac{O}{4}$ , 72 $\frac{O}{5}$ , 72 $\frac{O}{6}$ , 72 $\frac{O}{7}$ , 72 $\frac{O}{8}$ , 72 $\frac{O}{9}$ , 72 $\frac{O}{10}$ , 72 $\frac{O}{11}$ , 72 $\frac{O}{12}$ , 72 $\frac{O}{13}$ , 72 $\frac{O}{14}$ , 72 $\frac{O}{15}$ , 72 $\frac{O}{16}$ , 72 $\frac{O}{17}$ , 72 $\frac{O}{18}$ , 72 $\frac{O}{19}$ , 72 $\frac{O}{20}$ , 72 $\frac{O}{21}$ , 72 $\frac{O}{22}$ , 72 $\frac{O}{23}$ , 72 $\frac{O}{24}$ , 72 $\frac{O}{25}$ , 72 $\frac{O}{26}$ , 72 $\frac{O}{27}$ , 72 $\frac{O}{28}$ , 72 $\frac{O}{29}$ , 72 $\frac{O}{30}$ , 72 $\frac{O}{31}$ , 72 $\frac{O}{32}$ , 72 $\frac{O}{33}$ , 72 $\frac{O}{34}$ , 72 $\frac{O}{35}$ , 72 $\frac{O}{36}$ , 72 $\frac{O}{37}$ , 72 $\frac{O}{38}$ , 72 $\frac{O}{39}$ , 72 $\frac{O}{40}$ , 72 $\frac{O}{41}$ , 72 $\frac{O}{42}$ , 72 $\frac{O}{43}$ , 72 $\frac{O}{44}$ , 72 $\frac{O}{45}$ , 72 $\frac{O}{46}$ , 72 $\frac{O}{47}$ , 72 $\frac{O}{48}$ , 72 $\frac{O}{49}$ , 72 $\frac{O}{50}$ . In addition sheets Nos. 72 $\frac{O}{51}$ , 72 $\frac{O}{52}$ , 72 $\frac{O}{53}$ , and 72 $\frac{O}{54}$  are in hand and good progress is being made on them. Sheet No. 72 $\frac{K}{11}$  (old numeration No. 203) is in hand and awaits the inclusion of the block of hills south of Monghyr Town; the detail survey of those hills was done during the year under report, and on account of stress of work induced in the Bihar Party (No. 4) owing to the proposed reorganization of Bengal Surveys, I have transferred the 2-inch fair drawing to the Bengal Drawing Office so as to avoid unnecessary delay in the completion of this sheet. It should be noted however, that after publication, the sheet will not show all the hills which fall on it, because only the hills in the northern portion have been topographically surveyed by us; this point is of importance to those who, hereafter, carry out supplementary or re-survey operations in this district.

147. In addition to the above work, the section has coloured, for the head-quarters office of the Survey of India, the fiscal limits and cultivation on 31 unpublished proofs of 16 standard sheets; it has carried out the final examination and correction of 13 unpublished proofs of 6 standard sheets, and one district map, fiscal limits being at the same time coloured on the latter. Ninety-seven published proofs of 70 standard sheets and 13 district maps have been completely coloured for use in the office. Lastly small additions and corrections have been made on 8 published proofs of 2 standard sheets and 2 district maps.

148. The following miscellaneous work has been dealt with :—

- (a) District index maps of Shahabad and Manbhum have been prepared.
- (b) A coloured *mujmili* of the Sarkari Hata Estate has been made for the Deputy Commissioner of Hazaribagh.
- (c) A comparative map showing the boundaries of villages Ramdiri and Sihawan, according to the Revenue, Diara and Cadastral surveys, has been produced for the Collector of Monghyr.
- (d) Two sets of specimen thana maps have been prepared at my orders, in connection with a scheme, referred to in paragraph 14 of this report, for the improvement of thana maps of the province.
- (e) Three maps for the annual report of the Director of Land Records have been prepared.

149. The future of the Standard Mapping Section of the Bengal Drawing Office is somewhat uncertain. We are on the verge of the whole office being transferred from the professional control of the Surveyor-General to that of a Local Superintendent working under the Local Government only, and, as the Surveyor-General publishes standard maps, it is probable that he will not publish them of areas in which any but his own surveyors are employed. In accordance with the orders of the Government of India it has been decided that standard maps shall not, in the future, show village boundaries; on its being pointed out to the Surveyor-General that these boundaries were essential of local requirements, the Surveyor-General decided to superprint them on published

standard sheets if asked to do so by the Bengal Government and if provided with skeleton maps on his own projection by the Local Government. Government was advised that it would produce its own 1-inch maps of fiscal units (thanas) at small cost and therefore agreed that standard sheets need show no village boundaries. I am not, however convinced that superprinting, under certain circumstances, is not preferable to the production of Thana maps for areas not cadastrally surveyed on the modern system, but which have been recently topographically surveyed. Briefly what is about to happen is that the new standard sheets will meet with a very small local sale if Thana maps of the same areas are published before, or even after them, unless village boundaries are shown on the standard sheets. It is therefore easy to conceive a situation arising in which it may well be to a Local Government's advantage as well as to the advantage of the Government of India, that village boundaries should be superprinted on standard sheets. There is, however, the converse of the question to be considered and it is in the converse that Bengal is, at the present moment, most interested, for it would appear that many years will elapse before topographical establishments of the Survey of India will cover any appreciable area of Bengal. Where a cadastral survey executed on modern lines precedes a topographical survey, it is essential that Thana maps prepared locally be produced; these will show all local requirements, except inequalities of surface (hills). In such a case, after the standard sheets of the area in question are published, it will remain for the Local Government to decide whether it will transfer the hills from the standard sheets to its own Thana maps, or reject the latter, and have the village boundaries superprinted on the standard sheets. I have no hesitation in saying that it will be easier to transfer the hills from the Survey of India maps to the Thana maps and yet I know that this statement is open to challenge on the ground that any wholesale copying from other people's maps is reprehensible. I write the above with the utmost diffidence, and yet I feel that the subject is of sufficient importance to warrant plain writing to avoid misunderstanding; however I quote a few of the reasons which led me to the conclusions given above:—

- (a) The nomenclature of village and other names adopted in Survey of India maps can never be as accurate as that used in maps which are the result of Survey and Settlement operations.
- (b) Local requirements demand maps of fiscal units; miscellaneous requirements and those of the Government of India demand maps of squares of Latitude and Longitude.
- (c) Local requirements call for the emphasis of many items not given prominence on topographical maps.
- (d) It seems possible that the present scale of standard maps (1"—1 mile) may be reduced in the near future by half. Half-inch maps are too small for local requirements.
- (e) Areas of thanas, etc., are no longer shown on standard maps.
- (f) Topographically rivers will not be altered on Survey of India maps except after very long intervals of time. Unless the Survey of India will revise its maps on detail done by Local Survey Departments, from time to time, many standard sheets of Bengal will be obsolete almost before they are published. Bengal proposes to take steps to keep its large river surveys up to date and this consideration is of great importance.
- (g) Uniformity in a province's maps is essential. Twenty-five years hence Bengal may expect a new set of topographical maps covering the whole province. Are we to wait so long for uniformity?

I admit that the above arguments are not insuperable and I have every hope that a compromise between India's and local requirements may be arrived at; a reasonable co-operation between local work done by professional methods and Survey of India work seems to be the correct procedure, for it is clear that local and Survey of India surveyors will, time after time, pass over the same ground. A topographical survey is of little use for fiscal purposes because the scale used is too small and enlargement is out of the question; a fiscal survey uses a large scale and if properly done its results, reduced to

ordinary topographical scales, compare very favourably indeed with the results given by the latter; it appears that the ideal situation, in cultivated areas, would be for topographical establishments to follow cadastral establishments and to simply survey hills on a small scale; it is not unreasonable to suppose that the combined result would give maps just as accurate as present day standard maps, and the saving in cost would be enormous; it cannot be expected that the compromise we should aim at will exactly follow the lines just sketched, but I think that it may be assumed that the direction of economical compromise must lie in the direction I have indicated for at any rate all areas now well under cultivation.

#### *Traverse Charts Section.*

150. This section has been increased somewhat during the year; its outturn has been 36 charts of Orissa and 43 of Bihar. Twenty-two other charts are nearing completion. The charts for Ranchi will be taken up early in the next year.

151. Traverse charts show permanent boundary marks which will be of use during topographical surveys which follow cadastral surveys; they are prepared according to orders issued by the Surveyor-General. The limits of charts are geographical and not fiscal and a marks serial is adopted throughout each unit, the numbering being done from the north-west corner of each chart. As we work by fiscal units it is very often impossible to draw the charts up to margin all round.

In addition to traverse charts we also prepare in the Bengal Drawing Office trijunction mark *mujmilis* by thanas, for the use of District Officers. The unit of the latter is fiscal, the serial numbering commences at the north-west corner of each map, and the scale used is 2 inches to 1 mile; the unit of the traverse chart is geographical, its numbering commences from its north-west corner, and its scale is, according to circumstances,  $\frac{1}{2}$ " or 1" to one mile. It will be conceived therefore that a duplication of work is entailed which could, I think, be avoided; the question is one very similar to that of the duplication caused by the publication of both Standard maps and Thana maps, and the two matters are being dealt with conjointly.

#### *Trijunction Mark and Thana Mapping Section.*

152. Where standard sheets are prepared, the making of trijunction mark maps is easy because the sections of standard sheets are drawn on the 2" scale; of such maps two were made of thanas in North Bhagalpur. Where, however, standard maps are either not under preparation or are not sufficiently advanced to admit of traces from the 2" standard mapping being used, *mujmilis* reduced from the 4" rough plots used for the comparison of modern boundaries with Revenue Survey boundaries are used; of such maps those of 5 thanas (397 copies) of South Bhagalpur were produced and of 9 thanas (189 copies) of Purnea, thana Banki, (400 copies) of Cuttack were also dealt with. In addition 200 copies of the trijunction mark maps of 9 thanas of Ranchi were supplied to the Settlement Officer.

#### *Thana Maps.*

153. As in the case of trijunction mark maps, either 2" standard work or *mujmilis* may be used as basis of the map. Two thanas of North Bhagalpur were completed from standard maps; and 5 thanas of South Bhagalpur, 7 of Purnea and 1 (Banki) of Cuttack from *mujmilis*. Two hundred copies of each of the above maps were printed and supplied.

In addition 200 prints of each of 9 thana maps of Ranchi were produced.

154. For reasons which will be apparent from the remarks already made in this report on Standard Mapping, Traverse Charts and Trijunction Mark Maps, it will be clear that the future of Thana maps is somewhat obscure. There is, however, one point which can be dealt with at once and which I have taken steps to meet; except when compiled from 2" sections of standard sheets, our Thana maps have not been maps but "*mujmilis*"; there is no reason why this should be the case, and Settlement Officers will, in future, be supplied

with 2-inch plots which will eventually ensure the geographical positions of villages being shown on Thana maps. In addition notes have been prepared by which the Thana maps of the future will be made uniform in appearance and I hope that they will be found considerably more useful than those maps which we have hitherto published. Whether the existing situation of a duplication of work caused by both Standard and Thana maps being prepared can be compromised or not, it is possible for Government to be given colour printed maps of thanas instead of the makeshifts hitherto produced; if a compromise between Standard and Thana maps can be arrived at, and I hope it can, the time that I have spent on working out details for the future of Thana maps will not have been wasted.

*Reproduction of Village Map Section.*

155. This section has turned out considerably more work in the year than in the last.

156. *District Darbhanga.*—Has been finished, the 18,440 copies of maps left over from last year having been despatched.

157. *District Monghyr.*—Out of a total of 3,875 sheets (traced on 3,459 paper traces as the original maps were on thick paper), all tracing and examination work has now been completed. By the end of last year 34,880 copies had been reproduced and despatched, and, of the balance (34,300 copies) 15,140 have been dealt with during this year. In addition (*vide* paragraph 149 of last year's report) since ten extra copies of 422 traces were required, these have been re-vandyked and despatched during the year.

The work in North Monghyr would have been finished by now, had it not been found necessary to shelve it to make way for reproduction work of Purnea (to avoid delay in recovery operations) and Bhagalpur.

158. *Purnea.—Season 1887-1889.*—The programme consisted of 373 sheets on 372 paper traces of the Srinagar Banaili Raj lands; 20 copies of each trace being required, 312 traces have been reproduced with 6,240 copies and 5,420 copies of 271 traces were supplied during the year.

159. *Purnea.—(Season 1901-03).*—The programme consisted of 1,332 sheets which fall on 1,301 (and not 1,381 as was mentioned in last year's report) paper traces. All these have been traced and vandyked, 26,020 copies having been struck off; 12,860 copies were despatched during the year, making a total of 26,020 copies to date.

160. *Purnea.—(Season 1903-07).*—These maps are on their sheets and have been completed with the exception of five villages on six sheets during the year; the table below shows the number of copies issued during the year:—

Season 1903-04	...	...	...	...	5,905
„ 1904-05	...	...	...	...	221,983
„ 1905-06	...	..	...	...	83,550
„ 1906-07	...	...	...	...	300
				Total	311,688

161. *North Bhagalpur.*—In this area, including the Srinagar Banail Survey, there are 2,796 sheets for reproduction instead of 2,808 as mentioned in my last report; of these 434 will be reproduced direct from the original maps and 2,362, *i.e.*, the balance have been traced on 2,312 paper traces. There are therefore 2,746 sheets and paper traces for reproduction, and 20 copies of each are required, 54,040 copies, made from 2,702 sheets or paper traces, have been printed and 50,480 copies supplied to date. Of this last number 8,830 copies were supplied during the year.

162. *South Bhagalpur.—(Season 1905-06).* In all there are 2,278 sheets for direct reproduction; copy orders were received from the Settlement Officer, Bihar, and the whole work (177,280 copies) was dealt with in the year under report. Ninety-nine topographical sheets on the 4" scale are excluded from the first figure given in this paragraph. Before orders to the contrary were received two or more villages on one sheet were vandyked on separate



plates; thus 2,254 sheets dealt with during the year required 2,409 plates for vandyking purposes.

163. *Ranchi.*—(Season 1908-05). Final figures for the number of sheets are for 1903-04, 1,209 and for 1904-05, 1,280; 20 copies of each are required.

As in the 1903-04, two or more villages were sometimes mapped on one sheet, the 1,209 sheets of that season have been vandyked on **1,296** plates.

In all, for this seasons work, **60** copies were supplied this year, 25,860 having been supplied previously.

Similarly the sheets of the 1904-05 have been vandyked on **1,324** plates and the requisite number of copies **26,480** have been printed. Last year 3,500, copies were despatched, and the balance (22,980 copies) have been supplied this year.

164. *Ranchi.*—(Season 1905-06). No work was done because of the urgency of other districts in which recovery was about to take place. The reproduction will shortly begin and will be completed rapidly as the sheets are well drawn.

165. *Sonthal Parganas.*—The index map of the district shows a complicated patch work of areas dealt with by different surveyors in different years; although no work was done during this year it will perhaps be well to refer here to the existing state of things in the Sonthal Parganas. Up to the end of last year 9,292 traces (covering 2,341 sheets of the Damini-i-Koh, 2,331 of Mr. McPherson's first and 4,620 of his second programme) were reproduced and 233,260 copies supplied. There now remain about 1,708 sheets of the first half and about 1,710 sheets of the second half of Mr. Craven's third programme; when these are reproduced the district will be finished. The 1,708 sheets referred to above will probably be reproduced for sale during the first half of the next financial year.

166. *Cuttack (Banki Government estate).*—The reproduction of the maps of this estate was completed during the year; 3,390 copies of the remaining 113 traces were supplied making a total of 6,330 copies of maps (211 traces) for the whole estate. Throughout the demand was 30 copies of each map.

167. *Hazaribagh, (Kolarma estate.)*—This estate falls on 138 sheets and these were traced on 134 paper traces; 20 copies of each were required and 2,680 copies were accordingly supplied during the year.

168. *Midnapore (parganas Kaliampur, Balarampur, Jamirapal and Dipakiarchand.)*—Of 464 sheets for which the Settlement Officer sent copy orders all have been reproduced and **23,187** copies supplied during the year.

169. *Midnapore (Nayabasan and Rohini estates.)*—These fall on 597 sheets and the reproduction work is still in hand. Two hundred and ninety-nine sheets have been reproduced, **9,425** copies printed and **7,195** copies supplied.

Both these maps and those referred to in the last paragraph have given a great deal of trouble to the reproduction staff.

170. *Murshidabad (Beldanga and Fatehsingh estates.)*—Of the former there were 26 traces and of the latter 213 traces for reproduction. All the traces of Beldanga have been dealt with and the 6,995 copies asked for supplied. Of Fatehsingh 130 traces have been reproduced and **16,842** copies supplied. Here again we have had much trouble over the reproduction of the traces; some traces had to be returned as they were too large to be capable of reproduction by our plant and others were very badly drawn. All have had to be touched up before they could be vandyked.

With reference to the criticism of maps made in the last three paragraphs, I must point out that the Director of Land Records is doing what he can to improve the drawing criticized; it cannot be expected that he should give as good results in odd settlements as in major ones; it is, however, gratifying to notice that every endeavour is being made to improve minor settlement drawing and, we may, therefore, hope that in the future Mr. Berkeley and his staff in the Bengal Drawing Office will find less difficulty in dealing with the type of map here discussed. As will readily be imagined, it is very difficult to estimate for reproduction work of this nature.

171. *Patna (Mekra, Kanhaipur and Sarhan villages—season 1905-06).*—These villages fall on 12 sheets and 30 copies of each have been printed and supplied during the year.

172. *Cuttack (Dompara estate).*—In all 108 sheets were to be re-produced, 30 copies of each being required, 95 sheets had to be traced on 95 traces, and the other 13 were for direct reproduction. This work has been carried out during the year and 3,240 copies have been supplied.

173. *Gaya (Maksudpur estate—season 1900-01.)*—Of the 275 sheets in which this estate falls, all have been traced on 275 paper traces and the traces have been examined; no reproduction has been made, but it will be completed before the end of this financial year. Twenty copies of each trace are required.

174. *Reproduction for attestation.*—The table below gives full details of this work:—

DISTRICT.	Number of sheets.	Number of re-productions issued during the year.
Ranohi ...	1,496	25,093
Singhbhum (Dalbhum) ...	1,020	
Midnapore ...	665	
Sonthal Parganas ...	1,703	
South Monghyr ...	1,479	
Patna ...	1,423	

The Settlement Officer of Midnapore will send 55 more sheets to be re-produced for attestation immediately after the Puja vacation.

175. *Thana maps.*—The table below gives the reproduction outturn of these maps during the year:—

DISTRICT.	Number of sheets.	Number of copies struck off	Number of thanas.
Bhagalpur ...	14	2,800	7
Cuttack ...	1	200	1
Ranchi ...	13	2,600	9
Purnea ...	16	3,200	7
Total ...		8,800 copies.	

176. *Trijunction Mark Maps.*

District.	Copies.	Sheets.	Mark Maps.
Bhagalpur ...	397	34	7
Banchi ...	1,200	40	9
Cuttack ...	400	4	1
Purnea ...	189	63	9
Total ...	2,186 copies.		

177. *Miscellaneous work.*—The following miscellaneous work has been dealt with during the year:—

- (a) *District Cuttack.*—Sixty copies of correction slips for four thana maps for the Director of Land Records.
- (b) *District Puri.*—Seven hundred and sixty-two copies of 254 cadastral sheets of Parikud for the Director of Land Records.
- (c) *District Puri.*—One thousand copies of five cadastral sheets for the Collector of the district.
- (d) One hundred and twenty-five copies of 125 cadastral maps for the Executive Engineer, Brahmini-Byturni Division.
- (e) *District Cuttack.*—One thousand three hundred copies of 130 cadastral maps for the Collector of the district.
- (f) *District Champaran.*—Seven copies of seven cadastral maps for the Collector of the district.
- (g) *District Huzaribagh.*—(Sarkari Hata Estate).—Twelve copies of this map for the Deputy Commissioner of the district.
- (h) *Calcutta.*—Three hundred and fifty copies of eight maps for the Deputy Chairman of the Corporation.
- (i) *Calcutta.*—Five thousand and forty-six copies of 348 fair maps and 3 index maps for the officer in charge, Calcutta Surveys.

- (j) *District Hooghly*.—Fifteen copies of correction slips for one Thana map for the Director of Land Records.
- (k) *District Murshidabad*.—Twenty copies of correction slips for one Thana map for the Director of Land Records.
- (l) Eight thousand two hundred and fifty copies of miscellaneous work for the Settlement Department.

178. The total issue of copies of maps during the year has been 689,613. This excludes work done for Eastern Bengal. The gross supplies have been 8,61,401 copies. A small portion of this outturn was dealt with out of office hours.

It will be noticed that this outturn is better than that of last year, and when the very miscellaneous nature of the programme is taken into account it is clear that the outturn reflects the greatest credit on Mr. L. F. Berkeley and his staff. As soon as the Government of Eastern Bengal and Assam starts its own reproduction office on a scale large enough to meet the demand of its Province, the Bengal Drawing Office will obtain considerable relief; it is only because pressure has been maintained for some time past that serious hitches in reproduction programmes have not occurred. In addition matters have been complicated by the attempts which have been made to wipe off all arrears. The Director of Land Records and I have recently gone into this matter and programmes have now been so arranged that the near future will see the office working normally; the future normal outturn for Bengal is something between 750,000 and 1,000,000 copies of maps but there are indications that the office will, before long, increase considerably in other directions than its suggested normal programme. If this occurs considerable enlargement will be required and I would strongly advise the moving of the office from Calcutta to Ranchi or Hazaribagh as soon as a permanent increase of work is shown to be likely.

*Badar Section.*

179. During the year the *badars* given below have been received in office and 30 *badars* remained from last year. All the original maps have been corrected with the exception of 51 villages of district Midnapore:—

					Villages.
South Bhagalpur	...	...	...	...	95
Purnea	...	...	...	...	580
Ranchi	...	...	...	...	282
Midnapur	...	...	...	...	1,069
Patna	...	...	...	...	3

180. Headings and adjoining village names have been corrected according to the spelling and numbering given in Thana lists of:—

District					Sheets corrected.
Purnea	...	...	...	...	1,526
South Bhagalpur	...	...	...	...	2,464
North Monghyr	...	...	...	...	299
Ranchi	...	...	...	...	621
Midnapur	...	...	...	...	1,180
Patna	...	...	...	...	12
					—
			Total	...	6,102
					—

Districts Purnea and Bhagalpur are now absolutely completed in this respect.

181. Village names have been corrected and Thana numbers entered in the traverse volumes of:—

District				Villages.
North Monghyr	...	...	...	1,285
North Bhagalpur	...	...	...	1,233
Darbhanga	...	...	...	678
Cuttack	...	...	...	1,463
		Total	...	<u>4,659</u>

The field books for 2,908 villages of Darbhanga and 1,995 of Cuttack have been similarly dealt with.

The two last-named districts have now been completely dealt with. Now that the work of touching up original maps for reproduction has been reduced greatly; this work will proceed much more rapidly than hitherto (*vide* next paragraph).

182. The section has touched up, for reproduction, 1,156 sheets of Ranchi and 1,054 of Midnapore and the scales on 1,351 sheets of Ranchi, Midnapore, Bhagalpur and Purnea.

On 3,278 sheets, the sentence "made and published by the authority of Government" has been typed during the year.

#### Map Record Section.

183. It is expected that Government orders for the better safeguarding of records against fire and the ravages of insects will shortly be issued; this case and has been pending for some time and has been delayed by the future of the office in its relations to Eastern Bengal work not having been settled. It is now understood that Shillong will have its own office by the end of this financial year, and so very little more delay in dealing with this important matter should take place. I have told the officer in charge of the Bengal Drawing Office to estimate at once for further rack accommodation for the Revenue Survey maps of the province which are shortly to be stored in the Bengal Drawing Office. The future of modern survey traverse volumes will also have to be considered; I think that they also should be transferred from the head-quarters of the Survey of India to the Local Drawing Office.

184. During the year 5,720 original sheets of Bengal were received in the section; the total number of sheets belonging to Bengal now in the office is **92,838**. In addition we have at present **14,835** sheets of Eastern Bengal. All the maps have been *racked* excepting those in use in the Standard Mapping, Reproduction and Badar Sections. Lists either *pargana-war* or *thanawar* have been made for **6,012** sheets during the year, making a total of **82,368** sheets similarly dealt with to date.

Lists of the balance are either in hand or are awaiting the receipt of Thana lists in the office.

185. Serial numbers have been posted on 15,131 sheets during the year; altogether 79,578 sheets have been treated in this way. Seven thousand and sixty-nine sheets with broken edges were repaired and 14,667 paper traces stored during the year.

### CHAPTER III.

#### PART I.—TOURS OF THE SUPERINTENDENT OF PROVINCIAL SURVEYS.

186. I have been in the field and on tour for about seven and a half months of the year under report; I have inspected each section during the field-season on at least one occasion, and have visited each one in recess. Unfortunately, owing to stress of work caused by the pending reorganization of Bengal Surveys, I have not been able to pay proper attention to cadastral inspection; this has been inevitable under the circumstances but is none the less regrettable on that account.



PART II.—SERVICES OF OFFICERS.

187. The executive officers have been—Mr. R. B. Smart (Calcutta Surveys), (2) Mr. A. W. Smart (No. 6 Party), (3) Mr. L. F. Berkeley (Bengal Drawing Office), (4) Mr. C. S. Kraal (No. 5 Party) and (5) Mr. N. Bedford (No. 4 Party). All these officers have worked zealously; I specially commend to the notice of the Board, Messrs. R. B. and A. W. Smart and Mr. L. F. Berkeley; these officers held charges which were unusually intricate and they have discharged their duties with considerable ability and to my utmost satisfaction.

188. Amongst the junior officers Mr. Delaney, Sub-Assistant Superintendent, has again done unusually good work in the Sunderbans Survey. Mr. Hart, Offg. Extra Assistant Superintendent has also done exceedingly well. All the other officers, with one exception, have done well. I have reason to suppose that the exception will be shortly transferred from Bengal Surveys.

189. Before closing this report, I beg to be permitted to acknowledge the very great help that has been given me throughout the year by Mr. H. McPherson I. C. S., Director of Land Records; his sympathetic help, always so freely given, has simplified a host of difficulties.

I have the honour to be,

SIR,

Your most obedient servant,

F. C. HIRST, CAPTAIN, I. A.,

*Offg. Superintendent of Provincial Surveys, Bengal.*

APPENDIX I.

PART A.

Summary of the outturn of work of the survey parties in Bengal for 1907-08.

DISTRICT.	TRAVELLING.					CADASTRAL SURVEY.			RECORD WRITING.		TOPOGRAPHICAL SURVEY.
	Number of villages.	Linear miles of chaining.	Number of stations at which theodolite was set up.	Number of azimuths.	Number of sub-traverses.	Blocks.	Holdings and sub-holdings.	Sheets.	Blocks.	Holdings and sub-holdings.	Square miles.
1	2	3	4	5	6	7	8	9	10	11	12
<i>Private Estates.</i>											
Longhyr Hill block ...	...	...	...	...	...	...	...	...	...	...	185
Do. Ganges Diaraha (Surajgarha).	36	129.33	615	...	38	...	...	...	...	...	...
atna current ...	2,367	49,76.77	32,239	107	1,385	...	...	...	...	...	...
ahabad ...	762	1,372.99	9,285	31	360	...	—	...	...	...	...
idnapore (Jhargram Estate).	595	911.89	5,392	27	148	...	...	...	—	...	...
ingbhum (tenure of Babu Abhiram Tung).	6	45.99	339	2	19	...	...	...	...	...	...
ingbhum (disputed boundary between Dalbhum and Mourbhanj)	...	18.17	194	...	9	...	...	...	...	...	...
anchi ...	884	3,760.15	24,612	189	1,016	...	...	...	...	...	...
anbhum (Pargana Barabhum).	597	2,213.95	13,998	105	633	...	...	...	...	...	...
Chulna Sundarbans ...	(c)75	1,752.00	7,915	220	249	...	...	...	...	...	1,811
<i>Miscellaneous.</i>											
bagalpur { Nepal boundary Hosi River. (Putting up reference pillars). }	...	9.67	42	...	2	...	...	...	...	...	...
urnea { ... }	...	...	...	...	...	...	...	...	...	...	...
Longhyr—Demarcation of boundary between parganas Haveli Karagpur and Sakrabadi.	...	...	...	...	...	...	...	...	...	...	...
arbhanga—Demarcation of boundary between Raspur-Patasia and Chaparson 1,250 and Mahamadpore.	2	32.15	162	...	(a)7	...	...	...	...	...	...
Longhyr—Chinsura Khas Mahal.	1	19.97	436	3	44	...	...	...	...	...	...
ahabad—Taufir Bhojia	20	39.59	211	3	4	...	...	...	...	...	...
anchi Municipality ...	8	50.46	645	...	62	...	...	...	...	...	...
ikkim (Mining claims)...	(b)7	49.99	333	3	28	...	...	...	...	...	...
Calcutta Suburbs Surveys*	...	...	...	...	...	...	...	...	...	...	...
ort Commissioners' Land Acquisition Survey Scale 50=1 mile.	(d)16	67.15	2,876	4	301	16	5,346	131	16	5,846†	...
alt Lake area in Dhappa Scale 32=1 mile.	(d)2	33.52	300	1	23	2	...	12	2	...	2.68
<b>Total ...</b>	<b>5,378</b>	<b>15,481.54</b>	<b>109,594</b>	<b>695</b>	<b>4,328</b>	<b>18</b>	<b>5,345</b>	<b>146</b>	<b>18</b>	<b>5,346</b>	<b>1,498.68</b>

(a) Connecting lines.  
 (b) Ohake.  
 (c) Polygons.  
 (d) Blocks.  
 \* In Calcutta (Suburban area) the work done during the season consists of the compilation of maps both for Municipality and the Collector and also correction of records as received from the attestation officer.  
 † Exclusive of the extraction of areas of 4,092 huts, walls and drains situated within the Suburban area of Calcutta.

F. O. HIRST, CAPTAIN, I.A.,  
 Offg. Superintendent of Provincial Surveys, Bengal.

## APPENDIX I.

## PART B.

## Statement of outturn and cost rates.

DISTRICT AND ESTATE.	Discription of work.	Estimated area to be dealt with in square miles.	Year of inspection of operations.	AREA SURVEYED IN SQUARE MILES.		COST RATE PER SQUARE MILE.		Balance of area remaining to be surveyed.	Estimated cost of completing the area in column 9.	Estimated final cost rate per square mile.	REMARKS. (Explanation of unusually high expenditure.)	
				During the year under report.	Total, including previous years.	During the year under report.	From beginning to end of the year under report.					
1	2	3	4	5	6	7	8	9	10	11	12	
<i>Private Estates.</i>												
Moughyr Hill Block ...	Traverse and Topographical.	468	1905	183	458	40.8	30.1	Nil	Nil	30.1	A good rate.	
Ditto Ganges Diara (Surajgarha)	Traverse ...	42	1908	42	42	20.4	20.4	Nil	Nil	20.4	Ditto.	
Patna ...	Do. ...	2,075	1906	1,142	1,904	41.0	38.1	81	3,321	38.2	These rates have all been raised because grain compensations allowances have been paid to the establishment; considering this the rates are not high.	
Shahabab ...	Do. ...	4,373	1907	347	347	37.3	37.3	4,026	150,149	43.3		
Midnapore (Jhargram Estate).	Do. ...	211	1907	211	211	33.1	33.1	Nil	Nil	33.1		
Singbhum (tenure of Babu Abhiram Tung).	Do. ...	14	1908	14	14	35.6	35.6	Nil	Nil	35.6		
Ranchi ...	Do. ...	7,081	1901	1,208	7,134	34.3	34.6	Nil	Nil	34.6		
Manbhum (pargana Barabhum).	Do. ...	638	1908	638	638	41.6	41.6	Nil	Nil	41.6		High rate due to small area detached from main programme.
Khulna-Sundarbans ...	Do. ...	2,003	1903	1,311	2,264	55.8	56.9	Nil	Nil	56.9		Good rates.
Ditto ...	2" Topographical	2,003	...	1,257	2,210	42.6	39.1	Nil	Nil	39.1		
Ditto ...	4" do. ...	...	...	54	54	50.00	50.00	Nil	Nil	50.00		
<i>Miscellaneous.</i>												
Bhagalpur—Nepal boundary (putting up reference pillars).	Traverse ...	...	1905	...	...	...	...	...	...	...	A linear survey.	
Monghyr—Demarcation of boundary between pargana Haveli, Kharagpur and Shakrabadi.	Do. ...	...	1907	...	...	...	...	...	...	...	Ditto.	
Darbhanga—Demarcation of boundary between Raspur Patasia and Chaparsan 1,250 and Mahamadpur.	Do. ...	2	1908	2	2	Nil	Nil	Nil	Nil	...	A demarcation survey and ordinary rate rules do not apply to it.	
Hooghly-Chinsura Khas Mahal.	Do. ...	1.05	1908	1.05	10.5	453	453	Nil	Nil	453	Town surveys ordinary rates do not apply.	
Shahabad—Taufir Bho-dia.	Do. ...	2	1908	2	2	Nil	Nil	Nil	Nil	...	Demarcation work.	
Ranchi Municipality ...	Do. ...	7	1908	7	...	182	182	...	...	182	Town survey,	

DISTRICT AND ESTATE.	Description of work.	Estimated area to be dealt with in square miles.	Year of inspection of operations.	AREA SURVEYED IN SQUARE MILES.		COST RATE PER SQUARE MILE.		Balance of area remaining to be surveyed.	Estimated cost of completing the area in column 9.	Estimated final cost rate per square mile	REMARKS. (Explanation of unusually high expenditure).
				During the year under report.	Total including previous year.	During the year under report.	From beginning to end of the year under report.				
1	2	3	4	5	6	7	8	9	10	11	12
Sikkim (Mining claims)	Traverse ...	2	1908	2	2	(a) 420	420	...	...	420	(a) Difficult country. Small area and cost includes heavy travelling charges to Darjeeling and back.
Calcutta Suburbs Survey.	...	...	...	...	...	...	...	...	...	...	The chief work done during the year has been the compilation of fair maps of the added area and Panchannogram.
Port Commissioners Land Acquisition Survey.	Traverse ...	2	1907	1	2	...	...	Nil	Nil	...	Very close work; ordinary cost rate rules do not apply.
	Cadastral ...										
Salt Lake area in Dhap-pa.	Topographical.	2	1908	2	2	...	...	Nil	Nil	...	
Singhbhum (Dalbhum) Mourbhanj boundary.	Traverse ...	Linear	1908	...	...	...	...	...	...	...	A linear survey.
Total	Traverse ...	16,907.05	...	5,107.05	13,107.05	...	...	...	...	...	
	2" Topographical.	2,005	...	1,257	2,212	...	...	...	...	...	
	4" do. ...	...	...	54	54	...	...	...	...	...	

F. C. HIRST, CAPTAIN, I.A.,

Offg. Superintendent of Provincial Surveys, Bengal.

## APPENDIX II.

Statement of sums expended for the year ending 30th September 1908.

DISTRICT, &c.	Description of work.	EXPENDITURE INCURRED DURING THE YEAR UNDER REPORT.				TOTAL EXPENDITURE FROM INCEPTION TO END OF THE YEAR UNDER REPORT.			
		Actual (direct charge).	Share of Superintendent of Provincial Survey's pay and his office.	4 per cent. charge for instalments.	Total.	Actual direct cost.	Share of Superintendent of Provincial Survey's pay and his office.	4 per cent. charge for instalments.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Patna ... ..	Traverse ...	41,444	3,643	1,803	46,890	68,014	5,078	2,923	76,015
Shahabad ... ..	Do. ...	11,459	1,007	499	12,965	11,459	1,007	499	12,965
Ranchi ... ..	Do. ...	36,927	2,970	1,597	41,493	2,25,405	13,273	3,389	2,47,067
Singbhum—Tenure of Babu Abhi Ram Toong.	Do. ...	411	39	19	499	441	39	19	499
Manbhum-Barabhum ... ..	Do. ...	23,443	2,136	1,020	26,599	23,443	2,136	1,020	26,599
Khulna-Sundarbans ... ..	Do. ...	64,770	5,693	2,818	73,281	1,15,358	8,435	4,951	1,28,744
Ditto ... ..	Topo 2" ...	47,315	4,159	2,059	53,533	77,457	5,807	3,331	86,595
Ditto ... ..	Topo 4" ...	2,387	210	104	2,701	2,387	210	104	2,701
<i>Miscellaneous.</i>									
24-Parganas Sundarbans (areas) ...	Topo 4" ...	17	2	...	19	17	2	...	19
Calcutta Suburbs Survey including Revenue work and Panchannogram.	Traverse ...	191	17	...	208	64,713	3,396	...	68,109
	Cadastral ...	20,916	1,992	...	22,848	1,54,869	9,233	...	1,64,102
	Records ...	3,238	285	...	3,523	38,028	2,046	...	40,074
Land Acquisition Survey for Port Commissioners.	Traverse ...	*4,188	368	...	4,556	4,188	368	...	4,556
	Cadastral ...	*23,182	2,038	...	25,220	23,182	2,038	...	25,220
	Records ...	*1,762	155	...	1,917	1,762	155	...	1,917
Dhappa-Salt lake area ...	Traverse ...	412	36	18	466	412	36	18	466
	Cadastral ...	1,497	132	65	1,694	1,497	132	65	1,694
Fair maps for Port Commissioners	Ditto ...	771	68	...	839	771	68	...	839
Calcutta Block plans for Collector	Cadastral ...	*1,072	...	...	1,072	1,072	...	...	1,072
Monghyr—Areas ... ..	Records ...	2,405	210	105	2,720	2,405	210	105	2,720
Do. Hill blocks ... ..	Topo 2" ...	6,607	580	287	7,474	12,386	893	531	13,810
Do. Gangs Diara (thana Surajgarha).	Traverse ...	761	66	33	860	761	66	33	860
Bhagalpur and Purnea—Nepal boundary, Kosi River (putting up reference pillars).	Do. ...	576	50	25	651	576	50	25	651
Monghyr—Demarcation of boundary, pargana Haveli, Kharagpur and Sakrabadi.	Do. ...	927	81	40	1,048	927	81	40	1,048
Darbhanga—Demarcation of boundary Raspur Patasia and Chaparson ... ..	Do. ...	609	54	26	689	609	54	26	689
Hooghly-Chinsura Khas Mahal ...	Do. ..	401	35	17	453	401	35	17	453



APPENDIX II—concluded.

DISTRICT, &c.	Description of work.	EXPENDITURE INCURRED DURING THE YEAR UNDER REPORT.				TOTAL EXPENDITURE FROM INCEPTION TO END OF THE YEAR UNDER REPORT.			
		Actual (direct charge).	Share of Superintendent of Provincial Survey's pay and his office.	4 per cent. charge for instalments.	Total.	Actual direct cost.	Share of Superintendent of Provincial Survey's pay and his office.	4 per cent. charge for instalments.	Total.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
ahabad—Taufir Bhedia ...	Traverse ...	453	40	20	513	453	40	20	531
anchi—Arrears ...	Cadastral ..	9	1	...	10	2,742	144	116	3,001
Do. Municipality ...	Traverse ...	1,126	99	49	1,274	1,126	99	49	1,274
ingbhum-Dalbhum, Mourbhanj boundary.	Do. ...	260	23	11	294	870	54	37	961
Midnapore-Jhargram Estate ...	Do. ...	6,279	552	273	7,104	6,279	552	273	7,104
Do. Jalamutha and Majnamutha Government Estate (arrears).	Cadastral ...	61	5	3	69	577	31	25	633
ikkim—Mining claims ...	Traverse ...	840	...	...	840	840	...	...	840
Total	Traverse ..	1,96,507	16,909	8,267	2,20,683	5,26,275	34,799	18,339	5,79,413
	Cadastral ...	47,508	4,176	68	51,752	1,84,710	11,646	205	1,96,561
	Records ...	7,405	650	105	8,160	42,195	2,411	105	44,711
	Topo ...	56,326	4,951	2,450	63,727	92,247	6,912	3,966	1,03,125
	Standard maps ...	13,668	1,201	...	14,869	98,703	6,121	...	1,04,824
	Traverse charts ...	7,104	624	...	7,728	7,972	669	...	8,641
	Badars ...	7,266	639	(c) 316	8,221	25,904	1,689	542	28,135
	Map Records ...	2,922	257	...	3,179	19,896	1,120	...	21,016
	Thana Maps ...	3,728	328	...	4,056	15,118	999	...	16,117
	Trijunction mark maps.	2,285	201	...	2,486	7,807	477	...	8,284
Bengal Drawing Office	Correction and touching up of Midnapore maps.	549	48	...	597	881	64	...	945
	Preparation and reproduction of boundary mark maps of Purnea and Darbhanga.	492	43	...	535	492	43	...	535
	Reproduction for attestation.	5,308	467	...	5,775	17,935	1,129	...	19,064
	Reproduction for sale and distribution.	(a) 58,599	5,150	...	63,749	58,599	5,150	...	63,749
	Extra Departmental work.	(b) 1,651	145	...	1,796	5,263	333	...	5,596
GRAND TOTAL	...	4,10,318	35,789	11,206	4,57,313	11,03,997	73,562	23,157	12,00,716

(a) Of Purnea, Banchi, Bhagalpur, Monghyr, Banki district, Cuttack, Sonthal Parganas, Midnapore, Koderma district, Hazaribagh, Beldanga and Patanchpur district Murshidabad, Patna, Dompura district, Cuttack and Maksudpur district Gaya.  
 (b) Copies of maps supplied to applicants on payments.  
 (c) Four per cent. instalments applied under the orders of Government of India contained in their No. 210-39-S, dated 17th February 1908.  
 Work done extra Departmentally.  
 † Includes Rs. 3,242 on account of cost of instruments, forms, etc., paid by the Port Commissioners direct.

F. O. HIRST, CAPTAIN, I.A.,  
 Offg. Superintendent of Provincial Surveys, Bengal.