

134

GENERAL REPORT

OF THE

Revenue Survey Operations

OF THE

N. W. FRONTIER—PUNJAB,

FOR SEASON

1866-67.

COLONEL J. E. GASTRELL, *F. R. G. S.*

DEPUTY SURVEYOR GENERAL AND SUPERINTENDENT OF REVENUE SURVEYS, UPPER CIRCLE.

CALCUTTA :

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1867.

No. 3.

FROM THE SUPDT. OF REVENUE SURVEYS, UPPER CIRCLE,
TO THE SECY. TO THE GOVERNMENT, PUNJAB.

Calcutta, 20th December 1867.

SIR,

I have the honor to submit the accompanying Report on the Revenue Survey Operations of the North-West Frontier during the season 1866-67.

2. The total area completed in all details during 1866-67 is 661 square miles, whilst 2,080 square miles have been triangulated and are ready for Plane Tabling and hill sketching; and two more cantonments and civil stations with their environs have been surveyed and mapped, to meet the demands of the Secretary of State for India, for maps and plans of all places where European troops are located, similar to those furnished by the Ordnance Survey Office in England. These plans, having been expressly prepared for Photography, were sent into the Office at Calcutta as soon as completed, and have already been reduced to 6 inch=1 mile scale, put on zinc, and printed, by photographic agency.

3. The total expenditure for the year, including Rs. 1,845-0-10 drawn as arrears of pay on the introduction of the re-organization scheme, is Rs. 73,745-3-2.

4. The rate per square mile cannot, as before stated, be given without the chance of greatly misleading, till the whole of District Hazara has been surveyed in detail. Judging, however, from what has been done already, I think 60 or 70 Rupees per square mile will be about the cost, and this will be cheap for such work.

5. I append a statement of maps of the Punjab, published, and in progress :—

Photo-lithographed. Plans of the cantonments of Rawulpindee and Campbellpore, scale 6 inches=1 mile.

Compilations completed and in progress :—

Of the Delhi and Hissar Divisions, scale 2 miles=1 inch, completed and sent to Press for lithography.

Of District Lahore, scale 2 miles=1 inch, showing village boundaries, completed by the insertion of the line of Railway between Lahore and Umritsur, and between Lahore and Mooltan. This map will be photographed and published as soon as the necessary information (which has been applied for) can be obtained regarding any recent changes which may have been made by transfers to and from the District, so as to render the 2nd Edition of the map correct up to date of publication.

And lastly, of District Peshawur, containing Tuhseels Khalsa Khuttuk, Murdan, and Hushtnuggur, scale 4 miles=1 inch : this is half completed.

The last mentioned map is being prepared for photography, and there will therefore be no delay whatever in its issue after the Loondkhuwur Valley has been inserted on the compilation.

6. The re-survey of the Commissionerships of Delhi and Hissar has long been urgently required to enable this office to supply the public and Government with maps that will combine in all details and in every respect with the recent surveys made by Lieutenant Colonel Johnstone's Survey Party of the Native States and resumed Jageers within those Divisions.

7. In the Report on the annual operations of the Revenue Surveys of India made by the present Surveyor General for season 1856-57, and bearing date the 2nd August 1858, he thus writes regarding the survey records and mapping destroyed during the mutiny :—

“ Of the old North-Western Surveys, none of the village plans unfortunately were ever deposited in the Surveyor General's Office, Calcutta, but the originals were left in charge of the Board of Revenue at Agra, who again entrusted the same to Commissioners of Divisions, the duplicates being in the several Collectorates ; the consequence of this fatal policy has, I believe, been that every volume of these most valuable records has been lost.”

“ The originals of those Districts only which have been surveyed and mapped during the last ten or eleven years, together with a few of the old *Delhi Survey of 1822 to 1833*, are forthcoming.”

8. The re-survey of the North-Western Provinces, and the consequent restoration of mapping and true records of area, has already been sanctioned by the Supreme Government and re-commenced ; and I strongly urge on the consideration of the Government of the Punjab the advisability, not to say necessity, of employing the Hazara Survey Party under Lieutenant Colonel Johnstone in the re-survey of all tracts of country transferred from the North-West Provinces to the Punjab, and of which the records have been lost, as soon as Hazara is finished, say in the cold weather of 1869.

9. DEMARCATIONS.—Should the Government of the Punjab concur in this, then early steps must be taken to have, all boundaries settled and demarcated, and following the custom hitherto pursued in all the Punjab surveys, the triple-junction points of villages *permanently marked* by masonry or stone platforms prior to the professional party commencing the measurements.

10. PERMANENT BOUNDARY MARKS.—The system of permanently marking the triple-junctions of villages may be still further improved upon by having permanent marks erected between them. Wherever stone is available and plentiful, there I most strongly advocate the system of the Central Provinces being adopted, *viz.*, that of marking every inflection of boundary with a block of stone let into the ground.

11. **MADRAS SYSTEM.**—In Madras a most excellent plan prevails, which renders the re-laying of a boundary most easy and certain. There at every station where the Theodolite is set up, a masonry platform of definite dimensions is built, or a stone of certain fixed size is imbedded in the ground, so marked as to show at a glance whether the mark defines a triple-junction boundary station, or an intermediate one. From these marks as starting points, and with a simple chain and cross staff, the exact position of each inflection of boundary can be laid down from the original field book absolutely and certainly. The only case in which it would again be necessary to call in the aid of a professional Surveyor and his Theodolite would be in the event of a number of these marks having been wilfully removed. In such cases, it would, of course, be requisite to fall back upon the marks nearest to the sites of those removed, and again from the field book to fix from them, by re-observing the angles and remeasuring the distances, the sites of the missing marks. The intermediate points of boundary along each line would then be laid down by chain and cross staff as before. By these means Government can recoup itself *completely* in the future for the expenses incurred in the present, and give to future ages the *full* benefit of its survey operations.

12. **FIELD BOOKS.**—Every offset field book must, of course, be most carefully kept and guarded; duplicates should also be made of them. One (the original) to be lodged in the Surveyor General's Office in Calcutta, and the other in the Collectorate Office, or such other place of security as the Government may decide.

13. In the body of the Report on Lieutenant Colonel Johnstone's Survey Party, I have mentioned the instructions which I have issued in accordance with the desire of His Honor the Lieutenant Governor to have the village boundaries of the hilly tracts of the Rawulpindee Division surveyed in such manner as shall enable them to be laid down and shown on the former topographical maps of that part of the country by Lieutenant Colonel Robinson, R. E. I trust the proposed measures will succeed and be approved of.

I have the honor to be,

SIR,

Your most obedient Servant,

J. E. GASTRELL, *Colonel,*

Deputy Surveyor General.

GENERAL REPORT

ON THE

Revenue Survey Operations

ON THE

NORTH-WESTERN FRONTIER, PUNJAB,

For Season 1866-67.

NORTH-WESTERN FRONTIER.

COMMENCEMENT OF OPERATIONS.—The survey of District Hazara was resumed on the 15th October 1866, and the party continued in the field till 31st December, when heavy falls of snow and the severity of the cold forced them to suspend out-door work. From that date and until the 1st April 1867, the Establishment was employed in mapping and completing the computations connected with the work just done; field work then recommenced and continued uninterruptedly till 30th September 1867.

Lieut. Col. H. C. Johnstone, Staff Corps, Surveyor, 2nd Grade.

ASSISTANTS.

- Lieut. W. Barron, Staff Corps, Assistant Surveyor, 1st Grade, transferred to 2nd Division, Lower Provinces, from 1st February 1867.
- Lieut. J. E. Sandeman, Staff Corps, Assistant Surveyor, 2nd Grade, transferred from 2nd Division, Central Provinces, from 13th November 1866.
- Lieut. H. L. Hutchinson, R. A., Probationary Assistant Surveyor, appointed and ordered to do duty temporarily from 29th August to 30th September 1867.
- Mr. G. Housden, Civil Assistant, 1st Grade.
- „ W. H. Reynolds, Sub-Assistant, 3rd Grade.
- „ A. J. Gibson, „ „
- Baboo Hurree Sing, „ „
- Mr. G. B. Scott, „ „
- 16 Native Surveyors, &c.

POSITION OF TRACT.—The portion of Hazara in which the Survey Parties worked, consists of Pergunnahs Hurreepoor and Mansera, north-east of the former season's field of operations, between $33^{\circ}17'$ North Latitude, and $74^{\circ}33'$ East Longitude.

CONNECTION WITH GREAT TRIGONOMETRICAL SURVEY.—The Revenue Survey Principal Triangulation emanates from the Great Trigonometrical Secondary Stations of Doodha and Sirban of the Hazara Branch Series, closes on the Secondary Great Trigonometrical Stations Mukra and Musa-ka-Masala of the Khagan Series, and consists of 10 triangles, covering an area of 790 square miles north-east of the base between Mukra and Musa; the Revenue Survey Secondary Triangulation (consisting of 98 Stations) is connected with ten Stations of the Khagan Series, viz. :—

Nukra.	Oorhaie.
Sirool.	Waitar.
Jimgarh.	Bas.
Kundi.	Kotwai.
Manoor.	Loolasur.

The average error per mile in the Revenue Survey Principal Triangulation is 1.7 inches, and in the Secondary 9.8 inches.

AREA EFFECTED.—The entire net-work of triangles, principal and secondary, spreads over a surface of 2,080 square miles, of which 603 square miles, comprising 224 villages, have been surveyed in detail this season, the villages on the scale of 4 inches=1 mile, and the hill topography on the scale of 2 inches=1 mile.

CANTONMENTS.—An elaborate survey was also made of the cantonments of Peshawur and		
	Sq. miles.	
Peshawur ... ..	...=37	Nowshera on the scale of 12 inches to the mile, making
Nowshera ... ..	...=21	a total of 661 square miles for the season, of completed work
	—	on the several scales mentioned.
Total Area	...=58	

NATURE OF SURVEY.—The detail survey was a mixture of Revenue and Topographical. The cultivated valleys and plains were all surveyed and mapped on the full village scale of 4 inches=1 mile; all cultivation was carefully measured and recorded, and village boundaries were accurately laid down.

The hills were surveyed on the $\frac{1}{2}$ scale of 2 inches to the mile.

CHECK SURVEY.—The interior work was carefully checked by the European Assistants, and by the Revenue Surveyor himself, who made straight across the country, “putting up his plane-table at several places daily and testing the accuracy of the work. All proved most satisfactory. The Assistants also carefully examined portions of the plains lying within their plane table Sections, and a check line was run down the Hurreepoor Valley. All agreed well with the board plans. The Surveyor has so arranged as to send the Native Surveyors on ahead. Their plans, showing merely cultivation and boundaries, large streams, and any other features that *can be measured*, are then made over to the Assistants, by whom their details are laid on to their own sheets as they go on. The assistants thus purtail all the native surveyors’ work.” This plan answers, well and ensures accuracy. I purpose to preserve carefully these skeleton plans and to furnish copies to the Civil Authorities to guide them in Revenue administration. The absence of hill features prevents confusion, and renders them well fitted for Revenue purposes simply.”

HEIGHTS.—Numerous heights of peaks, crests of passes, of beds of streams, and their points of junction, and of village sites, were determined by boiling point Thermometers and Aneroid Barometers. “Nine principal and 42 secondary heights have also been computed trigonometrically and checked by the adjoining Great Trigonometrical Station heights. The average error was 1·4 feet.”

OBSTRUCTIONS.—Many causes operated to impede the otherwise rapid progress of the Survey, among which may be reckoned fever, which is very prevalent at certain seasons of the year. In Puklee and its vicinity and up the Khagan glen above Balakote, cholera was very severe.

Opposition was offered by the Syud Chiefs of Khagan, who caused annoyance and delay by knocking down Survey Stations. On one occasion a survey camp was fired into at night at the village of Gidhurpoor in the north-west corner of Puklee Valley, and a Sentry shot in the hand. The prompt action taken by the Civil Authorities in the matter put an end to this mode of displaying disaffection. The work was further retarded by the scarcity of coolies and supplies in Khagan, and by the continual bad weather which prevailed from April to September, and in especially the higher ranges of Upper Hazara, where the snow and mists for days obscured the signals.

These impediments to progress are fully detailed in the Revenue Surveyor’s paras 32, 33, 37, and 39, which will be found in the Appendix.

Hitherto the tact and firmness, coupled with kindness, of the Surveyor and his Assistants, have enabled them to prosecute their labors successfully under all difficulties. Much still remains to be done, and many troubles have still to be encountered ere the difficulties of the border survey be overcome, but I have every confidence in those employed, and cordially aided, as they are, by the Civil Authorities, I have no doubt of their ultimate success.

THAKBUST MAPS.—The Thakbust Maps of the hill villages in Hazara are described as very inferior, but the circumstance having been represented by the Surveyor to the Civil Authorities, a Settlement Officer has been deputed to Hazara. Being unable to reconcile the discrepancies found in village boundaries in many places, it has finally been decided in cases of difference to uphold the professional survey boundaries. The maps of the Civil branch of the survey will be altered and made to agree with them; this will materially expedite the work, and there will now be no further delay in finishing up the maps and final areas, the preparation of which has been delayed solely on this account.

MAPS.—Pending the submission of his maps (delayed for the above causes), the Surveyor sent down several for inspection and approval. The hill delinication is very effective and highly approved of, and reflects great credit on the exertion of the Surveyor and his Assistants.

STATE OF THE WORK IN HAZARA.—The following Abstract shows clearly what has been done in Hazara since the survey was commenced in 1865-66. The district is situated between $33^{\circ} 44'$ North Latitude and $74^{\circ} 35'$ East Longitude. On the south is District Rawulpindee; on the east Kashmir; on the west runs the Indus River, which separates Hazara from District Peshawur and the country of the Hussunzaie Tribe. On the north stretches the Hazara Kohistan, which abuts east on the country of the independent Tribe of "Chilas."

Estimated Area of Hazara=3,000 Square Miles.

SEASON.	SURVEYED IN DETAIL.		TRIANGULATED.	REMARKS.
	No. of Villages.	Square Miles.	Square Miles.	
1865-66	255	329	775	The number of square miles triangulated in advance is thus 1,923.
1866-67	224	603	2,080	
TOTAL	479	932	2,855	

The area still to be dealt with topographically in Hazara stands approximately at 2,068 square miles, and the small area still to be triangulated is 145 square miles. Of the area still remaining, the Surveyor estimates that at least 700 square miles will have to be surveyed in detail on the scale of 4 inches=1 mile. The whole of the field work of Hazara the Surveyor contemplates may be completed by the end of December 1868; all, however, depends upon the health of the Establishment and the state of the weather; if both be favorable it may be done. No exertions, I feel assured, will be spared by either the Surveyor or his Assistants to accomplish it within the time he has named, and if he does complete it within the time named, he will deserve every praise.

• 1865-66	{	Rawulpindee ... ..	...	...	26
		Campbellpoor ... ..	...	...	8
1866-67	{	Peshawur ... ..	...	...	37
		Nowshera ... ..	...	...	21
		Total	...	...	92

In addition to the area recorded in the above statement, this party has within the last two years surveyed four cantonments* on the scale of 12 inches=1 mile, bringing up the entire area surveyed in detail to 1,024 square miles.

PROGRAMME FOR SEASON 1867-68.—It is proposed this season to survey the cantonments of Attock and Abbottabad on the scale of 12 inches=1 mile, to triangulate the valleys of Agrore and Konsh, and with them complete the triangulation of Hazara, and to prosecute vigorously the topography of the large triangulated area in the Khagan Valley north of the work of last season.

LOONDKHWUR VALLEY.—The Loondkhwur Valley in the Eusofzaie portion of District Peshawur will also be completed this season, if possible, the estimated area of which, as stated in former Report, is 100 square miles.

The Survey Party broke ground on again the 1st October 1867, and will continue in the field till snow falls, about the end of December, when they will return to recess quarters at Rawulpindee, to bring up the maps and calculations; they will again take the field early in April, or as soon as the snow is sufficiently melted to admit of field work progressing, and will retire at the end of September 1868.

HILLY PORTIONS OF DISTRICT RAWULPINDEE.—It was originally intended that this party should make a re-survey of the Northern Tuhseels of District Rawulpindee, *viz.*, Murree and Kuhoota, which formerly were included in the Hazara District; but this tract of country having already been topographically surveyed on the scale of 1 mile=1 inch by Lieutenant Colonel D. G. Robinson, R. E., in charge of the Rawulpindee Topographical Survey, and being more than ordinarily rugged and broken, little advantage would be gained by resurveying its topography. The original intention has accordingly, under the orders of the Lieutenant Governor of the Punjab, on a reference made by the Surveyor General of India, been modified. The Revenue Surveyor has now been instructed to survey only the village boundaries in these Tuhseels, basing his measurements on the triangulation points formerly fixed by Lieutenant Colonel Robinson in 1849-50. These, it is hoped, will be found in sufficient preservation and numerous enough to furnish ample points of junction. He will also show all permanent roads, rivers, and streams that cross the boundary. Boundary maps will then be furnished to this Office, where they will be transferred to the original topographical maps. These maps will then, it is hoped, serve for all present revenue purposes, and will be issued to the local Officers under the Punjab Government. Large scale skeleton boundary maps can be also prepared for Civil Authorities.

If a sufficient number of points of former survey cannot be found further report will be made to Government on the subject, and other means must then and will be devised to carry out the wishes of His Honor the Lieutenant Governor.

The Revenue Surveyor speaks in high terms of his assistants both European and Native.

J. E. GASTRELL, *Colonel,*

Deputy Surveyor General.

SUPDT. OF REV. SURVEY OFFICE; }
Calcutta, 20th December 1867. }

APPENDIX.

Extract from Annual Report of the Operations of the North-Western Frontier Revenue Survey, by
LIEUTENANT COLONEL H. C. JOHNSTONE, Season 1866-67.

31. EXTRA PRINCIPAL STATIONS.—On the range of hills running between Bahingra and Shukr-Pani, two (2) extra principal stations have been fixed and observed, called Gooria and Baghdunna. They will be required for intersecctions and secondary work in Agrore, as well as to enable the triangulator to cut in with greater accuracy points on the Black Mountain and other parts of the border, where it is impossible to go. A good many observations have already been taken from these Stations.

32. BAD WEATHER.—Again and again from April to September bad weather impeded progress greatly. The Assistants were constantly kept at a Station for a week or more at a time, owing to clouds, mists, rain, snow, &c. They had to undergo no ordinary hardships on such occasions. In small tents with one fly at altitudes of over 15,000 feet and 3,000 feet above the nearest firewood, the life was trying indeed. This could not be avoided, for the operations could not have been carried on at any other time of the year.

33. CHIEFS, CIVIL.—In Lower Hazara generally the Chiefs and people were civil and obliging. Orders had been issued by the Civil Authorities for all parties to aid the survey in its operations, and these orders were well attended to.

34. SYUD CHIEFS.—On first entering Khagan the Syud Chiefs joined the various camps and seemed disposed to help, but very shortly difficulties occurred. Moving about was objected to; hills were pronounced impracticable; pathways impassable. Stations were knocked down; alarms got up, &c. It was discovered that among themselves feuds and heartburnings existed, brothers against brothers. In their desire to try and injure each other, they got up these troubles. The dismissal of one Chief from the Revenue Surveyor's camp, reporting the general bad conduct to the Civil Authorities, their action in the matter, the withholding of presents which the Syuds knew good conduct would bring them, and the discovery that their intrigues against each other had been detected and might result in punishment,—all combined to bring them to their senses. Afterwards all went on well.

35. INDEPENDENT TRIBES.—The Syuds prophesied all sorts of troubles with the independent tribes beyond the frontier and positively denied having any influence with them. The knocking down of the Survey Stations was attributed to them. When the Civil Authorities informed the Syuds that the preservation of the Station marks was entrusted to them, and that if any were destroyed, they would be held responsible, not a stone nor a pole was touched. The enmity of the Chilasee was much dilated on. On one occasion a letter was brought to the Revenue Surveyor purporting to come from the Chilas Jirgah, or Council of elders, protesting against the approach of the Survey towards the border, and holding out threats of armed opposition. When the ascent of "Loolasur" was made, and the disputed territory was entered, parties of men did show themselves all along the Loolosur range, but no opposition was attempted. When the Chilas Jirgah subsequently visited the Deputy Commissioner, they denied all knowledge of this letter, or the threatened opposition.

36. SUPPLIES IN KHAGAN.—Supplies in coolies are difficulties in Khagan. The population above Kbagad Khas is migratory, consisting entirely of graziers with their flocks and herds. They go up about May and June, and by October all have left again; meat and milk are plentiful; but all other supplies have to be procured from Balakote, Gurbi, and the Pukles

143

Valley, and carried up on mules. Getting the grazier to carry loads was a hardship to him, for it made him leave his flocks. Coolies, as a rule, were procured from villages below Khagan, and changed at certain intervals. Next year it is hoped that some Kashmerees at any rate will be obtained, who will take service for the season.

37. **CAMP FIRED INTO.**—Messrs. Scott and Smith, while encamped at the village of Gidhurpoor in the north-west corner of the Puklee Valley, had their camp fired into during the night. Both behaved well on the trying occasion and deserve credit for their coolness. One of the Sentries was shot in the hand, and lost a finger; a pursuit was attempted, but considering it was a dark night, and the ground broken all about, success was hopeless; the Chief of Gidhurpoor had six months given him to produce the man who fired, in default to pay a fine of one thousand rupees (Rs. 1,000). The prompt and severe action of the Civil Authorities was unexpected by the people. No more shots will be fired at the Survey Parties in Puklee or its neighbourhood.

38. Beyond Looloosur Lake the boundary is somewhat undefined, where in the Index Map is written "Disputed territory." Running from the Loolasur Station to the north east is a dotted line. This runs approximately along the crest of a range of hills which may be called Looloosur range, and which extends for many miles beyond what is shown on the Index Map. A large tract of country to the south of this range drains into the Looloosur Lake. The Civil Authorities maintain that the whole of this tract is British. The Chilasee on the other hand claims down to the lake. * * * * * The tract is under snow for seven or eight months in the year; during the remaining months the grazing is capital. Mapping this disputed territory will, it is hoped, be managed next year. By the above mentioned visit of the Chilas Jirgah friendly relations may be considered to have been established.

39. **MEDICINE.**—Throughout the district the demands on the Surveyors for medicine was very great and could not be met. Fever at certain seasons is very prevalent, and in Puklee and its neighbourhood and up the Khagan glen above Balakote cholera was very severe. The inability to relieve the sick and the dying was very distressing.* * * * *

40. **TEA SEED FOR DISTRIBUTION.**—Tea is a very popular beverage. The Revenue Surveyor's suggestions that the people should grow tea was received with delight, but seed was the difficulty. This was promised them. Shortly after the Revenue Surveyor's return to Murree, one of the Syuds found his way there, and asked for tea seed. The Assistant Commissioner last year had some for distribution. The Assistant Commissioner of this year, Mr. G. Smyth, was accordingly addressed, tea seed asked for, and reasons for doing so fully explained. He did not reply to the communication.

