

Report on the Earthquake of the 12th June 1897.

It is requested that any reply or
reference to this communication
may quote its number, distin-
guishing letter, and date.

No. 5409G.

THE OFFG. SECRETARY TO THE CHIEF COMMISSIONER
OF ASSAM,

THE SECRETARY TO THE GOVERNMENT OF INDIA,
HOME DEPARTMENT.

Shillong, the 14th August 1897.

In continuation of the telegrams from this Administration, noted on the margin,
and with reference to your telegram dated 20th June 1897, I am now directed by the Chief Commissioner to submit the following report on the earthquake of the 12th June 1897.

No. 1, dated 13th June 1897.	
" 2 " 16th " "	"
" 3 " 16th " "	"
" 4 " 17th " "	"
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" 6 " 18th " "	"
" 7 " 20th " "	"
" 8 " 21st " "	"
" 9 " 5th July "	"

2. A copy of a memorandum recorded by Mr. W. H. Nightingale, Superintending Engineer of the Province, which has already been submitted to the Government of India in the Public Works Department, is annexed. This records in a succinct manner the damage done to the buildings and communications which are borne on the books of the Public Works Department, and shows that the cost of repairing damages in that department alone is estimated at more than 35 lakhs of rupees. Copies of the reports received from the Commissioner of the Assam Valley from the district officers of all districts of the Province, are also annexed, and although they vary very much in fulness and detail, they will be found to furnish a tolerably complete account of the circumstances attending the earthquake and of the effects of this great calamity on the Province. I am to invite particular attention to the report of Mr. Arbuthnott, the Deputy Commissioner of the Khási and Jaintia hills, which is undoubtedly the best and most thorough of those received. The report of Captain Howell, the Deputy Commissioner of the Gáro Hills, is also an excellent one, and it may be observed that it was in these two hill districts that the extreme force of the earthquake was felt. The Chief Commissioner has obtained the permission of Surgeon-Major Dobson, the Civil Surgeon of Goalpára, to publish a semi-official letter addressed to him on the 16th of June, which contains a vivid description of his personal experiences and of the effect of the earthquake on the officers and villagers among whom he was encamped on the night of the occurrence. It will be found that Colonel Maxwell's inspection memoranda on the places visited by him as soon as possible after the earthquake record a brief but graphic account of the damage done.

3. There can be no doubt that this is the most severe and disastrous earthquake which there is any record in Assam. This Province is well known to constitute a seismic area, and earthquakes are not uncommon, but they have never been known on any previous occasion to cause widespread destruction. A peculiar feature of the Khási hills is the existence of the ancient monoliths which are referred to in paragraph 14 of Mr. Arbuthnott's report. Their meaning is not known, and they are of immemorial antiquity. Numbers of them are now broken and snapped, and in some cases they have torn out of the earth, but their previous condition is an evidence that no such earthquake as this has ever before been known to visit these hills. Similar evidence is

afforded by the destruction of one of the most interesting archaeological remains in the Province, the *Sil Sako*, a massive stone bridge in the Kámrúp district of very great antiquity. In modern times, the earthquake of the 10th January 1869, known as the Cachar earthquake, of which a full report is given by Mr. Thomas Oldham in the Records of the Geological Department, was very severe, but it is not to be compared in severity or extent with the present shock. More recently there was the earthquake of 1876, which was felt in Upper Assam, and the earthquake of 1885, which was severe in the Gáro Hills and over a considerable tract of Bengal, but they occasioned comparatively little damage. The present earthquake is a calamity unprecedented and unique in Assam, and indeed in India.

4. So far as the Chief Commissioner is able to infer from the information at his disposal, the focus of the present seismic disturbance must be held to be somewhere near the foot of the hills westward of Cherrapunji. It is believed to be due to a fault in the earth's crust, and the rumour that its origin was volcanic is entirely without foundation. Undoubtedly its effects were most severe in the Gáro and Khási Hills, and the force of the shocks appears to have radiated from them on all sides. The plains districts which suffered most are those in the immediate vicinity of these hills, *viz.*, Kámrúp and Goálpára to the north and west, Mymensingh and Sylhet to the south, and Nowgong to the east.

5. Too much importance ought not to be attached to the record of the hour at which the earthquake is said to have occurred, but the marginally noted statement, which is gleaned from the official reports, will be read with interest. The times recorded at Nowgong, North Lakhimpur, Sylhet, and Maulvi Bázár are obviously wrong; but, after eliminating these stations and allowing for the difference of local time, it will be found that the hour of the earthquake in all parts of Assam was very nearly the same. The force of the shock, especially along the hills, which are the best medium of transmission, must have travelled with almost inconceivable rapidity.

* Other accounts give 5 p.m. and 5-20 p.m. as the time.

6. The character of the shock felt everywhere was also much the same, though varying in degree: there was sharp vibration, accompanied by a rocking and heaving of the earth, and a loud rumbling noise. In the hills, there were terrible landslips accompanied by loss of life, which are graphically described by Mr. Arbuthnot; in the plains, the rivers were agitated, and the Brahmaputra at Gauháti, as shown by the river gauge, rose more than 7 feet. The readings were:—12th June, morning, 167·41 feet above sea-level; 12th, at 6 p.m., 175·00; 13th, morning, 173·11; 14th, 169·96; 15th, 167·91. So the wave rose suddenly and subsided very gradually. But it is observable that the river gauge at Sylhet showed no rise at all. In the Sunámganj subdivision of Sylhet, the river banks crumbled and fell into the river, and a heavy mortality is due to this cause. Geysers sprang up and spouted sand and water. Colonel Maxwell writes of Nowgong:

In every small area a jet of water and sand was thrown several feet into the air, and added to the terror of the inhabitants. This ejection was made with such force that the covers of wells embedded into the mortar were hurled aside and the wells were filled in with many feet of sand. A tank 14 feet deep is now dry, and has a layer of fine sand within a foot of its top. In this way a great part of the station is covered with sand.

and of Goálpára:

The action of the earthquake in the tazar was most extraordinary. Several houses subsided 6 feet, and to that height were engulfed in fetid smelling water. Other buildings were thrown down and embedded in 6 feet of sand. A well was altogether filled up with sand, and a portion of the wooden cover was buried 30 feet distant, where it lies half buried. Huge fissures running east and west are to be seen everywhere.

Captain Howell, Deputy Commissioner of the Gáro Hills district, writes:

In the plains portions of the district deep cracks and crater-like pits appeared in the ground, one of the cracks is as much as a mile long, 2 or 3 feet wide, and 16 feet deep. The pits average about 6 feet in diameter, though one is said to be as much as 40 feet across. Through these fissures jets of sand and water were thrown up to a height of 6 or 7 feet, in a few cases accompanied by pieces of coal, peat, resin, masses of semi-petrified timber, and a black earth, hitherto unknown in those localities.

Dr. Dobson describes the same phenomenon as follows :

Innumerable jets of water like fountains playing spouted up to heights varying from 18 inches to quite $3\frac{1}{2}$ or 4 feet. Wherever this occurred, the sand was afterwards seen to occupy a sandy circle with a depression in its centre. These circles ranged from 2 to 6 and 8 feet in diameter.

This eruption of sand and water was most prevalent in the Kámrúp and Goálpára districts, in the plains portion of the Gáro Hills and in the subdivision of Sunámganj. The subsidence of villages seems to have been a marked feature in the Sunámganj subdivision, and Babu Jagat Bandhu Nag, the Subdivisional Officer, writes:—"All the villages and places in this subdivision have been cracked more or less, the width of some of the cracks being 15 or 16 feet." All masonry buildings within the area of extreme incidence of the earthquake were completely wrecked, and bridges were shattered. Embanked roads were cracked, and in many places have subsided to a level with the adjoining country.

7. It is difficult to define the duration of the shock, but it could not have lasted for less than three minutes, though the period of extreme intensity was probably limited to about 30 seconds. The fall of Government House, the largest building in Shillong, must have been complete in five seconds. After the great shock the earth tremor was continuous for several days, and definite shocks were incessant for two or three days. They have gradually been growing feebler and fewer, though they have occasionally been very severe and are still felt. In accordance with a request made by the Geological Department, an attempt has been made to register these shocks, and a great mass of information is being communicated to the Director of the Department. Among the appendices annexed to this report will be found a register of shocks recorded by Dr. Dobson, Civil Surgeon of Goálpára, between the 18th and 22nd of June, and a fuller statement by Mr. H. Corkery, Assistant Secretary to the Chief Commissioner, in Shillong, from the 15th July to the 14th August. Statements are also annexed of shocks recorded at Goálpára and some other places. In Shillong itself, it was estimated that there were two hundred shocks a day for the first two or three days after the 12th June, and that these gradually diminished to 20 or 30 shocks a day up to the middle of July. A simple form of seismometer is kept in Shillong under the civil hospital assistant in charge of the dispensary. There are altogether nine cylinders of varying sizes. The arrangement is, however, not sensitive enough to record slight shocks, or even moderately severe ones, and so is comparatively of little use. The following observations have, however, been recorded:—At the time of the great earthquake of the 12th of June all the cylinders fell, and the direction was south-south-west and north-north-east. The seismometer room was then used for the reception of in-patients from the hospital, and no record of the shocks was taken for the next 36 hours. But there were several during this period which would have brought down some of the cylinders, and especially one which occurred at about 1 a.m. of the morning of the 13th of June. On the 19th of June there were three severe shocks which affected the cylinders. At 5-15 p.m. three cylinders fell, the direction being south-west and north-east. At 10-30 p.m. two cylinders fell in the same direction. Another cylinder fell during the night, with a direction north-west and south-east, but the time was not recorded. On the 12th July, two cylinders fell with a direction west-north-west and east-south-east, at 8-35 p.m. On the 2nd August, three cylinders fell at 9-10 p.m. Two of these pointed west and east, and one south-south-west and north-north-east. As already explained, this seismometer is capable of marking only very severe shocks, but this record of them will, no doubt, not be without interest.

8. Mr. Arbutnott has given a full account of the events which occurred at Shillong, and the Chief Commissioner desires to supplement it only in some details. The most urgent needs at the time of the crisis were to house the houseless, to feed the people, and to restore communications. For the first night or two the position of all, and especially the ladies and children exposed to the elements, was very deplorable, and the heavy rainfall added to the horror of the situation. No efforts were spared to provide temporary huts and shelter, and in a few days these were ready. The orders passed by the Chief Commissioner authorised the construction, free of cost, of temporary huts, or *báshás*, for private residents in Shillong, as well as for Government officers, but it was made clear that temporary shelter only could be afforded, and that the Government did not undertake to provide permanent or quasi-permanent accommodation to those who had been rendered houseless. It was pointed out that the case of the native residents differed materially from that of the European residents, in that it could not be said that they had been made absolutely houseless. But it was added that if clerks or others applied for assistance from the Public Works Department in the construction of temporary huts and shelter,

it should be afforded to them free of charge in the same manner as to European residents. At the same time, an advance of a month's pay was made to all ministerial officers in Government service, to enable them to meet their immediate necessities, and they were allowed very favourable terms for repayment. It was also directed that the rules for building advances should be interpreted liberally in their case. The Chief Commissioner was obliged to refuse an application for a bonus of a month's pay, which was made to him on behalf of some offices. Subsequently, some *quasi*-permanent edifices have been constructed by the Public Works Department on Government land, for which rent will be charged to the occupants in accordance with the rules on the subject. The private owners of all houses which were destroyed have been called on to report within six months the measures they intend to take for rebuilding. An advance of Rs. 2,000 was made to the representatives of the Welsh Mission, to enable them to tide over their immediate difficulties, and an advance of Rs. 5,000 was made to Messrs. Gholam Hyder & Sons, who contract for the delivery of the mails and are the proprietors of the tonga service. An advance of money was also offered to some *Kdyás* in the bazar, but it was not found necessary to make it. The question of supplies was found to solve itself very quickly.

9. The repairs of communications were effected in a manner which reflects the highest credit upon the officers of the Public Works Department. At the urgent request of the Chief Commissioner, the Government of India lost no time in supplying the services of two additional Executive Engineers, one temporary Engineer, and three subordinates to this Province. The services of Captain East, R.A., of the Hyderabad Contingent, who was on leave in Shillong, were also lent temporarily to this Administration for employment as an Executive Engineer, and the Chief Commissioner desires to particularly acknowledge the energy which he threw into his work and the value of his assistance. To Mr. Nightingale, the Superintending Engineer of the Province, to Mr. G. K. Watts, the Executive Engineer of the Khasi and Jaintia Hills Division, to Mr. W. McM. Sweet, Executive Engineer, who was transferred from Dibrugarh to work on the Gauhati road, to Mr. J. C. Carroll of the Forest Department, to Mr. E. D. Chanter, Assistant Examiner of the Public Works Department Accounts, to Mr. Hawthorne, junior, employed as a temporary Engineer, and to Mr. Hodgkins, U Roy Singh, and other subordinates of the Public Works Department, the greatest praise is due for their indefatigable exertions.

10. One of the earliest of the measures taken by the Chief Commissioner was to allot to every officer in Shillong his own special duty in repairing damages and restoring confidence. Mr. J. E. Dallas, the Consulting Engineer to the Government of India for Railways, and Mr. A. G. Harrison, the Examiner of Accounts in the Public Works Department, kindly supervised the removal of the ruins of the Press and Secretariat offices, and Mr. Harrison afterwards placed himself in charge of the daily payment of coolies. Mr. Pritchard, the Comptroller, took charge of the treasury as soon as it could be reopened, and at the same time restored his own office to working order with praiseworthy despatch. Mr. Carroll of the Forest Department, and Mr. Chanter of the Accounts Branch, were employed on keeping open the Gauhati road. Lieutenant Playfair, Assistant Commissioner of Kámrúp, was temporarily posted at Nongpoh in order to maintain a permanent coolie service. Mr. Corkery, Assistant Secretary to the Administration, was employed as an assistant under the Deputy Commissioner, and devoted himself with much zeal to the conservancy of the town and other municipal duties. Mr. Rita, Subdivisional Officer of Jowai, was deputed to Cherrapunji, and did first-rate service there at great personal inconvenience. Messrs. Hodson, Hart, and Chotzner, young Civilians who were temporarily placed at the disposal of the Chief Commissioner by the Bengal Government, were posted in these hills and rendered useful assistance in local enquiries as well as in the town itself. Mr. Hodson's labours deserve special recognition. Every man was placed at his own post, and all worked with their might. Of the native staff also, the Chief Commissioner desires to speak in the most favourable terms. Although their own losses were great, they devoted themselves to the public service unremittingly and without complaining. It is due to their co-operation, with the unwearied efforts of Mr. Gait, the Secretary to the Chief Commissioner, and to Mr. Gait's powers of organisation, that the records were saved with so little loss and that current work was resumed so promptly. Not a single table or chair came out unbroken from the wreck of the Secretariat, and yet within ten days from the earthquake the office establishment was dealing with all current cases. Above all, Mr. Cotton is anxious to accord his obligations and commendation to the Civil Surgeon of the station, Surgeon-Major Neil Campbell, and the Deputy Commissioner, Mr. Arbuthnot; these officers have never spared themselves, and in season and out of season have been continually at work, encouraging others and setting an example to everyone by their sense of duty and self-devotion.

11. The Chief Commissioner desires to acknowledge the invaluable services which were rendered by the military authorities to the Administration. Fatigue parties of sepoy under the command of Captain Chatterton were employed day and night immediately after the earthquake in rescuing those who were entombed in the fall of the Secretariat Press. They also assisted in building huts for the civil population, and temporary sheds for the Secretariat records, and were detailed on road and bridge repairing under Captain East. Mr. Cotton heartily thanks the officers and men of the 42nd Gurkha Rifles for their willing aid and active co-operation. He is also much indebted to Brigadier-General Hammond, v.c., c.b., whose energetic counsel and cheerful presence proved an encouragement to all. Owing to a misunderstanding on the part of the Bergal Government, the Swiss cottage tents which were telegraphed for by the Chief Commissioner did not arrive until too late to be useful, but, through General Hammond's kindness, 15 E. P. tents, which had been obtained from the Ordnance Department, were placed at the Chief Commissioner's disposal, and afforded shelter to many at a time when a little comfort of this kind was sorely needed.

12. Mr. Hawthorne, the Deputy Postmaster General, was on tour at Dibrugarh at the time of the earthquake. Efficient postal arrangements were, however, made for the despatch of letters, and the local authorities are not responsible for the delay in the receipt of the mails from Calcutta, which caused so much anxiety in Assam. Telegraphic communications were most energetically repaired under the direction of Mr. A. P. Hill, the Superintendent of Telegraphs, and as soon as they were open, the heavy work in that department was well carried on by his subordinate staff.

13. It is most fortunate that the earthquake occurred when it did, in the afternoon, when nearly everybody, after a wet day, was out of doors. Had it occurred at almost any other time—and it is needless to say that if it had happened at night—the mortality would have been terrible. As it is, one of the most remarkable features of a disaster so overwhelming and so widespread is the comparatively small number of deaths which it

Khási and Jaintia Hills	...	916
Sylhet	...	545
Kámrúp	...	29
Gáro Hills	...	27
Dharrang	...	12
Goálpára	...	5
Nowgong	...	3
Cachar	...	3
Sibsagar	...	2
Total	...	<u>1,642</u>

occasioned. The statement given in the margin shows the number of deaths which have been recorded district by district throughout the Assam Province. These figures are under the truth, for it is impossible to obtain accuracy, especially in the hills, at this season of the year when communications are not open. But, even after making all allowances, the numbers are certainly surprisingly small. The only Europeans who perished were Mr. R. B. McCabe, of the Indian

Civil Service, Inspector General of Police and Jails, and Mr. Rossenrode, a pensioner of the Survey Department, who were both killed in Shillong by the falling of their houses on them. Mr. McCabe was a very distinguished officer, whose death has occasioned universal sorrow, and is a grievous loss to the Administration. In Shillong itself, there were 29 deaths. Of these, 10 were caused by the fall of the Secretariat Press. Among the cliff villages near Cherrapunji the total number of deaths was about 600. These were principally due to the falling of the hill sides, which carried villages with them or buried them in their ruins. The mortality here, though serious, is far less than was at first reported, when it was believed that the large village of Shella, with nearly 4,000 inhabitants, had been entirely destroyed. The mortality in the Gáro Hills is put down at only 27, but there can be no doubt that this is an underestimate. In Sylhet, the total number of reported deaths is 545, of which more than half occurred in the Sunárganj subdivision, and are principally due to persons falling into the river and being drowned on the collapse of the river banks. In a few cases boats were swamped and the occupants were drowned. The Deputy Commissioner records two apparently authenticated instances of persons having been swallowed up by the earth opening under them. In the town of Sylhet there were 55 deaths, mostly caused by the fall of buildings. It will be observed that there was very little loss of life in the districts of Kámrúp and Goálpára.

14. It was inevitable that sickness should ensue. In Shillong, there was a temporary but complete dislocation of the station water-supply and station drainage. In the native quarter, cholera broke out and fever and dysentery have been rife; while in the station itself and in cantonments there has been much sickness, especially among the ladies and children, and enteric fever has laid many low. In the plains stations also there has been an unusual amount of sickness, and cholera prevailed at Gauháti for some time until the municipal waterworks were reopened. Very gloomy reports have been received of the public health in most districts, and all have suffered. The Chief Commissioner has no doubt that the Deputy Commissioner of Sylhet has taken an unduly optimistic

view of the situation in that district. The Deputy Commissioners of Kámrúp and Nowgong have been compelled to take short leave on account of their health, and the Deputy Commissioner of Sylhet has himself been very ill, though with characteristic courage he has remained at his post. Surgeon-Colonel Stephen, the Principal Medical Officer and Sanitary Commissioner of the Province, is now on tour through the distressed tracts, but no report from him has yet been received.

15. The crops also have suffered, but much less than might have been expected. The spring crop in Sylhet known as *boro* rice had been a very good one, and, though considerable damage was done by the subsidence of riparian land and by sand being thrown up through cracks and covering the soil, it is not estimated that, even in the Sunárganj subdivision, the loss from this cause will amount to more than one-eighth of the ordinary harvest of the year. The normal condition of the people in this subdivision is one of considerable prosperity. The outturn of the *aus* crop has been favourable, and the prospects of the winter rice at the present moment leave little to be desired. In the Assam Valley, some loss was occasioned from the same cause, but it is less than was at first reported, and here also the prospects are good. The enclosures of the report of the Deputy Commissioner of Kámrúp, give, what the Chief Commissioner trusts, and has some reason to believe to be, an exaggerated account of the damage done. The loss there is chiefly due to floods, and the Chief Commissioner has had experience of floods in other parts of India as severe as this one, which have indeed occasioned immense inconvenience and discomfort to the people, but have done no permanent harm to their cultivation and have rather improved than injured the ultimate outturn of the crops. Colonel Maxwell, the Commissioner of the division, will be desired to visit the north of this district, and Mr. Cotton hopes to be able to see it with his own eyes. In the Khási Hills, damage was done by landslips, but the potato crop proved to be an excellent one. It is feared that great loss has been sustained in the lime-quarries and coal-mines near Cherrapunji. The coal-mines near Margherita and the oil-wells at Digboi, both in the Dibrugarh district, were not affected by the earthquake. The damage done to the cultivation and manufacture of tea, both in the Assam and Surma Valleys, has also been found to be much less than was anticipated. The area of tea cultivation lies almost entirely outside the zone which was most seriously affected by the earthquake, and though masonry buildings were damaged, and some gardens have undoubtedly suffered considerable loss, the tea industry as a whole has escaped from the earthquake without any very great injury.

16. The population at large, although completely panic-stricken at first by the effects of such an unprecedented phenomenon, very soon displayed their usual calmness and patience, and have resumed their cultivation as though nothing had happened. Prices rose temporarily, but though they have been abnormally high during the whole of the present year, they are not now perceptibly higher than they were before the earthquake. It very soon became apparent that the catastrophe was one which had principally affected the wealthy and well-to-do classes of the community, who reside in masonry buildings. The poor, who live in mat huts, have not suffered very much, and though there was some destruction of food-stocks, it is much less than was at first feared would be the case. Contrary to all expectations, therefore, there has been little or no scope for charitable relief or relief works. The demand for labour, moreover, has been excessive, and all who are willing to work have been able to earn a rich harvest. In some cases gratuitous relief has been given and in others advances have been made; but they are very few. Local resources and local self-help have not been found to be insufficient. But, from whatever point of view it may be regarded, the losses sustained by the people of this Province in consequence of the earthquake must be considered to be immense. Among the wealthy and comparatively well-to-do, the loss and suffering have been acute, and perhaps no section of the community has suffered more than the respectable middle class who are ordinarily employed on clerical occupations, and depend on fixed salaries for their subsistence. They have but little resource to fall back on in an emergency, and their condition is in many respects a pitiable one.

17. It has been estimated that the damage done to roads and buildings which are borne on the books of the Public Works Department will cost the Government more than thirty-five lakhs of rupees. These figures do not include the cost of damage to local communications and works which is chargeable to Municipalities and Local Boards or departmental expenditure not borne by the Public Works Department. The resources of some Municipalities have been paralysed by the destruction of houses, from the taxation of which their income is mostly derived, while their expenditure on sanitary and other purposes must tend to increase rather than diminish. It is expected that the Administration will have to make large grants from Provincial revenues to meet

this expenditure, and that the amount is not likely to be less than three lakhs of rupees. On the other hand, the normal expenditure on Public Works in Assam has been fixed during the current contract at only Rs. 14,35,000, and, after restricting as much as possible all expenditure in the parts of the Province not affected by the earthquake, it is not possible that more than six lakhs of rupees can be made available annually for earthquake repairs. And in the meantime the most important communications of the Province are closed to cart traffic, and the work of the Administration is being carried on in temporary sheds and tents. It is, moreover, impossible to indefinitely postpone sanctioned projects or to arrest the development of this backward Province for several years. The Chief Commissioner has therefore been compelled to say that the unaided resources of the Administration will not enable him to meet the heavy expenditure which this earthquake has entailed, and has had no alternative but to apply for a grant from Imperial revenues to assist the Administration to recover from the effects of the earthquake. If funds are made available, it is hoped that in two years' time, or at most within three years, the Public Works of the Province will have been restored to their former condition.

18. The Assam-Bengal Railway is the greatest of the new lines of communication which are being opened out to develop the Province, and this report would have been incomplete if it did not contain some account of the effects which were produced by the earthquake on the undertaking. Through the courtesy of Mr. Way, the Agent and Chief Engineer of the Railway, the Chief Commissioner has received the following remarks under this head :

The portions of the railway most seriously affected by the earthquake were the Gauhati Branch and the line through South Sylhet with the branch to Silchar.

The Gauhati Branch had been opened for all classes of traffic on 1st January last as far as Jamunamukh (mile 75), and was in all essentials a completed line. The effect of the earthquake was to entirely demolish the Titamari bridge, a high bridge made up of one span of 100 feet and two spans of 40 feet over a navigable channel, to very seriously injure the Kopili bridge (3 spans, 100 feet, and 18 spans, 60 feet), and to more or less injure all minor bridges and culverts on the first 50 miles out of Gauhati. All station buildings and staff quarters on the whole 75 miles have been either razed to the ground, or so injured as to necessitate practically their entire reconstruction. The line has thus far been worked at a loss, and it will now be closed until all injuries are made good ; if, as is hoped, the foundations of bridges have not suffered badly, it may be that by the end of next working season everything may be restored to its former condition.

On that portion of the line running through South Sylhet to Badarpur nearly all culverts are more or less shaken, and some will have to be entirely rebuilt ; many of the larger bridges too will require extensive repair ; it has been found possible, however, by taking special precautions, to reopen the line for all classes of traffic as far as Karimganj, and it is hoped that the 12 miles to Badarpur may be ready for opening by 1st November.

On the Silchar Branch, rails have not been laid, but it was hoped that it might have been got ready for opening by 1st January next ; the earthquake, however, has completely destroyed all the large bridges and heavy banks, and it is feared that two seasons' work may be required to make good the injury done.

The railway buildings in Shillong have not escaped the general destruction with which that place has been visited ; the general offices, however, were built on posts, only the outer walls being of masonry ; they will probably be fairly well repaired in another month or so.

19. The Dibru-Sadiya Railway, the property of the Assam Railways and Trading Company, and the Jorhát State Railway were practically unharmed. The Tezpur-Balipara Tramway sustained considerable injury, but appears to have been rapidly repaired. The little State Railway from Therriaghat to Companyganj was more seriously damaged, and the cost of repairing it is estimated at Rs. 10,000. It is expected that it will be opened for traffic by the end of this month.

20. There is one important result of the earthquake which calls for special notice. Sylhet is a district which is permeated with river communications and water channels, and it is the usual custom to construct villages along the banks of rivers for the reason that during the rains the only dry ground in the country is found in such a position. This of course is due to the fact that the rivers flowing through an almost level country deposit silt when in flood more rapidly along their banks than further inland, and a strip of comparatively high ground is thus formed immediately along their banks, while behind this the land is permanently under water during the rainy season. This strip of high land is often not more than two hundred yards broad, and the effect of the earthquake has been that in many places a great portion of this bank has fallen into the river. In these the damage has been already done. In other places, the land has been cracked by the earthquake, the fissures running parallel to the bank, and so long as the river remains in flood, the water will support this bank, but

as soon as it falls to any considerable extent, there is imminent danger that the bank will slip forward and downward into the river bed. It is not improbable that a tract of ground farther from the bank than the fissured portion will also sink when the land which supports it is withdrawn. A general subsidence of this nature will lead to very serious consequences and necessitate the removal of the site of many villages in Sylhet, and to a lesser degree in the Assam Valley. There is also another grave danger to be apprehended from this cause. An enormous amount of silt has already been thrown into the river by the subsidence of their banks, and much more is likely to fall. The Subdivisional Officer of Sunámganj observes in his report that "the Surma and other rivers seem to have been widened," and it is stated by the Deputy Commissioner of Sylhet that at Manumukh in the Maulvi Bázár subdivision, at the junction of the Manu and Kusiara rivers, "the river appears to have been widened by some hundred yards." It is obvious that as the amount of silt a river can carry away depends on its fall, which in Sylhet is extremely slight, the rivers will not be able to carry away at once the amount of silt which is accumulating, but that it will be distributed over their beds, which must consequently be raised. If, therefore, any heavy floods come down the rivers, the water will quickly rise over the banks, and it is not unlikely that these will be broken through in places, and that great changes in the course of the rivers may be the result. Something of this kind has already happened, and the floods of the year are already spoken of as abnormal, although the rainfall up to the present time has not been above the average, and the depth of water, according to the river gauge, is far from having reached its maximum limit. It is impossible to foresee at present what the full effect of this widening of the rivers and the raising of their beds may be, but the whole question appears to be one calling for very careful examination and consideration, and the Chief Commissioner's anxious attention has already been drawn to it. It may be added that the free navigation of the rivers on which the prosperity of the Province so largely rests is also dependent in great measure on the vagaries of this riparian subsidence.

21. The Deputy Commissioner of the Khási and Jaintia Hills, in paragraph 12 of his report, raises the question of the transfer of the headquarters of the Administration as one of the consequences of the earthquake, and as the proposal has formed the subject of public discussion, the Chief Commissioner considers it desirable to record the following observations in regard to it. It has been proposed to transfer the headquarters of the Assam Administration to Dhubri, Gauhati, Dibrugarh, Kohima, Haflang, Mokokchang, and Wokha. It is now suggested by Mr. Arbuthnott that it should be transferred to the hill behind the present station known as Upper Shillong. The Chief Commissioner can see nothing in favour of this proposal, except that Upper Shillong enjoys a more bracing climate than Shillong. But it is a region of greater rainfall and mist, and there is a difficulty in regard to water-supply, which was considered fatal when the choice fell upon the present site more than thirty years ago. The argument that because Upper Shillong is five or six miles nearer to the plains of Sylhet it would turn the scale in favour of a railway project does not call for serious consideration. Mr. Cotton finds that the opportunity of the earthquake has been taken to suggest the transfer of many other headquarters in the Province. It has been proposed to move Dhubri and Tura, Mangaldai and Nowgong, Sunámganj, and even Sylhet. But, apart from other considerations, which are all against the removal of capitals, and the interference with public and private interests which such a step involves, it appears to be forgotten, when these proposals are put forward, that although buildings may be wrecked, the materials remain, and also the site of the buildings, and the roads and the land which has been acquired, all of which must be abandoned if the station is changed, and that it will be a far more economical measure to rebuild at the old headquarters than it would be to acquire land and lay out a station with its roads and gardens and entirely rebuild elsewhere. To lay out a new station in Upper Shillong would probably cost not less than three lakhs of rupees over and above the cost which must necessarily be entailed in rebuilding the station at all. The Chief Commissioner is, therefore, altogether opposed to the suggestion which has been made by Mr. Arbuthnott, and he is not prepared to agree to any of the other suggestions for the transfer of district and subdivisional headquarters, unless the very strongest necessity is shown in support of them. In regard to Sunámganj, and perhaps Tura and Dhubri, it is not impossible that such necessity may be established, and the question of the site of these stations is one which Mr. Cotton will not fail to enquire into during his present tour; but, as regards the headquarters of the Administration, he desires to say at once that he sees no reason for changing the site.

22. In concluding this report, Mr. Cotton desires to place before the Governor General in Council his appreciation and admiration of the energy, coolness, and courage with which the effects of this sudden and terrible calamity have been met by the officers of

the Assam Administration. The conduct of the officials in Shillong has already been referred to. The exertions of Mr. P. H. O'Brien, the Deputy Commissioner of Sylhet, who was at the time suffering from severe illness, deserve recognition. The Executive Engineer of Sylhet, Mr. Bolinarain Borah, bore the brunt of the work in that district and evinced activity and capacity of a high order. The Chief Commissioner's acknowledgments are also due to Babu Jagat Bandhu Nag, the Subdivisional Officer of Sunámganj, and Rai Jogesh Chandra Chatterji, Bahadur, the Subdivisional Officer of Habiganj. Colonel H. St. P. Maxwell, c.s.r., the Officiating Commissioner of the Assam Valley Districts, was of great assistance to the Chief Commissioner in Shillong itself, and by his promptitude and resource and sound advice afforded every possible encouragement to his subordinates. Captain Gurdon, Deputy Commissioner of Gauhati, displayed great energy, and the Chief Commissioner regrets that his health has temporarily given way under the strain and exposure to which he subjected himself. The Chief Commissioner is much indebted to the officers of the Assam-Bengal Railway Company stationed at Gauhati, and especially to Messrs. Anson, Gebbie, Thornhill, and Horne, and to Dr. Dickie, for the willing and opportune help they rendered to the civil authorities. Captain Howell, Deputy Commissioner of the Gáro Hills, proved himself fully equal to the emergency and displayed much readiness of resource. The conduct of Mr. C. G. M. Kennedy, Deputy Commissioner of Nowgong, of Mr. A. G. Hallifax, Deputy Commissioner of Goalpara, and of Mr. G. Balthasar, the Subdivisional Officer of Goalpara, has been highly praised by the Commissioner, and the Chief Commissioner is glad to reproduce the following encomium by Colonel Maxwell on Babu Madhab Chandra Bardalai, Extra Assistant Commissioner and Subdivisional Officer of Barpeta :

Placed single-handed as he has been in this isolated town among a population thoroughly terrified and full of prophesies of approaching dissolution, he has never lost heart, but by the cheerful disposition with which nature has endowed him has been of much comfort to the subordinate officials and traders, and has carried on the routine duties of his charge without interruption.

23. The Chief Commissioner has hitherto been unavoidably detained by urgent duties at the headquarters of the Administration, which have suffered so much from the earthquake, but he is now starting on a tour of inspection, which will last for six weeks, to the other tracts of the province which have been seriously affected, and at the close of his tour proposes to submit, for the information of the Government of India, such further report as his personal observations and local enquiry may suggest.

I have the honour to be,

Sir,

Your most obedient Servant,

E. A. GAIT,

Offg. Secretary to the Chief Commissioner of Assam.

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APPENDIX I.

Report, dated the 3rd August 1897, by W. H. NIGHINGALE, Esq., Superintending Engineer, Assam, on the damage done to roads and buildings by the earthquake of the 12th June 1897.

At about 5-10 in the afternoon of the 12th June 1897, an earthquake of unprecedented severity occurred in the lower portion of the Assam Province, causing great destruction to Government property. As far as can be judged, the shock lasted from 3 to 4 minutes, and the undulations appeared to be principally from south-south-west to north-north-east, as indicated by the direction in which pillars and lamp-posts fell. The area of greatest disturbance appears to have been bounded on the south by the Surma river, on the north and west by the Brahmaputra, and on the east by the Jaintia Hills and Nowgong. Within this area every *pucca* building was practically levelled to the ground. At first the motion was slight and undulatory, but, as the intensity increased, it changed to a violent rocking from side to side, accompanied by upheavals. Against this nothing could stand; masonry structures were completely demolished in a few seconds, whilst those that had masonry foundations and plinths had the plinths shaken from under them, causing the superstructure to collapse. Most of the bridges were destroyed in this manner, the abutments being shaken to pieces, the superstructure then collapsing. Stacks of metal on the road side were levelled as if the metal had been spread by hand, whilst the roads were cracked and fissured both longitudinally and laterally. The reports received from Executive Engineers show that the following damage was done in the several divisions.

2. In the sadr station every *pucca* building was levelled to the ground, and those of a semi-permanent nature were so injured that they will all have to be rebuilt. The buildings at the subdivisions of Habiganj and Sunámganj suffered badly, whilst those at the subdivisions of Maulvi Bazar and Karimganj escaped with slight damage. Five iron bridges and one masonry bridge on the Sylhet-Companyganj road and one iron bridge on the Sylhet-Fenchuganj road will have to be reconstructed, and the roads made up. The Executive Engineer estimates the cost of repairing the damages will be Rs. 4,62,080 for buildings, and Rs. 68,080 for roads, making a total of Rs. 5,30,160.

3. The damage done in this division was slight. In Silchar itself, one or two buildings were cracked, and the subdivisional buildings at Hailakandi and Haflong were rather severely damaged.

Cachar Division, comprising the districts of Cachar and the North Lushai Hills.

No damage was done at Aijal.

The Executive Engineer estimates the cost of repairing the damages in his division will amount to Rs. 4,000 for buildings and Rs. 8,000 for roads, or a total of Rs. 12,000.

4. This division suffered worst of all. Every *pucca* building in the division was levelled to the ground, and those of a semi-permanent nature so badly injured that they will have to be dismantled and rebuilt. The bridge from Therriaghat to Cherrapunji was completely destroyed, and will have to be reconstructed. The road from Shillong to Cherra, 33 miles in length, was practically destroyed beyond the 6th mile from Shillong, the portion between the 17th and 24th, and the 29th and 32nd miles went down the hillside bodily, whilst great chasms, 30 feet deep, have opened out between the 24th and 29th miles. The road from Shillong to Gauhati, 63 miles in length, was very badly damaged for about half its length, *viz.*, between Shillong and Nongpoh, by landslips and fissures. All the smaller bridges collapsed

Khasi and Jaintia Hills Division, comprising the Khasi and Jaintia Hills and the Kámrúp district.

more or less, but fortunately the two largest bridges, *vis.*, those at Burnihat, 16th mile, and at Barpani, 55th mile, have stood, although shaken. The bridle-path from Shillong to Jaintiapur, *via* Jowai, was also considerably damaged. The Assam Trunk Road, on the south bank of the Brahmaputra, and running through the Kámrúp district, was very badly damaged, the road having subsided and cracked in many places, and most of the bridges were destroyed. The North Trunk Road was also very considerably damaged.

The bank of the Cherra-Companyganj Railway sank in many places and the rails were twisted. The station buildings were also damaged. It is not expected that traffic will be resumed until about the middle of August 1897.

The Executive Engineer estimates the cost of restoring the buildings will amount to Rs. 8,33,541, that of the roads to Rs. 10,87,700, that of the Railway to Rs. 10,000, and for the Shillong Ward Lakes and water-supply Rs. 30,000, making a total of Rs. 19,61,241 for this division.

In the Gáro Hills, the headquarters station of Tura, was completely destroyed, and the roads in the district were very extensively damaged, owing to subsidence and fissures. In Goálpára every building was destroyed, and in Dhubri itself, nearly all the *pucca* buildings were levelled to the ground, and the others were so seriously damaged as to necessitate their reconstruction. The Assam Trunk Road, running through the Goálpára subdivision, was very badly damaged, and nearly all the bridges were destroyed, including an iron one of 1 span of 80 feet, 2 spans of 60 feet, and 2 of 22 feet, over the Krishnai river in the 74th mile. The roads to the north of the Brahmaputra, although damaged, were not seriously so.

The Executive Engineer estimates the cost of restoring the buildings to their former condition at Rs. 1,25,651, and the cost of repairing the roads at Rs. 1,88,268, making a total of Rs. 3,13,919.

The buildings at Nowgong and Mangaldai suffered very severely, and will have to be rebuilt. In Tezpur, no buildings collapsed, but several walls have fallen, and numerous cracks have appeared in the buildings. The Assam Trunk and North Trunk Roads were considerably damaged in places owing to subsidence. None of the bridges collapsed, but most of the abutments were cracked. The Executive Engineer estimates the damage to buildings as Rs. 91,000, and to roads as Rs. 93,000, making a total of Rs. 1,84,000.

The damage done in this division was slight. The treasury buildings at Golághát and North Lakhimpur, and the court-house at the latter place, were damaged, and the iron racks in the treasury building at Sibságar were so broken and twisted that they will have to be taken to pieces and reconstructed. At Dibrugarh, the south wall of the fort was cracked. The Executive Engineer estimates the damage to buildings at Rs. 6,367.

The Jorhát State Railway was practically uninjured.

Most of the buildings in Kohima were damaged, owing to the chimneys collapsing. The road between Golághát and Nichuguard, and near the latter place, subsided in many places, and bridges were injured. The Executive Engineer estimates the cost of damages at Rs. 6,700 for buildings, and Rs. 21,400 for roads, or a total of Rs. 28,100.

Manipur Division. No damage was done in this division to Public Works Department buildings.

I append a statement showing the approximate amounts that will be required to restore roads and buildings to their original state. The figures have been prepared by Executive Engineers, on the assumption that a portion of the materials from the wrecked buildings can be utilised in the new structures. So much of it has, however, been damaged, whilst nearly all the serviceable portions have been used in erecting temporary offices, that I fear very little will be available for the new buildings, and I have, therefore, added 10 per cent. to the amounts under the head Buildings to provide for new materials that will be required. I have also added 2½ per cent. to the amounts under Civil Buildings, Imperial and Provincial, to provide for the cost of erecting temporary offices.

Divisions.	Imperial.			Total Imperial.	Provincial.				Total Provincial.	Grand Total.
	Military Buildings.	Civil Buildings.	Communications.		Civil Buildings.	Communications.	Miscellaneous Public Improvements.	Railways.		
1	2	3	4	5	6	7	8	9	10	11
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Sylhet ... ..	...	15,050	...	15,050	447,030	68,080	...	...	5,15,110	5,30,160
Cachar	1,000	500	...	1,500	2,500	8,000	...	...	10,500	12,000
Khasi and Jaintia Hills ...	1,00,105	61,515	1,000	1,71,741	6,67,800	10,85,700	30,000	10,000	17,35,500	19,61,241
Lower Assam ... ..	...	29,760	...	29,760	95,891	1,88,368	...	...	2,84,159	3,13,019
Central Assam ... ..	...	1,000	...	1,000	90,000	93,000	...	...	1,83,000	1,84,000
Upper Assam	819	...	...	819	5,548	...	...	...	5,548	6,367
Naga Hills	3,650	50	...	3,700	3,000	21,400	...	...	24,400	28,100
Manipur ... ..	...	...	...	...	...	...	...	...	...	...
Total	1,14,695	1,07,875	1,000	2,23,570	13,06,760	14,65,448	30,000	10,000	28,11,217	30,35,787
Add—10 per cent. for new materials	11,470	10,787	...	22,257	1,30,676	...	...	...	1,30,676	1,51,933
Total	1,26,165	1,18,662	1,000	2,45,827	14,37,435	14,65,448	30,000	10,000	29,41,893	31,88,720
Add—2½ per cent. for cost of temporary offices whilst new ones are being rebuilt ... ..	...	2,967	...	2,967	25,916	...	...	...	15,916	28,893
Total	1,26,165	1,21,629	1,000	2,48,794	14,73,371	14,65,448	30,000	10,000	29,57,809	32,17,613
Add—10 per cent. for contingencies	12,617	12,163	100	24,880	1,47,337	1,46,545	3,000	1,000	2,97,882	3,41,763
Grand total	1,38,782	1,33,792	1,100	2,73,674	16,20,708	16,11,993	33,000	11,000	32,54,691	35,59,375

APPENDIX II.

Inspection Note by Lieutenant-Colonel H. St. P. MAXWELL, I.S.C., C.S.I., Offg. Commissioner of the Assam Valley Districts, on the effects of the earthquake at Tezpur, dated Camp Silghat, the 26th June 1897.

I arrived at Tezpur on 25th June, and in company with Colonel Gray, Deputy Commissioner, carefully inspected the station.

The earthquake of 12th instant had damaged the cutcherry, treasury, church, jail, and two private buildings in the town, but the circuit-house, telegraph and post offices, tahsil office and dāk bungalow, were uninjured. I saw no fissures in the area occupied by the town.

The Deputy Commissioner had already commenced the work of repairing the damage caused by the earthquake, and the cutcherry and treasury will soon be in sound condition again.

The church, which appeared to me to be a badly-built edifice, will possibly have to be almost rebuilt. Most damage was done to the jail; and here the outer wall suffered considerably, and the hospital and some of the smaller buildings were injured. In some places the walls were much cracked, and in others the roofing had fallen in, owing to the rotten state of the timbers.

The police lines and dispensary, I understand, were not damaged; and, as a whole, the earthquake treated Tezpur with some gentleness, due in a measure to the firm ground on which the town is built. In the evening I arrived at Silghat, and found the combined telegraph and post office in a perfectly sound condition.

I was glad also to see that the Hindu temple on the hill a little above the steamer-ghat was standing apparently uninjured.

*Inspection Note by Lieutenant-Colonel H. St. P. MAXWELL, I.S.C., C.S.I., Offg.
Commissioner of the Assam Valley Districts, on the effects of the earthquake
at Nowgong, dated Camp Nowgong, the 27th June 1897.*

I arrived at Nowgong on the evening of 26th, and left at noon next day. I accompanied Mr. Kennedy, the Deputy Commissioner, and Babu Brijmohan Lal, the Executive Engineer, and carefully inspected the station.

The earthquake of the 12th instant had considerably damaged the whole area occupied by the town, which is built on sand. The damage done was caused not so much from the pull of the earthquake, or by the subsidence of the ground, as by huge rents, several 6 feet wide and an equal depth, which ran in a parallel direction to the Kullung *Suti*, a small channel of the Brahmaputra. All the Government buildings are constructed on the banks of the Kullung; and where the ground has not subsided, or where the fissures do not pass actually through the houses, buildings are uninjured.

The cutcherry has sunk in the centre, and the walls have either fallen or are in a tottering condition. The iron roof is intact. The circuit-house and the two school-houses are in ruins. The treasury has sunk about 6 inches in the centre, and though the walls are cracked, the buildings can be repaired and at present are safe. There is no necessity to remove the treasure.

The Deputy Commissioner's house, a thatched building, is much damaged. Many of the walls have fallen in, but the roof is uninjured, and it is proposed to keep the roof in its place by timber posts, remove all dangerous walls, and use the building, as a temporary measure, for a cutcherry.

The walls of the jail have fallen in many places, but the vacancies have been filled by bamboo palisading. In other respects the jail is not much injured. The bazar houses are intact, except where the course of cracks on the ground has passed through a building. Very few shops are harmed. The following buildings show no damage:

Dak bungalow.	|	Telegraph and Post office.
Forest „	|	Tahsil office.
	Police lines.	

The dispensary is only slightly injured. The peculiarity of the shock here was that in every small area a jet of water and sand was thrown several feet into the air and added to the terror of the inhabitants. This ejection was made with such force that the covers of wells imbedded into the mortar were hurled aside, and the wells were filled in with many feet of sand. A tank 14 feet deep is now dry and has a layer of fine sand within a foot of its top. In this way a great part of the station is covered with sand. I visited several villages on the Kullung, and at all the raiyats were loudly complaining that the *ahu* crop was lost, but on examining their fields, I found but little or no damage done. They evidently looked upon the earthquake as the means of escaping the payment of revenue. Before leaving Nowgong, I held a meeting of the principal traders, and they reported that their communications with the grain market were proceeding as usual. The Assamese are pretending they are foodless, but their appearance did not confirm their statement, and I hope the Deputy Commissioner will not listen to the stories brought to him in this connection by his office clerks, who apparently are anxious to get up a famine scare, but who, as they reside in the station, are not the best authorities to consult in this matter.

In conclusion, I would remark that I am much pleased with the manner in which Mr. Kennedy, the Deputy Commissioner, and his officers, have met the present crisis. Their example has much comforted the native inhabitants of the town, and the Deputy Commissioner has throughout acted with promptness and energy.

*Inspection Note by Lieutenant-Colonel H. St. P. MAXWELL, I.S.C., C.S.I., Offg.
Commissioner of the Assam Valley Districts, on the effects of the earthquake
at Barpeta, dated Goalpara, the 2nd July 1897.*

I visited Barpeta on 1st July, in company with Captain Gurdon, Deputy Commissioner of the Kámrúp district, and Babu Madhab Chandra Bardalai, the Subdivisional Officer. The town is, for the most part, in water, varying from a few inches to 2½ feet deep. The inhabitants hold the opinion that the land subsided in the earthquake shock

of 12th June, but I think the flooding of the town is caused by the seismic disturbance raising the beds of the Chalkhowa and Hirajan streams, and hence forcing the water to seek its new level. I went up the Hirajan stream to the Kirtonghar situated in the Sastra, and this stream, which, before the earthquake, was 10 feet deep, immediately afterwards was only 3 feet, showing that the bed of the stream had been raised 7 feet. It was the water thus suddenly lifted which had spread over the town. Some time must elapse before the channel is scoured sufficiently again to drain the town properly. The Kirtonghar and its brick temples and walled enclosure are much damaged.

The cutcherry has many of the walls cracked, but can be repaired, and the roof is intact. The treasury, which is part of the cutcherry building, also shows many cracks, but is easily repairable. The walls of the cutcherry, which are badly cracked, might be pulled down, and *ekra* plaster walls substituted. The treasury walls can be repaired. The circuit-house has lost a good deal of plaster and is out of plumb, and the same is the case with the Subdivisional Officer's small residence; this latter will, I fear, shortly fall.

The police lines are in good order, except, as with all other buildings, they are in 1 or 2 feet of water.

The lock-up is in the same condition, and the four convicts and guard occupy a boat anchored alongside the entrance.

The school will require only a small amount of repair, and the dispensary is very little injured.

The bridges in the town are all broken.

The danger to BARPETA is from the floods which may shortly be expected, as the rainfall is generally heavy in July and August. The native residents are all in possession of small boats which are moored close to the compounds; and for the safety of Government officials and traders and their families, who are foreigners to the place, I have asked the Deputy Commissioner to hire six native boats of from 300—400 maunds burthen, and anchor them in suitable positions, to be occupied as places of refuge, should the floods be severe. The hire of each boat will be perhaps Rs. 50 per month, and they can be engaged for three months. At present, owing to the suddenness of the calamity, these boats are being hired for a few days at a time, at the exorbitant rental of Rs. 5 a day.

I agree with the Deputy Commissioner that the conduct of Bābu Madhab Chandra Bardalai, Extra Assistant Commissioner and Subdivisional Officer, at this crisis, has been most commendable. Placed single-handed as he has been in this isolated town among a population thoroughly terrified and full of prophecies of approaching dissolution, he has never lost heart, but, by the cheerful disposition with which nature has endowed him, has been of much comfort to the subordinate officials and traders, and has carried on the routine duties of his charge without interruption.

So far as is known, only four deaths were caused by the earthquake in the subdivision. The food-supply is ample.

Inspection Note by Lieutenant-Colonel H. St. P. MAXWELL, I.S.C., C.S.I., Offg. Commissioner of the Assam Valley Districts, on the effects of the earthquake at Dhubri, dated Goalpara, the 3rd July 1897.

Visited Dhubri on 2nd July, and inspected the town in company with Mr. Hallifax, Deputy Commissioner. The earthquake of 12th June has caused considerable damage, and the subsidence of the bank near the old jail has brought the Brahmaputra river dangerously near the bazar at the steamer-ghāt. The people here are fast removing their property and buildings. The new bazar lately formed on a site to the east of the town has sunk 2 feet, and the drainage scheme lately completed at much expense to the municipality has become practically valueless. The roads in the neighbourhood are much fissured, and several compounds are covered with sand. The cracks all run east and west.

To the north of the bazar the nearly completed outer brick wall of the new jail was thrown to the ground; the 1887 Jubilee well was filled with 13 feet of sand, and the brickwork on the surface was a ruin. The new police lines, with the exception of the brick magazine, which was completely wrecked, were uninjured. The out-houses of the dispensary were much damaged and rendered unsafe; the hospital building, however, is only slightly harmed.

Of the Government buildings on the Dhubri rock, the catcherry and circuit-houses, which are *kutchas* buildings, have lost all the wall plaster, and can be repaired at a small cost. The treasury is badly cracked, and the roof is in a dangerous condition; it is probable that the building will have to be rebuilt. For the present the treasure and records are housed in the circuit-bungalow. For the purpose of a treasury, the circuit-house is not suitable, and the Executive Engineer should either strengthen the room in which the treasure is stored, or perhaps a small house with corrugated iron roofing and sides might be temporarily erected.

The dāk bungalow now, as the upper portions of the walls have been removed, is considered safe. The telegraph office is but little damaged, but the post office adjoining is a complete wreck. The Forest office house is uninjured. The church is levelled to the ground; and the same fate has befallen its neighbour, the Sikh temple. The observatory is uninjured, but the residences (private property) of the Deputy Commissioner and Assistant Commissioner are complete ruins, and the Civil Surgeon's house is much damaged. The Government school is wrecked, and the Bijni Hall and the Gauripur zamindar's bungalow are on the ground.

On the whole, the shock was very violent at Dhubri, and has caused a considerable amount of loss to Government and private persons.

Only one person is said to have lost his life in the earthquake. The food-supply is ample, and I instructed Mr. Jewett, Executive Engineer, to repair as well as practicable the roads in his charge. The large bridge across the Krishnai is destroyed and a ferry-*mār* should be placed at this spot and at any other crossing where large bridges are dismantled.

I was pleased to notice that Mr. Halifax, the Deputy Commissioner, had acted with energy during the present crisis.

Inspection Note by Lieutenant-Colonel H. St. P. MAXWELL, I.S.C., C.S.I., Offg. Commissioner of the Assam Valley Districts, on the effects of the earthquake at Goalpara, dated the 4th July 1897.

I visited Goalpara on 3rd July, and with Mr. Balthasar, Assistant Commissioner and Subdivisional Officer, carefully inspected the town.

The earthquake of 12th June completely wrecked the catcherry and circuit-house (in the one building), the treasury, the telegraph office, the Public Works Department inspection-house, and Subdivisional Officer's bungalow, and damaged greatly the lock-up.

The police lines were not harmed.

The above buildings were either on the hill or on the toe of the hill. The Christian cemetery is much damaged. Situated off the hill and on alluvial soil, the Government school and post office were destroyed; the bazar, which contained a number of brick houses, was a mass of ruins. The dispensary was only slightly damaged.

The action of the earthquake on the bazar was most extraordinary. Several houses subsided 6 feet, and to that height were engulfed in foetid smelling water. Other buildings were thrown down and embedded in 6 feet of sand. A well was altogether filled up with sand, and a portion of the wooden cover was hurled 30 feet distant, where it lies half-buried. Huge fissures running east and west are to be seen everywhere. In no part of my division have I seen such violent results of the earth tremor of the 12th June as in this town. It is reported that a wave, 10 feet in height, was caused in the Brahmaputra, but I am inclined to think this is a mistake, as otherwise the long row of huts built on sand close to the river bank would have been washed away.

Geysers throwing up sand and water at once became active and temporarily flooded the interior of many houses, and perhaps led to the belief that the river had risen.

It is surprising that during these terrible few minutes, only four persons lost their lives.

The Government treasure and records have temporarily been housed in the servants' quarters of the circuit-house, and sheds with iron sides are being erected, in which they will shortly be placed. The post and telegraph offices have been arranged for. Mr. Balthasar, the Subdivisional Officer, has, I am pleased to notice, acted with calmness and energy during this trying period.

APPENDIX III.

Report by Lieutenant-Colonel H. St. P. MAXWELL, C.S.I., I.S.C., Officiating Commissioner of the Assam Valley Districts, No. 1837G., dated Gauhati, the 3rd August 1897.

With reference to your telegram dated

- (1) Letter No. 854G., dated the 13th June 1897, from the Deputy Commissioner, Goalpara.
- (2) Letter No. 893G.—XX-8, dated the 24th June 1897, from the Deputy Commissioner, Goalpara.
- (3) Letter No. 1012G.—XX-8, dated the 9th July 1897, from the Deputy Commissioner, Goalpara.
- (4) Baijali Tahsildar's diary for week ending the 19th June 1897.
- (5) Baijali Tahsildar's report forwarded with Deputy Commissioner of Kamrup's memorandum No. 1314, dated the 22nd July 1897.
- (6) Letter No. 468G., dated the 18th June 1897, from the Deputy Commissioner, Darrang.
- (7) Letter No. 412G., dated the 13th June 1897, from the Deputy Commissioner, Nowgong.
- (8) Letter No. 524, dated the 14th June 1897, from the Subdivisional Officer, Jorhat, forwarded with Deputy Commissioner of Sibsagar's memorandum No. 464G., dated the 16th June 1897.
- (9) Letter No. 349G.—IX-25, dated the 3rd July 1897, from the Deputy Commissioner, Lakhimpur, and enclosure (report from the Subdivisional Officer, North Lakhimpur).

N.B.—For Deputy Commissioner of Sibsagar's report (return), vide Appendix XIII (d).

station, these towns were immediately within the area more severely visited by the earthquake, and demanded more urgent attention. My inspection reports on these places have already been submitted, and I have little to add to them.

3. The present is the third seismic disturbance of some severity I have experienced in the province. In 1876, an earth tremor occurred, which cracked the arches of the brick buildings in North Lakhimpur, and which for some minutes made standing upright a difficulty; and again, in 1885 a very similar earthquake happened when I was stationed in Tura, Garo Hills, which completely levelled the stone-built treasury and police quarterguard. In other respects, these two occurrences did no damage, but they both were more severe than any of the numerous quakes we have had since the first shock of the 12th June 1897.

4. The earthquake in the afternoon of the 12th June was, however, of extreme severity, and has pointed out the defects in our system of constructing houses and bridges. I venture to think no stone or brick-built houses are capable of withstanding such a shock, and that in future they must be constructed of more pliant materials. I am not in a position to advise about the construction of bridges, but with reference to single iron girder bridges, of which so many have of late years replaced more temporary structures, it is obvious that if the girder is tipped by 2 or 3 inches only on the stone walls at each end, the slightest wave of the ground will displace it. With this improvement in resting girders and the experience our Engineers will have gained from this earthquake, communications will not again be so hopelessly dislocated in any future severe shocks.

5. On the 12th June, the early *ahu* rice crop, which was sown in January and February, was fast ripening, and promised to give a good outturn. This fact was the more encouraging, as the late rice crop in the preceding year had been a partial failure, and in consequence the price of this staple article of food was rising. The *ahu* crop, where sown on light soil, was in places damaged by the earthquake, which caused geysers of sand and water to be ejected from the subsoil and overspread the cultivation. The crop growing on loam or clay escaped entirely this injury. If one man in twenty has suffered from this action of the shock of the 12th June, the remaining nineteen are not backward in joining with him in complaining of the total destruction of the *ahu* crop. That some considerable loss has been sustained by cultivators on light soil is undeniable, but the extent of the damage done can only be gauged by local enquiries, which necessarily will take time, and the result cannot be given now. It is not probable that so heavy a loss on the crop as 4 annas can have occurred in the Goalpara district, as is reported by the Deputy Commissioner. Another loss to the cultivating classes is the fall of houses; in this respect, the earthquake has merely anticipated the next gale of wind and wrecked the houses, either tottering from old age or with rotten supports. Where

the 21st June, asking for a report giving details of injury done by the earthquake of 12th idem, I have the honour to submit reports from all the Deputy Commissioners of my division, except the Deputy Commissioner of Kamrup, whose report has been delayed, partly through ill-health and partly through a desire to obtain further information from the more distant portions of his district. His report will follow on receipt.

2. On the 12th June, I happened to be in Shillong, and as soon as possible I returned to Gauhati and visited one after the other the headquarters stations of Tezpur, Nowgong, and Dhubri, and the subdivisional stations of Barpeta and Goalpara. With Gauhati, my own headquarters

granaries have been upset, some loss has undoubtedly been sustained, as is also the case with the property inside houses affected by geysers and fissures. On the whole, however, I do not think the earthquake has caused much injury to the natives residing outside the larger towns in the province.

6. In the towns and tea gardens, the loss to Europeans and natives owning or occupying stone or brick houses has been very complete, and the earthquake will not readily be forgotten. For some years past the attention of tea planters has been drawn to the construction of permanent godowns, tea houses, hospitals, and coolie-lines, etc., and where these works have been executed and the locality has fallen within the area of earthquake severity, the loss to the manufactories has been great.

The Assam-Bengal Railway, with its starting terminus at Gauháti and open line as far as Lanka, 74 miles distant, and a further mileage of over 30 miles nearly ready, has been severely dealt with; in some places the rails have been twisted and the track fissured and many bridges have fallen or been damaged. The large bridge across the Titamari stream was destroyed, while other important bridges will require extensive and costly repairs. Most of the picturesque stations and liemen's houses were wrecked, and the Company have suffered a heavy loss, which, I believe, is also largely shared by Government.

7. The trade of the Brahmaputra Valley has been but slightly dislocated by the earthquake, owing to the season offering water communication to almost all parts of the division. The seismic disturbance has not affected the river traffic, which from the very first has continued uninterrupted, and for the most part it would seem that Nature has only overthrown the work of man.

8. It will be seen from the report now submitted that in the two eastern districts of the division, *viz.*, Lakhimpur and Sibsagar, the damage has been slight; the shock was more intense in the Nowgong and Darrang districts, where more injury to land communications and houses was inflicted, and in the Kámrúp district and subdivision of Goálpára the height of the earthquake was felt and the greatest amount of damage occurred. In the subdivision of Dhubri the shock again was lighter and the injury less in consequence.

9. In conclusion, I have much pleasure in bringing to the Chief Commissioner's notice the admirable conduct of the officers, both Native and European, in this division during this trying crisis. Though most of the European gentlemen were rendered homeless by the first shock, and for some days were in a state of destitution, they all immediately set to work to save the Government records and treasure, in which duties they were ably assisted by their native subordinates. In the town of Gauháti, the greatest aid was willingly afforded to the Deputy Commissioner by Messrs. Anson, Gebbie, Horne, and Thornhill, Engineers, and Dr. Dickie, Medical Officer, of the Assam-Bengal Railway, and I would bring their valuable services to the favourable notice of the Chief Commissioner. In all the districts, temporary offices have now been constructed, and routine work is being carried on as usual.

Report from A. G. HALLIFAX, Esq., I.C.S., Deputy Commissioner of Goálpára, No. 854G., dated Dhubri, the 13th June 1897.

I have the honour to report that yesterday (12th) at 5 p.m. there was a severe earthquake felt here. There was a violent shock lasting for about 4 minutes, and slight tremors were felt afterwards all night and next morning. Much damage has been done to houses and offices. Office records are in confusion, and the treasury is unsafe. Water has risen and swamped a good deal of country, and there are many fissures in the ground and subsidence of the earth in places. Goálpára and Gauripur are said to have suffered severely.

The Deputy Commissioner is requested to save the records as soon as possible and erect temporary sheds in order to carry on current work.—H. Maxwell.

Report from A. G. HALLIFAX, Esq., I.C.S., Deputy Commissioner of Goálpára, No. 893G.—XX-8, dated the 24th June 1897.

In continuation of my letter No. 854G., dated the 13th June 1897, I have the honour to send the following further report about the earthquake in this district.

2. In Dhubri, *pucca* buildings were thrown down, but the treasury escaped. It is, however, very seriously damaged and quite unsafe. The cutcherry is standing, though the walls have been injured. The almirahs and papers were thrown about over the floor, but were picked up and arranged within a short time. The circuit-house is standing and is habitable. The dák bungalow is also standing, but is in a bad condition. As most of the European residents lived in *kutchá* bungalows, they escaped without much loss.

3. The dispensary is badly cracked and the *pucca* out-buildings are down. The new jail, which was approaching completion, has been thrown down. The old jail is standing, not much injured, but the site is dangerous. The post office and high school have been thrown down and destroyed. There has been considerable sinking of the land in various places, and large cracks in all directions. The river bank from the old jail downwards in front of the old bazar is so badly cracked that it is not worth while to attempt to repair it, as it must go into the river soon. Parts of the new bazar seem to have sunk, and I have fears that the river may destroy it or part of it.

4. The earthquake was accompanied by an upheaval of sand, and jets of sand and water were thrown up from holes in the ground. Wells were cracked and filled with sand from below. The water of the jets appears to have been cold.

5. The direction of the shock at Dhubri was north and south, more or less. The time was 5-5 p.m., and I calculate the duration to have been about 4 minutes, although opinions differ about this.

6. Only one death (that of a child killed by the falling of a brick wall) has been reported at Dhubri. Several persons were injured. Great panic prevailed, which has not altogether subsided yet. Slight shocks have been felt daily since the 12th. The last was at about 3-45 this afternoon (the 24th).

7. At Gauripur the zamindár's *pucca* buildings have either collapsed, or been very badly damaged. Many low places have been filled up with sand. The damage to crops in their vicinity, owing to their being covered with sand, is estimated at about 4 annas.

8. Postal and telegraphic communications all over the district were interrupted. The roads have been badly breached everywhere, and bridges destroyed. Labour is expensive, and the price of rice has gone up to famine rates. I have hitherto abstained from interference with private trade as objectionable on principle, and hope the prices will soon fall again. I am afraid stocks of food kept by the people in their houses have been lost throughout the district to a considerable extent. It is of the utmost importance to restore communications at once and repair the main district roads so as to make them passable for carts and provide substantial temporary bridges.

9. Reports have been received from all the thanas. Information is given as to the thana buildings and premises, all of which have been destroyed or seriously damaged. I have not yet much definite information as to the parts of the district at a distance from thanas, but will have it soon. The Protabganj thana site has sunk. The time of the shock is given as 4-30 p.m., which is probably wrong. The direction is not mentioned.

The Gosaigaon outpost was damaged, and fissures have been made in the earth:

Sukhchar has been very severely injured. A *khal*, 300 feet by 75 feet by 5 feet deep, is reported to have been completely filled up with sand forced up from below. There was a serious flood in this direction, and a great deal of sand was thrown up. It is reported that muddy water spouted up to a height of 10 cubits accompanied by a rattling sound. The crops have been very seriously damaged by the flood and the sand.

At Mankachar, the thana building sank 4 cubits, the lock-up being half buried in the ground. Low places were filled and water spouted up.

At Bijni, the time is given as 4-55 p.m., and the duration as 5 or 7 minutes. Buildings sank into the ground. Sand and water were forced up to a height of 4 or 5 cubits, and there was much damage caused by floods. At Jubhajar, it is reported that stones weighing 2 or 3 maunds were thrown up.

The reports from the other thanas are similar: Buildings damaged or destroyed, land sunk, sand thrown up, damage caused by floods. The Lakhipur zamindárs were without shelter for a day or two. Many villagers all over the district were rendered homeless, but I have not got full details about villages yet. The Krishnai bridge, as well as other bridges, has been completely wrecked. The number of deaths reported is extremely small.

10. The subdivisional station of Goálpána has suffered severely. The circuit-house, to which the cutcherry was attached, fell flat, burying the records. The treasury was destroyed. The jail was damaged, but has escaped with comparatively little damage. The Subdivisional Officer's bungalow is a complete ruin. The Missionaries' house and the Steamer Agent's house are standing, both being *kutchu* houses. The school-house and post office and telegraph office have been thrown down. Parts of the bazar are half buried in sand. A report has got into the papers that there was a 'tidal wave' at Goálpána, and sixty people killed. This is incorrect. I do not know who supplied this information.

Report from A. G. HALLIFAX, Esq., I.C.S., Deputy Commissioner of Goalpara,
No. 1012G.—XX-3, dated Dhubri, the 9th July 1897.

With reference to your note dated the 3rd July 1897, about your visit to Dhubri on the 2nd July, forwarded to me with your memorandum No. 1591G., dated the 5th July 1897, I have the honour to state that your remark that "the new police lines, with the exception of the brick magazine, which was completely wrecked, were uninjured," requires correction. The plinths of the houses have been so badly cracked and damaged that the District Superintendent of Police informs me that he estimates the repairs will cost about Rs. 1,300. It is also remarked that the Gauripur zamindár's bungalow is on the ground. This should be the Bagribari bungalow.

Diary of Babu BANGA CHANDRA CHAUDHURY, Tahsildár of Baijali, Kámrúp district, for the week ending the 19th June 1897.

Sunday, 13th, and Monday, 14th.—At Baijali. Could not do anything owing to the earthquake. Though the catcherry house was not blown down, still the walls have fallen down and some of the papers were de-stroyed. Our own houses were blown down and sank under ground. Made temporary arrangement to live in. The shocks are still continuing at intervals of 20 to 40 minutes. People are alarmed. Given up all business, and even the household affairs, anticipating death and destruction of all at any moment.

Tuesday, 15th.—Earthquake continued, but at intervals of 30 to 60 minutes. Walked to Dubi through Raipur, Bamankuchi, and back through Ganakgaon, Pathasala, and Haripur. The state of the country is all round the same: Houses blown down and sunk under ground. Paddy, mustard and other stores destroyed to a considerable extent. People are living on open ground, and with half diet. Most of the people have no rice or paddy, even two days' consumption, and those who have got some do not like to part with any quantity of the same. The distress is thus severe. Almost all the bridges on the trunk road have been destroyed, and the road itself somewhere lowered, somewhere raised, and somewhere torn into pieces. People can hardly walk; riding is impossible.

Wednesday, 16th.—Earthquake continued. Baijali to Jemgarkur, Sarilha, Dharamtala and back. The same state as above, but the people have sufficient quantity of food-grains in stock to tide over the difficulty.

Thursday, 17th.—Earthquake continued. Baijali to Pata, Nolikuchi, Bijkuchi and back. The same state, but no want of food articles.

Friday, 18th.—Baijali to Umgoria, Hapurigaon and back, through Bamakhata and Gobindapur. The state of the affair in this part of the country is worse. Half of the *aku* and *asra dhan* has been buried under ground, whereas in other places which have been visited by me, the damage is estimated to be one-third of the crop. People are homeless, clotheless, and foodless. No paddy available for purchase. In distant places where it can be had, the price is rising higher and higher. Now it is sold at only 15 seers a rupee. Many have no means to buy paddy at such a high rate, and to support themselves thereby. They are thus living on jacks, plantain, and mango fruits. If no gratuitous relief can be given, I think an advance or loan of small sums to deserving people might give some relief at the time of this distress.

M. C. BARDALAI,
Subdivisional Officer.

This was suggested by me in my report on the scarcity in the Baijali circle.

M. C. BARDALAI,
23-6-97. Subdivisional Officer.

Saturday, 19th.—At Baijali. Did a little office business, and removed the records to another room of the catcherry house.

20th June 1897.

BANGA CHANDRA CHAUDHURI

Forwarded to the Deputy Commissioner, Kámrúp.

M. C. BARDALAI,

23rd June 1897.

Subdivisional Officer.

Report on the condition of the people and crops in some of the villages in the Bajjali tahsil after the earthquake, by the Offg. Tahsildar of Bajjali.

I visited villages Morka, Horipur, Dharamtala, Raipur, Dubi, Gobindpur, Sihan-kuchi, Moripur, Anandpur, Ninua, Bengnabari, Majarkhat, Goraimari, Kharadhara, Bamakhata, Boniagaon, Pokha, Kerki, Barea, and Kaharpara. In villages Morka, Horipur and Dharamtala in mauzas Sariha and Raipur, and Dubi in mauza Dakbin Bajjali, the people are in a pitiable condition, their houses having either come down or sunk under water. The *ahu* crop has suffered seriously. In these villages, several families are not having their usual meals. There are of course a few men in these villages who can afford to help their poorer and starving neighbours with food grains, but they will not do so. These men say they themselves are not safe yet. I tried my best to induce them to part with a small portion of their supply, either for love or money, but they were inexorable.

In villages Bichankuchi, Monpur, Anandapur, Nimua, Bengnabari, Majarkhat, Goraimari, Kharadhara, in mauza Pub Bajjali, the people are comparatively better off. Excepting a very few, the people have enough of food-supplies, though not much to spare. But those who have not got enough to eat are receiving help from their more lucky neighbours. The damage done to the *ahu* crop is not so great in these villages. There are of course patches of *ahu* which have been buried underneath sand. The damage done to the *achra* crops seemed to be very serious in almost every village I passed through. The *sali* seedlings have also suffered very badly. If the weather be favourable, a successful *sali* crop may be expected in the villages of Pub Bajjali. It is painful to see almost all the jack trees and *pans*, which brought the people a fair income, dying out.

In Bamakhata, a large and thickly populated village in Uttar Bajjali, though the people, excepting a few, are not starving, they are suffering much. Nearly the whole village is under water from the 12th June, the day of the earthquake, till now. Here I was asked by some villagers permission to flush a certain Sarkari drain and to cut it deeper, so that the standing water might run out leaving a portion of the village dry, and I could not withhold the permission asked for. The bed of the Povmara river having been thrown up, the water has overflowed its banks and has inundated that part of the country. Unless the water runs down the Bamakhata, rice fields will be converted into *beels*, and in that case the people will suffer extremely.

In Boniagaon, Katarpara, and Pokhaketkibari, the people are not so badly off. The *ahu* is nearly as successful as in Pub Bajjali. As far as I was able to find out, nobody was starving in these three villages. When the river Kaldia is in flood, these villages are under water, and as soon as it subsides they dry up. As directed by the Subdivisional Officer, I intercepted several boats bringing down food grains from Nāosali (in Baska) for sale and sent word to the neighbouring villagers to come and buy the *dhan* or rice at the bazar rate, but not a single man turned up. They all want food grains gratis, as they told me.

At Gobindpur one Bhebol Khatnir, at my request, offered to lend a few maunds of *dhan* to his suffering neighbours, but none offered to borrow it.

In this tahsil, Chapaguri is the only mauza which has not suffered much by the earthquake. I understand the people have enough of food-supplies and to spare. The *beparis* are seen bringing down *dhan* for sale from this mauza. If the drain on the Chapaguri stores of *dhan* is not stopped, there may be more serious distress in those villages of this tahsil which have already suffered too much. As directed by the Subdivisional Officer, I shall visit Chapaguri within a day or two, and arrange with Babu Ram Mandal, the most influential man in that part of the country, if a hundred maunds of *dhan* can be raised on loan for distribution on loan, of course to the needy.

I have not, I am sorry, been able to visit all the places in this tahsil where the distress is being keenly felt, as I have been obliged to devote a portion of my time and attention to the settlement business, which I hope to be able to finish within a few days. The mandals delayed coming into the *sadr* for their work on account of their troubles at home after the earthquake.

NOBIN RAM PHOOKAN,

Offg. Tahsildar, Bajjali.

It is quite evident from the report of the Tahsildar that the raiyats, who are said to have suffered from the scarcity, wish to get gratuitous relief from the Government, and this I am afraid will not be sanctioned by the Government at all. In the event of any relief work, which is impracticable at present owing to the floods, being started later on,

hardly any raiyat will come forward to earn his bread at any relief work, partly owing to laziness and partly through fear of being considered a coolie. As for the other means of helping the raiyats in distress, the Tahsildár's report will show the means I have already adopted by procuring food-grains within their reach by intercepting the beats of Naosali *beparis* on their way to Barpeta, and if still the raiyats won't avail of the advance, there is no help for it. The *ahu* has not suffered in the Bajjali circle owing to the late earthquake, and since the raiyats have begun harvesting it, the price of food-grains is falling, showing thereby that the scarcity is being felt now much less than before.

M. BARDALAI.

No. 248, dated Barpeta, the 18th July 1897.

Memo. by—The Subdivisional Officer, Barpeta.

Forwarded to the Deputy Commissioner, Kámrúp.

No. 1314, dated Gauháti, the 22nd July 1897.

Memo. by—The Deputy Commissioner, Kámrúp.

Forwarded to the Commissioner of the Assam Valley Districts for perusal and return. The Commissioner will see that the former reports regarding distress in the Bajjali tahsil were much exaggerated.

Report from Lieutenant-Colonel M. A. GRAY, I.S.C., Deputy Commissioner of Darrang, No. 468G., dated Tezpur, the 18th June 1897.

I have the honour to submit the following report in connection with the recent disastrous earthquake which occurred on the evening of the 12th current.

2. The earthquake occurred at Tezpur at about 16 or 17 minutes past 5 p.m. local time. I was in kutcherry at the time, and was, of course, compelled to leave the kutcherry building hastily, in company with all others who were then within the building, on realising the terribly serious nature of the seismic disturbance. Plaster and bricks began to fall from all sides of the public offices, and the movement of the ground was so severe as to render it almost impossible to keep one's feet. I estimate the duration of the shocks, whatever their number may have been, in the first instance, as covering a period of about 2 minutes in all. Many gave it as their opinion that the period extended to about 5 or 6 minutes, but I cannot but think that this is an exaggeration of the actual facts of the case, natural enough on such alarming occasions, when a minute seems more like five, amid the terrifying and demoralising effects of the subterranean rumbling, quaking, and the dread of the possible opening up of the ground under one's feet.

The direction (upon which point all seem to be pretty well agreed) was apparently from *south south-west* to *north north-east*.

3. Directly the shock or shocks ceased for the time being, I proceeded at once, with the Executive Engineer, Central Assam Division, to hold a hasty inspection of the damage done to the several public buildings in the station. At first sight, this appeared to be pretty severe in the case of the cutcherry, treasury, church, jail, and Executive Engineer's office; but I am exceedingly glad to be able to report, now after the removal of the cracked and loose plaster, that the cutcherry and treasury are not badly injured, though, of course, damaged to some extent. The injuries, however, can speedily and effectually be remedied. The new iron record racks in the several record-rooms have stood splendidly, and show no sign whatever anywhere of having moved in the least degree. The "Strong-room" of the treasury will require careful repairs, but nothing that will require anything like out and out dismantling. The jail has been the worst sufferer: but here the chief damage is confined to the northern and western outer walls. The greater portion of the former has fallen, and a portion of the latter also. The hospital ward is badly injured, the verandah masonry pillars being badly cracked and bent out of the perpendicular, and the timber of the roof known as the *kainchis* being mostly cracked and crushed completely out of their position. Some of the interior partition walls, separating the several wards from each other, have fallen in places; but the ward buildings themselves are all fit for occupation, though needing thorough repairs.

The church is severely injured, the whole of the east end wall being knocked down, and other walls cracked to some extent.

The dāk bungalow is only damaged to some extent at the east end, but the rest of the building has almost escaped injury.

Kutcha buildings have apparently escaped altogether.

Private houses, built of so-called masonry, have suffered pretty severely, notably the Deputy Commissioner's bungalow and the planters' "Chummy" club-house. But the wretched quality of the construction, in the case of these, renders it a matter for great surprise that there should be any portion of them left standing at all.

4. I am thankful to be able to report that there has been no loss of life, or bodily injury, caused by the earthquake anywhere, either in the Tezpur or Mangaldai stations.

5. I strengthened the police guard round the injured sides of the jail at once on the evening of the occurrence, and trust, therefore, that there will be no trouble in the matter of escapes.

6. At Mangaldai, the damage to public buildings has been more serious. The Subdivisional Officer's residence has fallen; likewise the walls of the cutcherry and treasury, but the roofs of these last two, being supported on timber posts, are still standing. Temporary arrangements are being pushed on for the repairs of these last two buildings to such an extent as will render them fit for use. The dāk bungalow has fallen out and out, and is wholly past possibility of repairs.

7. I may here mention that the difference between good masonry work and bad has been brought most prominently to notice by the results of Saturday's great earthquake. The new and only half-constructed masonry bungalow now being erected by Mr. J. W. deTivoli, Agent and General Manager of the Tezpur-Balipara Tramway Company, stands absolutely uninjured. This is the more remarkable, as the site of it is on a very high *tila*, immediately behind, and to the north-east of, the Deputy Commissioner's bungalow, where the oscillation of any seismic disturbance naturally must be comparatively strong. But the explanation evidently lies in the fact that the structural work is first rate. This is also the case with the "new malkhana" wing recently added on to the east side of the treasury building, in which there is not even a plaster crack discoverable.

8. I regret to say that the damage done to parts of the Tezpur-Balipara Tramway permanent-way has been very serious between Sessa and Rangapara. At the latter place, the upheavals and lateral throes of the low-lying land have thrown the permanent-way right and left in all sorts of directions, and even twisted the iron rails into various curious shapes. I inspected that portion of the line, in company with Mr. A. B. Moore, of Barjuli, on Monday, the 14th June.

9. In conclusion, I can only say that I venture to congratulate the Local Administration upon the comparatively small extent of the damage sustained in the Tezpur station itself; while no words to which I can give expression serve to convey adequately the deep and most heartfelt sorrow which I, in common with all residents of this district, keenly feel at the terrible tale of loss and damage sustained by the Local Administration of Assam, and by all residents, both official and non-official, European and native, in the several districts and stations west of Tezpur, as the result of the terrible visitation of the 12th of June.

Report by C. G. M. KENNEDY, Esq., Deputy Commissioner of Nowgong, No. 412G, dated the 13th June 1897.

I have the honour to report, for your information and for communication to the Local Administration, that a series of most destructive earthquake commenced at 5.36 p.m. yesterday, and are still continuing (10 a.m.).

2. The station has been wrecked.

The *court-house* is a wreck. All the walls are cracked beyond repair. The floor has sunk. The roof still hangs together. The building is utterly unsafe, and cannot be patched up. All office work, with the exception of correspondence, must necessarily cease until some arrangement for a temporary building is completed. I am having the records and library got together and removed to the tahsil office, which is the only building at present safe.

A temporary shed should be erected for carrying on work.

H. MAXWELL,
Commissioner, A. V. D.

The *treasury* is also damaged beyond repair and is unsafe. Almirahs, etc., have been knocked down. The masonry plinth has sunk, and the walls are cracked. I would propose the removal of the greater part of the cash to Gauhati, and will ask you not to allow our opium *challan* to come forward, as we have no place to store it.

A small building to be erected.

H. MAXWELL,

Commissioner, A. V. D.

Not necessary, as you have a police guard.

H. MAXWELL,

Commissioner, A. V. D.

I will see about the opium when it arrives here.

H. MAXWELL,

Commissioner, A. V. D.

The *circuit-house* is completely wrecked. The plinth has sunk and the walls fallen in. The iron-roofed school *house* is also a wreck and beyond repair. I am afraid that the other building is in the same condition.

The Jail.—The wall has fallen down for considerable length in more places than one on all four sides. The well has become choked with mud, and the wards are damaged. All convicts of over one month should be transferred to Gauhati, as the place is not safe.

No room at Gauhati. Utilise the convicts for extramural labour in station.

H. MAXWELL,

Commissioner, A. V. D.

The Deputy Commissioner's *residence* is a complete wreck, and can only be pulled down. It is quite beyond repair, and was put together originally and on conversion in a most *kutchra* manner. I have removed over to the *dāk bungalow*, which has only suffered, so far, to the extent of some plaster falling off the walls.

Post and telegraph office is damaged, but not beyond the repair, and is habitable, though slightly dangerous.

Forest bungalow is in good order.

General.—Nowgong as a station is wrecked. The strand road has disappeared in parts; huge gaps yawn at intervals for many feet in width and depth, and running in all directions for hundreds of yards. The earth opened in all directions and vomited mud. All the wells are choked with mud. The tanks are also filled with mud. The town is now solely dependent on the Kallang for water for all purposes. Great damage has been done to nearly all the roads which have gaps across them everywhere. In the Kaya *Pattis* several masonry shops and store houses have collapsed utterly, and some damage has been caused in the Dacca *Patti*.

The Muhammadan *musjid* behind the *dāk bungalow* has fallen in.

3. The whole population remained awake all last night, and for the most part camped out in the rain on the *maidan*, or fled to Panigaon. Telegraphic communication is cut off on both sides, so I am quite unaware what damage, if any, has taken place in the district. Under the circumstances, seeing that all Government buildings are hopelessly damaged and beyond repair, that the station itself, at least so far as the neighbourhood of the

This is a matter which will be duly considered later on. At present, make arrangements to tide over present difficulties.

H. MAXWELL,

Commissioner, A. V. D.

I am proceeding to Nowgong tomorrow.

H. MAXWELL,

Commissioner, A. V. D.

4. In conclusion, I have the honour to request that, if possible, you will pay us a visit to see things for yourself. That in the meantime you will ask the Local Administration to pass immediate orders to have a temporary court-house built, so that judicial work may be recommenced, also about the removal of treasure and of prisoners to Gauhati.

Report by B. C. ALLEN, ESQ., I.C.S., Assistant Commissioner of Jorhát, No. 524, dated Jorhát, the 14th June 1897.

I have the honour to report that a severe shock of earthquake was felt at Jorhát about 5-23 p.m. on Saturday, June 12th. The shock was apparently travelling from west to east, and lasted for about seven minutes, the motion of the earth being so violent that some difficulty was experienced in walking, and people were to be seen clinging to trees round the tank for support. The water of the Jorhát tank was in a state of great commotion, its movements being exactly similar to those of water shaken in a basin, and the Bhogdai river is said to have been violently agitated.

The Government buildings round the tank were all severely shaken, and plaster fell in large quantities, but fortunately no damage was done to the treasury building. The jail escaped with the loss of a small shed under which the prisoners husk rice, which collapsed entirely, but two *pucca* shops in the bazar have been so injured, that the buildings seem likely to subside at any moment, the walls having been completely cracked and forced out of the perpendicular. At this part of the town (the *Dacca Patti*) the earth opened, and quantities of sand and water were discharged, the drains at the side of the road being filled with muddy sand to the depth of two or three feet.

2. On June 13th, I visited the Domgaon, situated immediately to the north of the town, where the shock had been particularly severe. The roads and court-yards of the houses were cracked in all directions, and the surface of the earth presented the appearance of a sheet of ice on the setting in of a thaw. Large quantities of sand and water had been thrown up, but the buildings, being all of bamboo, had escaped unhurt. At the railway station two brick pillars in the engine house had fallen in ruins, and the iron roof supported by them had collapsed, while one of the walls of the building had cracked and was bulging inwards. I am informed that it will in all probability be necessary to rebuild the engine house.

3. It is reported that at Gotonga tea estate, the Superintendent's bungalow was so injured that he was obliged to vacate it for the night, while at Parbatia tea estate, 5 miles west of Jorhát, one of the walls of the manager's bungalow fell in. Reports of the shock have also been received from Daklangia, Meleng, Diha, and Kathalguri tea estates.

4. Several very slight shocks were experienced on the night of the 12th, and again on the 13th, the last taking place about 4 o'clock in the afternoon. The mauzadárs have been asked to report whether any loss of life or property occurred within their respective mauzas, and on receipt of this information a further communication will be addressed to you.

5. Information has just been received from the Manager of Kaliapani tea estate that his leaf-house was thrown down, and that one girl, aged 11, who was inside, was killed, while her sister was severely injured. It is reported that considerable damage was done at Dhooli, Titabar, Sykatta, Bokahola, Dhekiajuli, and Hilika gardens, but no details have as yet been received.

No. 484G., dated Sibságar, the 16th June 1897.

Memo. by.—The Deputy Commissioner of Sibságar.

Forwarded to the Commissioner of the Assam Valley Districts, in continuation of this office No. 482G., dated the 14th instant.

*Report by F. C. HENNIKER, Esq., I.C.S., Deputy Commissioner of Lakhimpur,
No. 340G.—IX-25, dated Dibrugarh, the 3rd July 1897.*

With reference to the telegram dated the 21st June 1897, from the Secretary to the Chief Commissioner of Assam, I have the honour to state that the earthquake was felt here at about 5-22 p.m. on the 12th instant. It lasted for about 4 minutes. About its direction there is difference of opinion. I officially reported it to have been from north to south, but I did this in deference to the opinion of other observers. My own opinion was that it was from west to east, and, since hearing of accounts of the earthquake elsewhere, I have no doubt that this was the case. Evidently there was an explosion of some sort somewhere near Shillong, and earthquake waves radiated thence in all directions, diminishing in intensity. The shocks were not very severe, but remarkable for their long duration. The damage done was not great. Had it lasted for another two or three minutes, the damage would have been great. The shocks continued to increase in intensity till a minute before they subsided. Some of the *pucca* buildings in the Kaya Patti have been slightly damaged. The Thakurbari of the Kayas has suffered the worst. No loss of life is reported in this district, but the Agent and General Manager of the Assam Railways and Trading Company reported that on the 15th instant 3 coolies were killed by the fall of coal. The accidental fall is ascribed by him to the earthquake. It took the Company two days to clear the mines of falls caused by the earthquake. No other damage was done there.

Since then, slight shocks of earthquake have been felt at intervals; on the 13th we had two slight but perceptible shocks. The last shock is reported to have taken place at 1-30 a.m. on the morning of the 28th ultimo. This is reported to be the most severe one since that of the 12th ultimo.

Little or no damage has been done to Government or other buildings. The only case of collapse of a house that I have heard of was the fall of a leaf-house under construction at Romai tea estate. For North Lakhimpur I enclose a copy of the Subdivisional Officer's report.

Report by H. A. C. COLQUHOUN, Esq., I.C.S., Subdivisional Officer, North Lakhimpur, No. 283, dated the 26th June 1897.

With regard to your letter of June 22nd, requesting information as to the recent earthquake, I have the honour to submit the following report.

The first and most severe shock occurred here on June 12th at 5-10 p.m. It lasted for nearly 5 minutes, increasing gradually in intensity up to the third minute, and then again decreasing. It was followed about 10 minutes later by a second shock, much less violent, and lasting for about a minute. Subsequent shocks were felt at irregular intervals up to the morning of the 14th; there were six or seven in number, and they averaged in duration from two to three seconds. The above observations refer to the station of North Lakhimpur only, but may be taken as applying with slight modifications to the subdivision generally. The direction of the main shock appeared to be from south or south-west. It was followed by rumbling in the hills to the north. The damage done was but slight. The walls of the masonry buildings in the station, treasury, cutcherry, and dāk bungalow, were cracked in several places, but not to a dangerous extent. In this district little or no damage has been sustained by bungalows or tea houses. The shock seems to have been felt more severely on low-lying and swampy ground, and in some cases such ground has subsided. This has occurred at Kadam tea garden and at various places along the trunk road. Between the 5th and 7th miles from Lakhimpur on the Dhakuakhana road several such subsidences have been reported, varying from 3 to 10 feet in depth. The road to Tezpur is not, however, greatly damaged. No bridges have been injured, and the bazar and town of Lakhimpur have not suffered at all.

APPENDIX IV.

Report by Captain P. R. T. GURDON, I.S.C., Deputy Commissioner of Kámrúp, No. 1505, dated Gauháti, the 8th August 1897.

The first shock occurred at a quarter past 5 p.m. on the 12th June 1897. The sun was shining, the sky was a little gloomy, and the weather was perfectly still. The shocks grew in intensity, and in a few seconds became so violent that people ran out of their houses. Houses and trees began to rock as if in a violent storm, and it was difficult to stand. The earthquake lasted for about three minutes, and caused the most disastrous devastation. The direction seemed to be from south-west to north-east. Almost all the Government buildings were completely destroyed. The Brahmaputra rose 4 feet, and, at any rate near the bank, flowed up stream. It fell again after two or three hours. All the bungalows occupied by the European officials collapsed. The Pán Bazar and Fáni Bazar roads were blocked with ruins, and it may be said generally that all buildings with *pucca* walls collapsed. It was only such buildings as were supported by strong wooden or *bamboo* posts with *ekra* walls that escaped without serious injury. Buildings with iron posts hardly suffered at all. The two long *chang* buildings in the jail compound which had *kutcha* walls but were supported on *pucca* pillars have not fallen, and are comparatively uninjured, though the high wall round the jail was completely demolished. The roads throughout the town cracked in places. Near the Káyá Patti in the west end of the town, the strand road also subsided in several places, and at one place a hole several feet deep formed. At several places in the Fáni Bazar springs of water and a very fine kind of sand, the colour of Portland cement, bubbled up, and the bubbling lasted for about 24 hours, causing heaps of sand to be deposited. All the European residents were homeless, and had to take shelter in the mail steamer. The dwelling houses of most of the natives were also rendered unfit for habitation, and the continuous shocks so much increased the consternation of the people that they passed the night in the open air or in half-covered places.

2. The state of affairs at Barpeta was still worse. The houses there being mostly *kutcha*, the devastation of property was not as great as at Gauháti, but the distress of the people was very great, owing to the flooding of the river, which immediately succeeded the earthquake and submerged the whole town. People had to

stand in water or take shelter in boats. All the villages around Barpeta were submerged, and the flood continued to rise till the 19th of June, and thus intensified the distress. The same state of things prevailed in all low-lying parts of the district which are drained by rivers and small streams, the beds of which were upheaved by the earthquake; in consequence of the upheaval they overflowed their banks and flooded the neighbourhood. Springs gushing out from below the earth also flooded many villages. The earthquake had the effect of depressing many high places, raising low places, and filling tanks, wells, *bis* and the beds of streams with sand. Several rivers have changed their course. Huge rocks are reported to have fallen from several hills. New streams have opened in some places, causing damage to the standing crops. Roads have been broken throughout the district; masonry bridges have suffered the most.

3. The *Silsako* bridge in Maneiri village in Patidarrang tahsil, a monument of very ancient date, said to have been constructed by the Mahomedan invader Bakhtiar Khilji in 1203 A.D., has been broken down. Communications were interrupted. While well-to-do people in the town have sustained heavy losses by their *pucca* houses falling down and valuable properties being damaged, the distress of the poor *raiyats* in the mufasil has been still more severe. Their huts were either thrown down or flooded, and their provisions were completely or partially damaged; in places granaries fell down and the grain was damaged by water. Thus situated, the people experienced great hardship and privation. Scarcity of food-grains has been apprehended in some places of the Barpeta subdivision. At Nalbari, some cases of paddy looting were reported, in which people at first seem to have offered money for paddy, and, being refused, used violence.

4. Another phenomenon caused by the recent earthquake has been the issuing of white sand from beneath the earth and the destruction thereby of the standing *ahu* crops, rendering the prospect of *sali* cultivation also poor in some tracts. The *ahu* crop in the Nalbari tahsil, in mauzas North and South Barkhetri of the Hajo tahsil, and in mauza Dakhin Sarubhangshar of the Palasbari tahsil, has been seriously damaged by the sand.

5. Another sequel to the earthquake has been the outbreak of cholera in the town of Gauhati in epidemic form. Fever, dysentery, and other diseases have also been prevalent. Cholera has, for some years past, been very little known among the residents of the Gauhati town. The sudden stoppage of the water-supply, owing to the damage done during the earthquake to the waterworks and pipes, may have been the cause of its recrudescence. Reports of outbreaks of cholera have also been received from some villages in the interior. Great havoc has been caused by this disease in Dharapur in the Palasbari tahsil, and in Galhati in the Chhaygaon tahsil.

6. At the time of the earthquake, Mr. Hamilton, Assistant Commissioner, was in charge, the Deputy Commissioner being in camp. After the shocks ceased, he repaired to the cutcherry, and learnt that the jail walls had fallen down and water was rising in the jail premises. He went to the jail, and arranged for a double guard for the night. He also removed the treasure from the wrecked treasury building to the Bar library. The treasury has since been removed to a temporary building erected for the purpose.

7. As regards the damage done to Government property at Gauhati, all the buildings, excepting the Post Office, Telegraph Office, Training School, and the dak bungalow, which had been newly built, will require complete renewal. The abovementioned buildings are repairable, and can be restored to their former condition without much expense. The Deputy Commissioner's office is now held partly in the tahsil cutcherry and partly in the boarding-houses attached to the High School. Temporary sheds have lately been built. Temporary sheds are also under construction for the Commissioner's office, which was accommodated in the boarding-house attached to the Training School. Some sheds have already been constructed, and are being used.

8. For some time, before the magnitude of the disaster had been ascertained, owing to communications on all sides having been interrupted, a great rise in the price of food-grains was apprehended. To prevent this and the exportation of grain in large quantities from the town, the Deputy Commissioner temporarily fixed the price of some of the chief articles of consumption in consultation with the principal dealers, and prohibited the exportation of food-grains from the town. The effect was very satisfactory.

9. *Records.*—The record-rooms at Gauhati were entirely wrecked. The records, partly damaged by rain, were taken out, and are now being arranged. As all the *débris* was removed from inside the record-room, none of the records ought to be missing. I have set my office to carefully arrange the records and make lists of

papers missing, if there be any. It will, however, take some time and labour to restore the records to their former good order. In the tahsils no damage was done to records. In the Barpeta subdivision, all records were found in order.

10. *Library*.—Much less damage has been done to the books in the library. With the exception of a few books that got injured by the ruins falling upon them and a few books that may be missing, the whole of the library books were recovered in good condition.

11. *Damage done to furniture*.—The damage done to furniture in the offices, dāk bungalow and circuit-house by roofs and walls of buildings falling upon them has also been considerable. A good deal of the furniture, however, has been repaired, and a good deal more is being repaired, and the ultimate loss on this account will be small. The cost of repairing the damaged furniture, together with that of purchasing new furniture for my office, the Subdivisional Officer's office, tahsil offices, dāk bungalow, and circuit-houses (inspection bungalows excepted), will, I think, roughly estimated, be between Rs. 600 or Rs. 700.

12. *Popular rumour*.—It will be interesting to note here a rumour which the Sub-Deputy Collector reports spread fast, and was widely believed in this district for some time after the first earthquake. An edict came from Jagannath Kshetra some days after the shock of the 12th June, that an earthquake far more terrible than the one of 12th June would occur on Saturday, the 3rd July, and that the earth would collapse and disappear under water. The people were seized with alarm; they prepared plantain rafts to float them in case of the deluge taking place, and sat outside their houses for the whole night on that date, either under trees or under temporary shelters. Cattle were kept on high places or on public roads, tied to pegs driven into the ground. There was *Hari nām* in the villages, both in the daytime and in the evening. The people were all in despair of their lives and property, and nothing would persuade them to believe that the prophecy was false.

13. *Damage done to temples*.—*Kāmākshyā temple*.—The most important of the temples in this district is that of Kāmākshyā, which stands on a hillock adjacent to the town of Gauhati. The temple is of great antiquity, and is said to have been originally built by Kām Deb. Tradition says that the upper part of the temple was demolished by *Kālpāhār*, and this portion was subsequently rebuilt by Nar Narayan, ancestor of the Koch Behar Raj dynasty, and his brother Sila Rai. In this hill there are several other minor temples besides that of Kāmākshyā. The Kāmākshyā temple has escaped with somewhat slight damage. Its spire with a golden *kaśi* (jar) has fallen down. The *Nāt Mandir* has cracked, the walls around the temple have fallen, and some of the rooms attached to the temple have been more or less damaged.

The most notable of the minor temples is that of Bhubaneswari, which is situated on the top of the hillock, and has been completely shattered. The other temples have almost all been cracked, but are still standing.

Umānanda.—Next in importance among the temples in and near the town of Gauhati comes the temple of Umānanda, situated on a rock known as Peacock Island in the Brahmaputra, just opposite the Deputy Commissioner's office. The temple, as the inscription shows, was built by Garhganya Handikai Bar Phukan in the reign of Raja Gadādhār Singha, in *Saka* 1616. The spire of the temple has fallen, and the temple itself has cracked, but stands erect and is repairable. The walls around it have collapsed.

Aswaktanta.—This temple, consisting of two buildings standing on a rock on the bank of the Brahmaputra opposite Gauhati, was built by Taruna Duāra Bar Phukan in 1642 *Saka*, in the reign of Raja Siva Singha. The building, situated on the summit of the rocks, has been completely demolished, and the other building lower down has been cracked, and its spire, like those of other temples, has fallen down.

14. *Mortality*.—The loss of human life in this district in comparison with the magnitude of the disaster has been small. Twenty-nine persons are reported to have been killed; details are given in the margin.

Gauhati town	...	5
Kāmākshyā hill	...	5
Pālasbari	...	7
Tambalpur	...	1
Rangia	...	2
Faidarrang	...	1
Hajo	...	2
Boko	...	1
Barpeta	...	4
Bajali	...	1
		29

Deaths among cattle have been much more numerous. Many cattle died by falling into fissures caused by the earthquake, or were washed away by floods, or buried alive in the sand.

The following remarks on the present condition of the district, abstracted from the reports received from the Assistant Commissioner, Sub-Deputy Collectors, and Tahsildars are annexed to the Deputy Commissioner's report :

Palasbari.—The Tahsildar reports that the dispensary building has completely collapsed, that the walls of the inspection bungalow were wrecked, although the house is standing, and that the *churs* in the Brahmaputra appear to have subsided. In mauza Dakhin Sarubhangshar the *ahu* crop has been seriously damaged. Owing to granaries having tumbled down, food-grains have been damaged by the wet, and people have been exposed to great distress. One village, named Saportari, in mauza Chayani, subsided to some extent and has been overflowed, and the people have taken shelter in another village.

Chhaygaon.—Similar reports of distress have been received from the Chhaygaon and Boko tahsils. In Chhaygaon, a village, named Lankhar, in mauza Chhaygaon Pantan, is reported to have sunk down a few feet, and the people, with their cattle, have taken shelter on the hill side.

The reports from the Tahsildars of Hajo and Gauhati are very meagre. It appears, however, that the Coolihati village near Sessamukh and Pakergonah, south of it, have subsided. I have also learnt by enquiry that the village Garigaon, in mauza Ramsa, along the Brahmaputra, has sunk down a few feet. It has been reported that in some places, through the violence of the earthquake, very old timber posts, betel-nuts, etc., and money underneath the earth were thrown up and brought to the surface, and in some cases money buried in the floor of houses has sunk down still further below the earth.

Reports from other tahsils on the north bank are to the same effect.—Roads cracked, bridges broken, people houseless, and the *ahu* crop damaged more or less by floods and sand.

Mr. Hamilton made a tour from Gauhati *via* Hajo to Nalbari, and thence returned to Gauhati *via* Rangia and Patidarrang. He mentions the *ahu* crop as having been damaged in several villages alongside the road to Hajo by sand and floods, but he does not think the damage near the road to have been considerable; he, however, reports a worse state of things in Nalbari. The following is quoted from his diary :

As to the loss of crops in Nalbari, I learn the following:—Mauza Dharmapur has lost nearly all its *ahu* crop, and the land for growing *sali* is also made useless by the sand. Distress may be acute in this mauza, and possibly a remission of revenue would be advisable. Pokoa mauza is nearly as bad; next comes Bahjani, then Khata, which is slightly damaged, and Batasgila is the least damaged of all. The last three mauzas will probably sustain no loss over the *sali* crop. All crops would have been exceedingly good this year but for the earthquake; so if a loss of 6 annas occurs owing to the earthquake, I do not think that sufficient ground exists for remitting the revenue. I only saw Khata and Batasgila myself.

The Sub-Deputy Collector, who has just travelled through the tahsil, estimates a somewhat larger loss of the *ahu* crop; he says that about 10 annas of the crop has been lost; he, however, confirms the fact that a very rich *ahu* crop was expected by the people before the earthquake. A large number of villages in this tahsil are under water. People have been living on *machans* or hill sides, or betaken themselves elsewhere. The Sub-Deputy Collector has also toured through the Patidarrang, Boroma, and Tambulpur tahsils. About the destruction of crops in Patidarrang he writes :

There were cracks and gaps in all the villages, through which were emitted sand and water. The sand covered up and destroyed small patches of *sali* seedlings and the *ahu* crop. But the loss on this account is small.

It is the water springing up at the earthquake, which, together with the rain water, is threatening the *ahu* crop and will damage it to a considerable extent if it does not subside fast. *Sali* cultivation may be affected by the cattle-disease which is now prevalent.

About Boroma he remarks :

Destruction of crops in the greater portion of the tahsil is not so serious as in the Tambulpur tahsil. The *dhulia ahu** has grown high, and this crop has not been considerably damaged by sand, the emission of which was not in large quantities, except in the western part of the tahsil. The *achra*† and *khurma*‡ crops have suffered, as the plants were young.

In the western part, where the gaps were numerous and the springing up of sand and water was very considerable, the crops have been largely destroyed. The ditches around the sugarcane plantations and the drains between every two rows of canes have been filled up with sand. The crop itself has not been damaged up to date, but it will suffer later on from the dampness due to there being no drainage.

In Tambulpur tahsil, the Sub-Deputy Collector reports the *dhulia ahu* crop has escaped destruction, as the plants have grown high, but the young plants of trans-

* *Ahu* or *aus* sown broadcast on dry ground. † *Ahu* or *aus* sown broadcast on muddy ground.

‡ Transplanted *ahu*.

planted *kharma* and of *achra ahu* have been much damaged. About a quarter of the crop is estimated to have been destroyed. *Sali* cultivation has also been much affected by the sand covering the fields and damaging the irrigation canals, and this crop is also threatened by the cattle-disease which prevailed here some time before the earthquake. As in some parts in the Barpeta subdivision, the distress of the people in the Hajo tahsil is reported to have been very keen, mainly through the overflowing of the Barlia and Hajo *sota*: most of the people in the tahsil live on *machans* or rafts of plantain trees. Scarcity of food-grains is also being felt in this tahsil. Many people live upon one meal a day, and even that consists of jack fruits and country potatoes. Although some people had a store of paddy, they would not sell it. The *ahu* and *baa* crops have been greatly damaged by sand and water. *Sali* cultivation being comparatively very small in this tahsil, the loss here will be great. In the Barpeta subdivision, the distress is more acute, owing to the villages having been flooded.

The Sub-Deputy Collector, Barpeta, writes as follows regarding some villages in mauza Paka:

Rice fields were sunk and under water, or were covered with sand. Fully two-thirds of the *ahu* and at least half of the *baa* crop have been destroyed, and if the water rises again, as there are indications that it will do, it is apprehended that nothing will be saved. People sleep on bamboo *changs* raised above water inside their huts, and also cook on similar structures or on rafts made of plantain trees.

The Sub-Deputy Collector and the Tahsildar report that the Bajjali tahsil has fared no better. Reports of scarcity from this tahsil were received before the earthquake, and since the earthquake the scarcity has been greatly aggravated. Many people here also have to live on one meal a day. Some have been eating boiled plantains and jack fruit and the seeds of jack fruit. The *ahu* crop has in many places been seriously damaged by floods and sand.

The Tahsildar of Roha reports as follows:

Since the afternoon of the 12th June, Saturday, a deluge has taken place and all houses have tumbled down. The tahsil cutcherry having been inclined on one side, the partition walls have fallen down, smashing tables, chairs and almirahs. The police lines and outpost buildings are gradually sinking. The inspection bungalow, the dispensary, etc., have all been damaged more or less. All the rivers except Beki and all *bils* and wells have been filled up.

The Sub-Deputy Collector, Barpeta, writes:

The village Belbari in mauza Bhabanipur is completely flooded. Many houses have collapsed, and most are under water. People live and cook on *machans* or on rafts made of plantain trees. Three-fourths of the *ahu* crops have been destroyed. The well-to-do people have sufficient supplies. But the poor are feeling the want, although many of them purchase from Barpeta, or beg and borrow locally.

The Subdivisional Officer is now holding his office in boats. Many of the walls in the cutcherry are cracked, but the building can be repaired, and the roof is intact. The treasury, which is part of the cutcherry building, also has many cracks, but is repairable. The walls of the cutcherry, which are badly cracked, might be pulled down and *ekra* plaster walls substituted. The treasury walls can be repaired. The circuit-house has lost a good deal of plaster and is out of plumb, and the same is the case with the Subdivisional Officer's small residence. The police lines are in good order, except that, as in the case of other buildings, they are standing in one or two feet of water. The lock-up is in the same condition, and the convicts and guard occupy a boat.

The school and tahsil buildings at Roha and Bajjali will require a small amount of repair. The dispensary at Barpeta is very little injured. The bridges in the town are all broken. The Kirtanghar and its brick temples and walled enclosure are much damaged. The Subdivisional Officer estimates the loss of the *beparis* and Marwari merchants to be nearly Rs. 50,000. Many people have died of cholera in the Barpeta Shashtra, and some are still suffering from this disease.

APPENDIX. V.

Demi-official Note by Surgeon-Major E. F. H. DOBSON, M.B., of his experiences during the earthquake at Jemadarhat in the Gajpura district, dated Dhubri, the 16th June 1897.

On the 12th I sent you a demi-official, and about four hours later, that is, at 3 p.m., left the station by the ferry steamer, which landed me on the opposite bank at 4-15, and from there I drove to Jemadarhat, where I met my camp. There was a stormy sky ahead and a strongish breeze blowing whilst I was crossing the river;

on reaching the opposite bank, had a few drops of rain, and, on the whole, had a cool and pleasant drive till I reached Jemadarhat, which is $3\frac{1}{2}$ miles from the opposite bank of the river. The rest-house at Jemadarhat was burnt down some months ago, and my servants rigged up a small godown about $16' \times 8'$ for me to stay in during the night.

At 5 p. m. came this terrible earthquake. I invariably sit out an earthquake, as I have always thought the worst is over before one has time to get outside a house, but though I was safe enough in the light shanty I was in, I had to rise, as the shock seemed never ending, and a roar of water flowing near and the hum of voices compelled my getting up. The villagers were panic-stricken and fleeing from their houses to the Trunk Road. The ground I at once saw was everywhere cracked up, sunk, etc. Behind the old rest-house is the termination of a very long *bheel*. It was a wonderful sight, this *bheel*. The water rose steadily in it, and in two minutes must have risen at least twelve feet and then overflowed, and with this overflow, the whole country, as far as the eye could see on each side of the Trunk Road, was one sheet of water. The fact being that from all the innumerable cracks water had gone on spouting, and that, coincidentally with the overflow of this *bheel*, the water level had risen to the same height all over the surrounding country.

In addition to the cracks from which the water welled up carrying the sand with it, innumerable jets of water, like fountains playing, spouted up to heights varying from 18 inches to quite $3\frac{1}{2}$ or 4 feet. Wherever this had occurred, the land was afterwards seen to occupy a sandy circle with a depression in its centre. These circles ranged from 2 to 6 and 8 feet in diameter, and were to be seen all over the country. In some places, several were quite close together; in others they were at a distance of several yards apart. They had the appearance of small craters. I have heard it said that the water from the cracks and these so-called fountains was warm, almost hot, but this must be due to someone's imagination: I had to wade through a good deal of water whilst the water level was rising, and had the temperature of the water been abnormal, it must have made itself felt to me. It must not be overlooked that the country had been water-logged days before the earthquake came, and that it must have been this water which was driven up with the subsidence of the land, as I believe the quake was due to a subsidence.

In front of Jemadarhat rest-house the Garo Hills are within 5 miles, and behind it is the Brahmaputra at a distance of not more than 2 miles. The Trunk Road remained above water, but in certain portions where it had subsided from 1 to 2 feet the water flowed across it, and at these places, where the panic-stricken villagers tried to run towards the direction of Lakhipur, which is 12 miles off in the Gauhati direction, the poor creatures got more alarmed than ever, for they found themselves sprawling about in the water, unable to realise what had barred their progress, and not knowing if they were going to get out of it again. At all these gaps or places, where the earth had subsided, or where fissures and cracks had formed, the rush of water from them all carried with it an immense quantity of sand, and this was what barred the progress of these panic-stricken villagers. This sand had a particularly quicksandish feel about it, but fortunately, as a rule, was not deep on the portions of the road that had subsided near the rest-house.

The main shock seemed to me to have lasted nearly six minutes; but perhaps in this I am wrong, and perhaps I may have missed a cessation and taken two or more shocks as one, for certainly I noticed no cessation. It seemed as though death from drowning must have been the end of every one near me. Although the shocks went on being repeated incessantly at intervals of a few minutes, the rise in the water ceased after half an hour, and then the idea present to one's eye was that the country on either side of the road was nothing more than innumerable sand-churs of different sizes, such as are met with in the Brahmaputra. This meant, of course, that crops were considerably covered by this sand. Most of the excavations made by the earth-cutters annually on each side of the Trunk Road to enable them to throw fresh earth on to it have been filled in by this sand, and the Public Works Department will not have quite such heavy rates to pay for earth-cutting, as the leads will be comparatively short when they begin work again; but for this, which is really no advantage to speak of, the loss to the province must be enormous.

All the panic subsided by about 9 o'clock; the hut I was originally in was now under water, and I could not get back to it. Many of the villagers' houses and those of the Kayas had sunk a good deal, whilst others filled with two or more feet of sand through the door ways. My horse broke away towards the end of the first shocks, and made for home, the *syce* after her as hard as he could go, but on reaching a good strong wooden

bridge, she was stopped by the bridge subsiding on the Dhubri side. Cattle seemed to find great trouble in extricating themselves from the sand and water, which but a few minutes before was their grazing ground. Villages were wholly vacated and refuge taken wherever high land was available. Almost everything is said to have its ludicrous side, and in the midst of confusion and the marked panic of the villagers, it was amusing to find my cook busy at work preparing dinner within half an hour of the occurrence. There he was, as though nothing had occurred, on the plinth of a burnt down hut only just above water and surrounded on all sides by it. I was very grateful to him later on for not having parted with his wits.

As the rush of water ceased and order was to some small extent renewed, those who were able to do so scrambled to their huts, and brought out boxes and bedding, etc., etc., and, with their belongings, encamped on the road for the night. At about 10 it struck me I might have a roof over my head if I got near the ferryghât, as there was a tumble-down serai there. I had gone half a mile when two men assured me it was impossible for me to progress, owing to a gap of several feet in the road through which water flowed, and across which they had just swum. On hearing this, I returned, and with my bed on the road, attempted to get some rest. This was impossible, with the continuous and oft-repeated seismic shocks at short intervals, which, whenever the least bit strong, were followed by a wail of human voices. Cattle, goats, and dogs formed a goodly addition to those resting on the road for the night. At 2 a. m. a sharp drizzle came down, and with my umbrella over my face and a rug over my body, I weathered it out till 3 a. m., when my rug had got wet through. Close by was the rest-house well. I now transferred my headquarters to it by wading across 2 feet of water for about 15 yards; and then spread a dryish rug on the masonry platform of this well. The well and its platform had both been badly cracked at 5 p. m., and the water had risen to within 18 inches of the surface. It had a thatched covering over it, and this sheltered me during two hours of heavy rain.

At 5 a. m. I rose finally, having had a fair night's rest under most extraordinary circumstances. Having had *chota hasree* at 6, I started to walk back to the ghât, having learnt that the road was impassable towards Lakhipur. As the road was heavy and my *syce* had developed strong fever, I left him the trap to drive in slowly. The whole Trunk Road from Jemadarhat to ferryghât, which I had seen, had cracks running along it, which were in some instances over 100 feet long; in others the earth had subsided for a similar distance, and then, again, traverse cracks, depressions, etc., existed all along the road, at distances of a few feet for miles; the same thing seemed to have occurred off the road side. The villagers stated that they had lost the grain they had stored in their houses. On arrival at the ghât, it is scarcely necessary to say it was much changed, the river having risen considerably since 4 p. m. However, after getting almost knee-deep in many places in very disagreeable soft sand, about which I was hopping for quite half an hour, I got safe on to the ferry, and returned to Dhubri at 9 a. m. Shortly before reaching the ferryghât, my *syce* had sent word that my horse was drowned, and desired me to return. At the ghât another messenger brought me word saying the animal was well stuck in soft sand. So I sent back coolies, and, much to my surprise, found her none the worse, and at Dhubri by 5 p. m. It seems she had got into the sand at about 7 a. m., and remained in it till 1 p. m. There were several gaps in the road between Jemadarhat and the ferryghât, but none over 2 feet wide, and the *syce*, instead of exercising a little care when having to go off the road, took the shortest cut possible, with the result noted by me. The huge gap I was told of the night before turned out to be a myth.

On returning to Dhubri, everything was as I had pictured it at 5 p. m. the previous night. The town is in ruins. It has sunk everywhere, and for hundreds of feet in a stretch it is cracked and fissured. The dispensary (main building) stands, but has suffered much. It is built on iron pillars, and its brick walls are only about 12 feet high and 2 feet thick; above, its walls are lath and plaster. Hence the reason it has stood. The cutcherry, the forest house, Local Board bungalow, circuit-house, the club, telegraph office and telegraph signallers' quarters, and the Gauripur zamindars' house stand, also Leslie's and Maher's, because they are built on piles. Of course, the plaster and lath are all gone. The treasury, Jewett's house, Jolly's house, the dâk bungalow, the Bijni Hall, two large houses at the immigration depôts, the liquor shop in the bazar, and the Muhammadan *musjid* and my house still stand, but are dangerous to enter and must all be dismantled. The post office, Halifax's, Bogribari zamindar's house, the high school, the church, the Sikh temple, the new jail, the newly-built magazine, the seven newly-built houses in the dispensary ground, and all the out-houses of every single brick-built house are down flat. So far, only one fatal case has been reported, and this a native child

about 5 years of age. The natives are all panic-stricken, are living on the roads, in boats, and in steamer flats, and seem most helpless; the better classes encamp out on the roads during the night, although several of their houses are safe. Several of them have, however, suffered considerably; houses, especially those built on new reclaimed land near the Dhubri back water, have subsided a good deal towards the back.

Just beyond the front of the old jail and extending for nearly a quarter of a mile below it and in the direction of the old bazar, the land has subsided quite 5 feet, but this subsidence is not so great as we get further away from the jail; in fact, it is as little as 2 feet. Unfortunately for the station, this subsidence near the jail is all but communicating with the river, and runs parallel to it behind a row of houses situated in the old bazar on the river bank. As soon as the river rises, it is certain to flow into this subsidence (which already has water in it), and then there will be one steady flow from the river right on into the recently-excavated tank in connection with the new drainage scheme of the town. Shortly after this takes place we shall, I think, find the narrow strip of land between this tank and the main bank of the river will be *non est*, and that the river will be flowing through what was once the tank and continuing its onward course carrying all before it and skirting uncomfortably near the new bazar.

The station drains are *kutchas*, and almost every drain is choked up with sand carried up from the cracks up to or very nearly on a level with the roads. The station tanks have risen considerably and some overflowed. In several of them islands of sand are visible, clearly showing that, though the tanks are full, the actual depth of water is not very much. This I have verified in some instances, and it is further proved by the condition of the public wells in the station. Almost all the pits have been levelled up by the sand from the cracks. The new bazar, which was very low ground, has benefited considerably by being raised with this overflow of sand. It is at present also more or less flooded. This sandy overflow was restricted to low lands, more especially as *bunded* roads showed no sand or water on them, till after they had subsided to a certain depth. The two *bunded* roads in the station, *viz.*, the Bidyapara and Gauripur roads, and the two or three branch roads from them, as also the $3\frac{1}{2}$ miles of road on the opposite bank of the river over which I had travelled on 13th, have all subsided a good deal in places, and I think it not a bad comparison to make when I say they are not at present very unlike switch-back railway roads on a small scale.

The station is terribly cracked up and has subsided in places, but this is not to be wondered at, more especially when we recollect that during the rains it is almost an island, and a very narrow one with rivers on three sides of it, and these rivers forming three large expanses of water tearing along. The front of this station is, as you know, very high land, a sort of hill and on rock. This portion was not cracked up, but as soon as we reach the first road behind the front or river side road, which is low land, we notice terrible cracks in the ground both in numbers and extent, and this road is not more than 300 yards at the back of the river side or front road. It is in this high portion of the station that natives of all classes seek refuge, especially as the evenings begin to close in. I am told the Brahmaputra rose several feet at the time of the earthquake. Next morning when I crossed it, it seemed a very different river: a huge sand-*chur* in front of the station had disappeared; it seemed in full flood; driftwood was plentiful, and I noticed two small boats (empty) being carried along. Bilasipara and Lakhipur zamindars' country residences are down in a heap. Gauripur, Rupsi, and Bagribari are said to be badly damaged. The Joldoba or Gara bridge and the Krishnai bridge, our two chief iron bridges, are reported broken. A hill between Goalpara and Agia is said to have slid forward towards the road. The *sdl* wood railing of the bridge near Jemadarhat is quite 8" x 8", and it was split right across on one side. On 13th night we had heavy rain. It had been fairly cool till yesterday, and up to the present it is hot again. It has just rained for five minutes at 2 p.m., and is threatening to do so again. But what about these continuous seismic shocks, which are really strong at intervals of every half or one hour? A severe one again at 2-40 p.m., and so on all day and night. We seem to have had such a severe beginning and so much of it since that we are quite accustomed to shocks that at any other time would have been referred to as very serious.

There seems to be almost one continuous tremor of the earth going on. I attach a tabulated statement regarding the wells in the station, which, I think, will be of great interest. It will reveal how they have filled with sand, and also that those which had not filled entirely with sand filled almost to overflowing with water. In some, both sand and water had overflowed. I am afraid this silting up of sand in wells, tanks, *bheels* or *jheels*, and I presume in rivers, will mean great misery for the villagers and their cattle when the dry season sets in, and especially if we have a long drought.

Tabular Statement showing the effect produced on the several drinking-water wells in Dhubri station by the earthquake of 12th June 1897. Of the 13 wells, 11 were built of brick, one of country made clay rings, and one of rings supplied by Messrs. Burn & Co., Raneeunge. All these wells, with the exception of the Emigration well, were constructed during the past few years, and all of them were in excellent order.

Name of well.	Diameter.	Original depth.	Depth after earthquake.	Amount of water before earthquake.	Amount of water after earthquake.	Remarks.
1	2	3	4	5	6	7
Assam	3' 0"	40' 0"	Nil	7' 6"	Nil	The well and platform are seemingly not damaged. Both water and sand spurted up out of the opening in the masonry top, which is over 2 feet above ground-level.
Baptist	2' 0"	30' 0"	4' 6"	6' 0"	3' 0"	This well is made of Burns and Co.'s Raneeunge rings. It has tilted slightly to one side, the ground has sunk, and the platform is cracked up. Sand and water were shot up through the cracks.
Dutta	4' 6"	53' 0"	24' 0"	9' 0"	20' 0"	Seems in excellent order. The platform is very slightly cracked.
Logan No. 1	4' 2"	26' 0"	4' 3"	7' 0"	0' 3"	Well and platform in excellent order. Sand and water spurted through the opening at the top, which is 2 feet above ground-level, to a very great extent.
Logan Nos. 2 and 3	3' 2½"	22' 0"	Nil	6' 0"	Nil	In excellent order. They had no brick platform. Sand and water forced up through the top opening, which is 2 feet above ground-level.
Jubilee	7' 9"	40' 0"	9' 0"	14' 0"	2' 6"	Jubilee well has been considerably damaged, and the large masonry platform has sunk 2 feet in parts and cracked up.
Emigration	10' 2"	40' 0"	20' 10"	15' 0"	19' 2"	Emigration well and its platform very much destroyed.
Bazar No. 1	7' 2"	40' 0"	28' 0"	14' 0"	26' 8"	Seems in excellent order. Its platform also has not suffered.
Bazar No. 2	4' 6"	40' 0"	29' 6"	12' 0"	28' 0"	The masonry platform has cracked up very considerably. The ground has sunk about 2 feet, and it also seems the well has been shot up a foot.
Police No. 1	3' 6"	36' 0"	1' 0"	8' 0"	1' 0"	The well and platform badly cracked. Sand and water shot up all round. The well is absolutely useless.
Police No. 2	1' 6"	23' 0"	The site has disappeared.	5' 1"	The site has disappeared.	This well was made of ordinary clay rings (country). It is not to be seen. The ground around has sunk, and it has disappeared. No attempt has been made to find it. It had a masonry top 18" above ground-level, and this was found about 7 feet from the site it originally occupied.
New Jail	6' 0"	40' 0"	8' 0"	16' 0"	6' 0"	This is a new well, of which the platform had not been made. It is very badly damaged.

Note—The Emigration, Dutta, and two bazar wells are in fairly close proximity to the river bank.

APPENDIX VI.

Report by F. C. ARBUTHNOTT, Esq., I.C.S., Deputy Commissioner of the Khasi and Jaintia Hills, on the effects of the earthquake in his district—No. 1736, dated Shillong, the 29th July 1897.

I have the honour to submit my report on the earthquake which occurred in the Khási and Jaintia Hills district on the evening of Saturday, 12th June, between 5-10 and 5-15 p.m. The exact time at Shillong was 5-11 or 5-12. The first shock, which was comparatively slight, was preceded by that rumbling underground noise since so familiar, but was accentuated within a few seconds with such severity that every masonry building in Shillong, and, in fact, throughout the district, was instantaneously levelled with the ground. The direction was roughly from south-west to north-east. The Secretary's residence on the hill above the Ward Lakes, in which my wife and I were living, collapsed at once as we stepped out on to the lawn, and the magnitude of the disaster was revealed immediately by the roar of the water escaping from the Ward Lakes, which rushed down a ravine, and damming up the stream Umkra, destroyed the iron bridge leading to the Polo ground, driving the heavy iron girders a considerable distance up stream. I proceeded at once to Government House, $\frac{1}{2}$ mile distant, which I found a complete ruin, and after ascertaining that the Chief Commissioner and Mrs. Cotton were safe, I went on to the Secretariat Press and my own office, where I found a chaprasi buried in the *débris*, his head alone protruding. I saw to his rescue. The man had a marvellous escape, and has since recovered. At the Secretariat Press, where the chief disaster occurred, many willing hands were soon at work. While at my office I was informed of the collapse of Mr. McCabe's bungalow, and that he was buried under the ruins. I went straight there. Unfortunately, the bad news proved to be only too true. I waited while the body was being recovered, and ordered Inspector Rash Behari Sen, whom I found there, to despatch two constables at once to Cherrapunji to ascertain the damage done in that direction, and to endeavour to open communication with Sylhet. Returning by the telegraph office, to which I had already been, I found the officials still vainly endeavouring to connect with Gauhati and Cherrapunji. I then went, after consulting the Chief Commissioner, whom I met near the Press, to the bázár and the police lines, and despatched two constables down the Gauhati road with a *tonga* driver, in case part of the road might be practicable for riding or driving. The men had, however, to reach Gauhati, 63 miles distant, on foot. Rain commenced falling at dusk, and continued all night until the following afternoon. Before they started, news had been brought that the large iron bridge with masonry pillars, 2 miles out of Shillong (61st mile), had collapsed. The men, however, got over before the torrent rose. I then had double guards placed over the treasury, where the boxes and almirahs were exposed, and over the jail, the walls of which were level with the ground. It was now nearly dark. Shortly after 10 p.m., I proceeded to visit the treasury guard, police lines, and jail, where the prisoners were spending the night in the open. While at the jail about midnight, an alarm of fire was raised from the main bázár. I went across from the jail, and found a shop in the centre of the bázár on fire. The iron roof had collapsed like every other one in the station, and the fire must have smouldered for hours. I had a passage cleared on either side through the *débris* of the adjoining shops, to prevent the fire spreading, a very necessary precaution, as one of them contained a large quantity of kerosine oil. From the fallen roofs of the adjoining shops earth and water were thrown, and the fire was finally got under about 1-30 a.m., when the woodwork and contents of the burning shop had burnt themselves out. Had the fire spread as at one time seemed likely, it would have resulted in the destruction of all food-supplies, except those in the hands of the regimental bunnias and the tinned provisions at the Co-operative Stores in the European quarter. This would have been a most serious matter. I then revisited the treasury guard, and went on to the Co-operative Stores, on which I had placed a police guard to prevent looting, and returned finally to the Secretariat Press. At the Press I found the Gurkhas, who had been working all night under Captain Chatterton, recovering the killed and wounded at the risk of their lives amid successive shocks, the worst of which occurred shortly after 1 a.m. The men were quite fagged out. It was now about 3 a.m. While on the subject, I may say all praise is due to the regiment and the officer in command, who worked night and day to rescue the men entombed in the ruins of the Press, as long as there was any hope of anyone being left alive. I have perhaps dwelt with unnecessary length on the events of the first night, but it is not one likely to be forgotten by anyone who happened to be in Shillong.

2. Day revealed the fact that Shillong was without a water-supply, and that it was cut off from communication with the outer world. Water from the pipes for drinking purposes was not to be expected, and could not be laid on for some days. But even the water in the numerous open channels throughout the station had disappeared. As regards communications, the telegraph officials, to whom I lent ponies, returned from the 61st mile, as they were unable to cross the swollen torrent. In the afternoon a second batch of messengers to Gauhati swam the river, assisted by ropes. In the evening news was received from Jowai of the destruction of the missionaries' houses, mission school, the fine dispensary, military block-house, churches, and partial destruction of the cutcherry, dák bangalow, and Subdivisional Officer's residence.

Telegraphic communication was resumed with Gauhati on the 16th June, and with Cherra on the 20th idem. Communication with Cherra was again recently interrupted for four days. Earthquake shocks continue with more or less severity, and are of constant occurrence. Great credit is due to Mr. Savedra and his assistants of the Telegraph Department for their unremitting labour from the very outset.

3. The pressing questions were obviously supplies and communications, and last, but not least, sanitation. After visiting my own house about 5 a.m. in the morning of the 13th, in the vain endeavour to get some dry clothes, as I had been out all night in the rain, I proceeded to the bázár to enquire into the supply question. The Marwaris owned up to having 1,500 maunds of rice, 200 maunds of *ata*, and about 200 maunds of *dak*, sufficient for about a fortnight, though, for obvious reasons, the supply was no doubt understated. I continued to visit the bázár daily with the Inspector and Babu S. C. Das, Superintendent of my office, who is a Municipal Commissioner, in order to watch sales. For the first three or four days there was a considerable scare, so much so that many persons laid in stock enough to last for a month. I accordingly found it necessary to arrange with a Marwari, Ram Chandra, the only man who came forward, for the import of 5,000 maunds of rice by 1st July. The rest had formed a ring prepared to charge anything which panic-stricken people were willing to give. The rice-eating population of Shillong is largely composed of clerks and their families, so, in order to prevent extortion, while not interfering with legitimate free trade, I fixed the price at Rs. 8 a maund, which gave the vendors ample profit on the stocks they had in hand. At the same time I informed the ring that I would seize their rice and have it sold by the police, if my orders were in any way infringed. I did not find it necessary to fix a narrow limit to the amount sold to individuals, as it was soon obvious by daily noting the sales that the supplies would last longer than the estimated fortnight, and the orders already issued had a most salutary effect. Fortunately, potatoes, which could not be exported owing to the stoppage of communications, were unusually cheap and plentiful. At the same time, until and for some time after it was known that the Gauhati road had been reopened to within 33 miles of Shillong, there was considerable anxiety as regards supplies.

4. As regards Cherrapunji and the numerous villages in that quarter, the apprehension continued much longer. As there was no doubt that the most serious damage had occurred in that neighbourhood, I obtained the Chief Commissioner's permission to despatch Mr. Rita, Subdivisional Officer of Jowai, to Cherrapunji, where the descent of the hills is absolutely abrupt, and the country consists of narrow plateaux intersected with valleys from 2,000 to 3,000 feet in depth. At the same time, I despatched Inspector Nava Kisore Datta with Rs. 1,000 to Jowai to endeavour to get up rice from Jaintiapur in Sylhet as a precautionary measure, and in order to restore confidence in that direction.

Mr. Rita arrived at Cherra on the 19th, and I was in constant communication with him by wire as soon as the telegraph office was open. Communication between Cherra and the plains of Sylhet and sources of supply were absolutely cut off for days. The paved bridle-path down to Therria at the foot of the hills was either covered with rocks and earth, or had gone bodily down the *khud*, and the Therria river, which is the route to the important bázár of Bholaganj, had entirely dried up, the water having been diverted down the sister stream (the Dholai), which is considerably to the east. It took a fortnight to clear the bed of this stream in order to restore communication with Bholaganj and thence with Chhatak in Sylhet. The credit of this is due to Sub-Inspector Job Solomon, Khásia. The Therria-Companyganj State Railway was, of course, impracticable, having been badly damaged. It has been described in its present condition as a Switch-back railway without supports.

5. Rumours were already current as to the total destruction of Shella, a village of some 4,000 inhabitants (population by the census of 1891, 3,658), which were confirmed by the statements of three Europeans made to Mr. Rita at Cherra, and who stated that they witnessed the collapse of the village from the other side of the river. These gentlemen, who narrowly escaped themselves, naturally did not wait to investigate the catastrophe, nor could they then have crossed the river had they wished to do so, but made their way through the driving mist and rain up the hills on the right bank of the Bogapani. To those not acquainted with the climate of Cherra and the southern hills, I would recommend the perusal of Oldham's *Geology of the Khasi Hills*, which gives full details. Suffice to say that from what I know of it, I feel sure that Mr. McKay and his companions could have got but a casual glimpse of Shella through the mist and rain, and that from a distance, and seeing part of the village collapse, they not unnaturally concluded that the whole had gone. I was unable to proceed to Cherra and Shella at once, much as I should have liked to do so, as I was necessarily detained at Shillong, which had suffered so severely itself. I have, however, since visited Shella. The northern portion has suffered most, and many houses have been carried down by a landslip and buried. The southern part of the village is on comparatively level ground, and has escaped with little loss. It is not visible from the opposite bank, being embowered among orange and jack groves. The village was largely saved by the fact that the hills above are covered with dense evergreen forest not denuded for temporary cultivation, and owing to the way in which the houses are constructed on ledges cut out of the hillside. The houses, which are built of a framework of bamboo, have roofs and eaves of the leaf of a species of cane. The eaves rest on stone walls 2 or 3 feet high. The result was that the walls were thrown out on either side, and that, while many of the houses remained *in situ*, others were tilted down the hillside, and others again were broken up in the process. I believe that many persons would have escaped even if they had remained in their houses. I was surprised to find so little damage, but the appearance from a distance in the hills opposite must have given the impression of the entire collapse of the whole village.

6. Mr. Hodson has submitted a valuable and interesting report on his visit to Shella and the villages in the valleys below the Laitkynsew plateau. This report is annexed in original. I instructed Mr. Hodson, in consultation with the Chief Commissioner, as soon as I was aware that his services were placed at my disposal for work in that direction, to proceed to Shella first, and then, making Laitkynsew his headquarters, to institute enquiries among the villages below Laitkynsew on either side of the Laitkynsew ridge. The Chief Commissioner, I understand, issued instructions to Mr. Hodson on the same date, 28th June. I saw Mr. Hodson at Cherra on the 11th July, when he came in from Laitkynsew. On the 13th Mr. Hodson proceeded under my directions across the Shella river and up the Maosynram plateau, and thence *via* Maoflang into Shillong, as there was no use in his returning by the same route, or our covering the same ground. Mr. Hodson has done excellent work, which I have much pleasure in reporting.

7. The Khasi path to Therriaghat, which consisted of steep stone steps down the hillside, had also gone, and the people were naturally afraid to descend the bare slopes, down which landslips were of constant recurrence. The rainfall, I may mention, between the 20th June and 1st July was 42.77 inches. On no day did less than 1 inch fall, and on two days between 7 and 8. Mr. Rita was instructed to reopen communication by paths with the plains, and with such villages as Laitkynsew, which were temporarily cut off, and to get up local supplies from Bholaganj *via* Therria, and also to arrange for bringing up the rice which had been ordered from Sylhet. Refugees from Shella, Nongwar, and the villages in the valley commencing below Tyrna had either taken refuge on the small Laitkynsew plateau above Shella and Mustoh, or had, as the Tyrna people did, encamped at Maomlu on the western verge of the Cherra plateau, and were afraid or unable at first to revisit the sites of their villages. Many of these people were in want of temporary assistance, which was afforded them by Mr. Rita, who has done excellent work under great difficulties. I advanced Mr. Rita Rs. 2,000, Rs. 200 of which were given to the Revd. Mr. Williams, of Laitkynsew, with some maunds of rice for distribution to the poorest of the refugees on the Laitkynsew plateau from Shella and the War villages. Indiscriminate relief has in no case been given, but the rice was sold under Mr. Rita's supervision at a fair rate to those who cared to purchase it. There has, however, been very little actual distress, as I can personally testify, and I am borne out in this by Mr. Hodson, who made an expedition to Shella and the War villages in the beginning of July. Individual instances, of course, there were, as I ascertained when I went to Cherra in the second week of July, and during my recent visit to Laitkynsew, Shella, and Nongwar.

8. Mr. Hart, Assistant Commissioner, was deputed to visit Sohiong, Mairang, Normai, Nongkhlaw, and the adjacent villages, 40 to 50 miles west and north-west of Shillong. He returned on 17th July. The loss of life was small, but the damage done to roads, bridges, and all *pucca* houses was great. The mission stations and churches at Maoflang and Mairang were destroyed, also the houses of the Seim of Nongkhlaw at Mairang and Nongkhlaw. All rest-houses between Maoflang and Nongkhlaw and Nongstoin were also destroyed.

9. The failure of the water-supply and the homeless condition of the great majority of the population, European and native, together with the enforced suspension of the usual sanitary arrangements owing to the collapse of bridges and destruction of roads in the town, rendered extra precautions absolutely necessary for the safety of the public from the outset. A few days elapsed before the municipal carts could go round, and it was mainly with this object that I pressed for the erection of the pile bridge across the Umkra below the station, in order that the trenching grounds might be reached by cart. In the meantime trenches were dug, and every effort made to secure adequate sanitation under the personal supervision of Dr. Campbell, the Civil Surgeon, and Mr. Corkery, Assistant Secretary, whose services were placed temporarily at my disposal by the Chief Commissioner, both of whom have worked indefatigably and untiringly ever since the earthquake. It has been largely due to their efforts that there has been no outbreak of epidemic disease. There has been much unavoidable sickness in the form of influenza, fever, and bowel-complaints, due to exposure in the very wet weather which succeeded the earthquake till towards the end of June, since when there has been an almost unprecedented drought for the time of year. Among workers in the cause of sanitation, I would also name Babu S. C. Das, Municipal Commissioner and Superintendent of my office, who has worked with a will, and who, from the evening of the 12th June, has shown to my personal knowledge much courage and resource in a time of great difficulty.

10. A table is appended giving the mortality in all villages where deaths have occurred so far as is known up to date, and the greatest care has been taken to secure accuracy as far as possible. The largest actual number of deaths naturally occurred at Shella with its dense population, viz., 117, but the villages which suffered the most in proportion were Laitiam (86), Nongwar (59), Sohbar (24), and Rangtama (17). Nongwar has been referred to in Mr. Hodsor's report; Laitiam, Sohbar, and Rangtama did not come within the scope of his enquiry. The Seim of Cherra reported 31 deaths at Cherra; of these, 28 occurred in the village of Cherrapunji, one on the road to Therria, one on the road to Laitkynsew, and one in the coal-mines. There are 78 villages in the Cherra Seimship, which has suffered pretty severely. I will refer to some of them in detail.

Laitiam, 86 deaths.—The village of Liam or Laitiam is situated in a deep valley almost directly below the famous Maosmai falls in a *cul de sac* formed by the Maosmai cliffs on the north and almost vertical hillsides on the west and south-west. It can be seen well from a point on the Cherra-Therria road, 3½ miles from Cherrapunji, where the road passes within a few yards of the verge of the precipice lying some 2,500 feet below on the bank of the Liam, a mountain torrent. The green hillocks surmounting the vertical sandstone cliffs of the falls have been shot over, so that now there is a long red landslip extending for about a mile horizontally from near the village of Maosmai along the top of the cliffs to the eastward. The western and greater portion of the village of Laitiam was overwhelmed by this shower of loose earth, which must have been dislodged almost instantaneously. A similar phenomenon occurred at Laoshainai, further up the deep gorge which runs from near Therria to Dumpep, 17 miles from Shillong, which has resulted in forming a fine cataract by the denudation and exposure of precipitous cliffs of sandstone. Fortunately, there was no village below. The census of 1891 gives the number of houses as 50 with a population of 217. The people are, strange to say, still encamped about half a mile from the village on lower and more level ground. The number of houses is said to have been 65. Being a village of the Cherra Seim's, the people are not Government raiyats, and do not pay house-tax. This would give a population of about 260, at 4 persons per house, the usual rate, of whom one-third have perished. The names of the 86 persons killed have been recorded on the spot—28 men and 22 women, and 19 boys and 17 girls under 12 years of age. The betel-nut and orange groves belonging to the village and situated lower down the stream, have not been seriously damaged. To the 86, 1 woman killed at Sohbar should be added.

Sohbar, 24 deaths.—This includes 1 woman belonging to Laitiam. The village site has been abandoned, and the people are encamped on the slope of the hill near Therria. The village contained over 200 houses.

Rangtama, 17 deaths.—This is a small village of 6 houses, on the slopes of the hills opposite Serrarim. These 17 persons—5 men and 4 boys, 7 women and 1 girl—were killed at their cultivation at a place called Umnup; only one man, U Shiat by name, escaped. They were all Rangtama people, with temporary cultivation and huts at Umnup. This village belongs to the Seim of Cherra, who returned 21 deaths from Ksei village. As a matter of fact, only 4 persons—2 women and 2 men—were killed at Ksei. I instance this in order to show the difficulty of obtaining accurate returns from the chiefs of these semi-independent Native States, all of whom have treaties with the Government of India. From enquiries made personally, I found that 31 persons from Ksei are encamped at Rangtama, and that the Seim returned the deaths as deaths at Ksei, because 3 men belonging to Ksei brought him the information. To give another instance, the Seim reported 20 deaths from village Shyntiang. His report is dated 12th July. I received it on the 19th, and had enquiries made at once by Sub-Inspector Job Solomon, Khásia, a well-educated and most intelligent officer. As a matter of fact, only 2 deaths—1 man and 1 woman—have occurred at Shyntiang, which has 18 houses, but the Seim has included the deaths which occurred at Kdait, Warbab, and Kohiar villages, and even then he is inaccurate. The villages, however, may be considered as the Shyntiang group, as they are within a mile or so of each other. *Warbah* is a village of 15 houses. There were 10 deaths—5 women, 1 man, 3 boys, and 1 girl under 12; all killed in their fields by landslips. The houses collapsed, but no one was killed in the village. The survivors have removed to a hill-top at Maophari, about half a mile from the old village site.

Kdait, 2 houses.—Eight persons—4 women, 2 girls, 1 man, 1 boy, members of the same family—were killed in their houses by a landslide. The survivors are at Maophari.

Kohiar, 8 houses.—Eight deaths, killed in their fields—5 men, 2 women, 1 girl. Survivors at Maophari, about $1\frac{1}{2}$ miles from the village site. Rangtama, Ksei, and the Shyntiang have no permanent cultivation, but rely on their millet, job's-tears, *kochu*, and yams.

Maomang.—The same is true of this village, 30 houses. Eight deaths—3 men, 3 boys, 2 girls. Killed in their millet fields by landslips. The children were between 10 and 12 years of age. The houses which collapsed have been repaired, and the old village not abandoned.

Kongthong is a large village of 63 houses. Only two women killed in the fields. The houses have been repaired and the village site adhered to.

Pydei, 20 houses.—Only 2 deaths. The same remarks apply.

These villages lie in the deep valley of the Wah Ru between the Nongkredem, Thanjinath ridge, and the central ridge, which, commencing at Suair, runs south, opposite to and beyond Cherrapunji, and is divided from Cherrapunji by another deep valley, which ends at Dumpap and Suair. The position is well shown on the map which I annex to the report.

Cherra coal-mines.—Seventeen persons were killed in the coal-mines near Cherrapunji, of whom one only belonged to the village of Cherra. The other 16 belonged to the village of Maosmai, where only one death occurred actually in the village, though 10 persons were killed on the road coming up from Therria. The coal-mines, which were worked by the Khásis themselves, are situated in the range of hills about 2 miles to the south of the village of Cherrapunji and between it and Maosmai. They are entered on the southern face of the hill near the top by tunnels driven through it and ramifying inside. The workings are of no great extent, and entirely unscientific. The roof, which is of sandstone and high enough at the entrance to admit a man erect, rapidly diminishes in height, and is either unsupported or feebly supported by beams, and in places by columns of coal left for the purpose. It is easy to understand how the workers, under such conditions, were buried by the collapse of the roof and feeble supports.

The difficulty of obtaining accurate statistics from these remote valleys at this time of year, when the rainfall, as is well known, is the heaviest in the world, is accentuated by the unwillingness of the people to afford information, and the utter apathy of the rulers of the petty States whose subjects are concerned.

Jaintia Hills, Khyrim, Nongstoin and other seimships.—The Jowai subdivision has suffered little so far as loss of life is concerned. Mr. Rita, who is now on tour there, reports only 14 deaths up to date. The Rambrai Seim in the remote north-west corner of the district reports 15 deaths from his State. The Nongstoin Seim reports 10 deaths from Nongsingriang, south-west of Nongstoin, which is 60 miles west of Shillong. His State extends for another 60 miles up to the river Someshari and the Gáro Hills boundary on the west, and for a similar distance to the extreme south-west

on the borders of Mymensingh. There are no roads and no bridges beyond Nongstoin, and the country, which consists of forest and bamboo jungle, is intersected by considerable rivers, which are only fordable in the cold weather. I do not, however, anticipate that there has been much loss of life among the sparse Gáro population in this quarter, or in the adjoining State of Rambrai. I will, however, proceed to Nongstoin and make enquiries, as soon as possible, as regards that State and the small State of Langrin. Mr. Hodson is now enquiring into the mortality, but more especially into the condition of the people in the comparatively accessible State of Maharam, where between 30 and 40 deaths are said to have occurred, and some distress is alleged to exist on the authority of a local Khási pastor, U Amirkha. He has since returned, and reports 52 deaths and no distress worth the name.

The Chief of the Khási State of Khyrim, which extends across the hills from the borders of Sylhet to the districts of Kámrúp and Nowgong, in the Brahmaputra Valley, has returned 146 deaths distributed over 36 villages, mostly situated in the deep valleys or on the steep slopes of the southern hills. Enquiries have been instituted with regard to all villages, commencing with those which show a death-rate of 8 and over. The villages are spread over a wide and difficult area. The seim has only now furnished the information, after he had received repeated written requests on the subject. In no village, however, have more than 11 deaths occurred. Nohwet and Nongshken report 11, Nongmaolam 9, and Maolat and Liting 8 each.

Shillong.—In Shillong station and cantonments, there were 27 deaths. This does not include the deaths of Mr. McCabe, Inspector General of Police, and of Mr. Rossenrode, a Government pensioner, killed by the fall of his house at Upper Shillong.

11. The station of Shillong is accessible, firstly, by cart-road from Gauháti, 63 miles distant, on the Brahmaputra. Secondly, from Restoring communications. the Sylhet district by a cart-road, which extends as far as Cherra, 33 miles distant, whence Therriaghat at the foot of the hills, 10 miles distant, is reached by a paved bridle-path. From Therria to Companyganj, where boat carriage is available throughout the year, a distance of 8 miles is, or rather was, covered by the Companyganj-Therria State Railway. Thirdly, from Jaintiapur in Sylhet to Jowai, 25 miles, and thence to Shillong, 33, total 58 miles, not traversable by carts. It was, therefore, clearly necessary to re-establish communication by the only through cart route. Fortunately, the Gauháti road was not very seriously damaged up to Nongpoh, 30 miles from Gauháti and 33 from Shillong, though this was not known for some days. Up to Nongpoh the road was very speedily put in order by the Executive Engineer, Mr. Watts, working up from Gauháti. Working from the Shillong end, a pile bridge was thrown across the Umkra, above the iron bridge destroyed by the bursting of the Ward Lakes, by Captain East, B.A. This rendered cart communication possible by a *kutchá* road joining the Gauháti road beyond the large bridge destroyed by the earthquake. Captain East with great promptitude reopened the road from mile 61-60 down to Borpani at mile 54 by the 29th June for cart traffic. The damage done, however, between mile 36 and mile 54 was immense, every bridge having collapsed, while at mile 37 a landslip of loose sandy soil undid the work done in the day, at night. The main difficulty, however, was want of labour. In the low hills locally known as the "Bhoi" country, villages are few and scattered. The scanty road-side population is not indigenous, and will not work except under compulsion. The Khásis of the hills do not care to work in this *terai*, nor do Khási contractors during the summer months. As a rule, the Mikirs and half-bred Khásis within hail are sufficient for ordinary repairs. It was, therefore, a fortunate circumstance that, under the Chief Commissioner's instructions, I had collected a transport corps of local men at Nongpoh and Nya Bungalow, whom I was able to place at the disposal of the Public Works Department officers. On the 28th June, I walked with Mr. Sweet, Executive Engineer, to Umsning, 18 miles from Shillong, and met there Lieutenant Playfair, who was working as transport officer under me, and arranged for the transfer of some 200 transport coolies whom I had got together to the Public Works Department, as well as that of some 70 other coolies collected by Inspector R. B. Sen under my orders from Mardon and other villages. I returned to Shillong in the afternoon of the 30th June, having proceeded down to mile 36, where wheel traffic was congested.

The road was open to Shillong for carts and *tongas* on the 8th July. The difficulty had been labour, but when this was overcome, Mr. Sweet with his usual energy very rapidly arranged for through traffic from mile 36-37 to the point where he was met by Captain East's party. It will, however, take months before the Shillong-Gauháti road is restored to its former condition.

12. The damage done to Government property throughout the district is enormous, while the damage to private property everywhere, and in Shillong in particular, is incalculable. It is no exaggeration to say that the station of Shillong has been entirely destroyed, so much so that, in my opinion, before any steps are taken to rebuild it, or to spend lakhs on re-erecting Government buildings, it is a question for most serious consideration whether the new station should not be erected on the extensive plateau which commences at the 5th mile on the Cherrapunji road, and where it was originally intended to be placed. The present station lies in a hollow 1,000 feet below, with a further drop of 1,500 feet, which commences 3 miles to the north, on the Gauhati road. The advantages of the plateau as regards increased area for building and climate are obvious, while it is a matter of notoriety how the existing station is crowded round with and dominated by native *bustis*. These matters need not be dilated on, but what I wish above all to lay stress on is the fact that the removal of the site would considerably increase the facilities for communication with the plains of Sylhet. A scheme was recently on foot for a railway to Nongjuri and Shella at the base of the hills and its ultimate connection by a line to Shillong *via* Thanjinath and Laitlyngkote. This scheme is certain to be revived as soon as the present scare is over, and the wisdom of having a terminus 6 or 7 miles or even nearer Sylhet, and a terminus which does not involve a further descent of 1,000 feet after the plateau, which must be traversed, is reached by a railway, is beyond all question. From mile 5 to mile 13 on the Cherra road below Laitlyngkote the country is much on the same level, or with very easy gradients. To put the matter briefly, if Shillong is rebuilt on the present site, I doubt whether the branch line of railway will ever be made, whereas if the station is rebuilt on the plateau, avoiding the 5 miles' declivity of 1,000 feet at the end, I look upon the construction of a railway from the Sylhet plains as a matter of course in the very near future. Under the circumstances, when the rebuilding will, in any case, cost Government an enormous sum, and when the advantages of a site at no great distance are so incontestable, the question, as I have said, in my opinion, deserves the fullest consideration. As a base for supplies, Chhatak, which is so much closer to Calcutta, is infinitely preferable to Gauhati with its 63 miles of hill road. The chance is one not to be lost, and will never occur again. All the Government buildings in Shillong have been levelled with the ground in common with every single stone masonry or *pucca* building in the place. The photographs which have been taken will, however, as regards Shillong, give a far better idea of the absolute destruction wrought than any mere description in words. I have already referred to the Gauhati road, which was rendered impassable for nearly a month by landslips and broken bridges. I have been over nearly the whole of the Cherra road more than once. It will require entire reconstruction for at least 5 miles on the whole length up to the village of Cherra. From 17½ to 22½, where it passes along the edge of the great valley commencing near Dumpep on the watershed of these hills and extending below Cherra to Therria, it has slipped down the *khud* in many places and totally disappeared. The fragments which remain can no doubt be utilised in some instances, and the road, where the outer face is impracticable, carried along the old route at the back of the hill-tops.

The bridges on the bridle-paths to Nongstoin and Nongkhlaw *via* Mairang have collapsed, and the paths, which are paved in steep places on account of the heavy rainfall, are covered with landslips. The old Cherra route *via* Maoflong (to which place there is a cart-road, 14 miles in length, not seriously damaged), has collapsed badly on both sides of the Bogapani (Shella river), a descent and ascent of 1,500 to 1,800 feet, but the old suspension bridge is standing; also the old stone arch bridges. This road joins the Cherra cart-road at mile 23. On the Cherra cart-road the only bridge standing is the stone arch bridge at the 10th mile from Shillong, which rests on solid rock, and is, I believe, the largest bridge of its kind in Assam. The Maoflong *dāk* bungalow and the six rest-houses to the west, towards Nongstoin and Nongkhlaw, have collapsed. The mission buildings, churches, and schools at Maoflong, Mairang, Nongrimai, Nongkhlaw, Shella and Cherrapunji, have all been destroyed.

Cherrapunji.—At Cherrapunji the fine old circuit-house and *dāk* bungalow, the police station, and all the old ruins of the houses built when Cherra was a military station are levelled with the ground. All *pucca* houses were destroyed in the village, also the mission school, church, the excellent hospital, and the missionaries' houses. The Seim's niece and heiress was killed in his house. The cart-road from mile 31-32 round the *khud* on the outside of the village has slipped down with part of the hill above. The massive obelisk in memory of David Scott, Agent to the Governor General on the North-Eastern Frontier, who died in 1831, a structure some 50 feet in height, has lost its top, though the blocks of stone were rivetted together with iron bars. The three enormous pieces of hewn sandstone which form a tier of the base, each some 4 feet wide, 12 feet

in length, and at least a foot in thickness, have been driven apart some inches in spite of the prodigious weight of the superincumbent mass, which, though apparently *in situ quo*, has been shifted 6 inches. The marble tablet is uninjured.

Jowai, Jaintia Hills subdivision.—The only Government building which stood the shock well was the dák bungalow. The court-house will have to be rebuilt. The military block-house and police lines collapsed entirely, also the mission chapel, mission bungalow, and school. No one was killed in Jowai town, and, on the whole, the subdivision escaped comparatively well.

The Shillong-Jowai road, which is a steep paved bridle-path in places, was damaged, notably between miles 5 and 7 near Shillong, miles 19 and 20, and again near Jowai, where there is a steep descent and ascent, miles 29 to 33.

The missionary buildings at Shangpung and Raliang, 12 and 15 miles north-east of Jowai, on the Kopili bridle-road, were also damaged, as was the Kopili road and small bridges, but apparently the earthquake died away in this direction and towards North Cachar. Mr. Rita reports only 14 deaths in the subdivision to date. I may add that the Jaintia Hills which project to the east of Jaintiapur on the confines of Cachar, and which can be well seen from Cherra, showed small signs of landslips on their western face.

13. I have alluded generally to the loss incurred by the Welsh Mission, which has done much excellent work in these hills for over half a century.

Losses of the Welsh Mission. The missionaries' houses, their schools and churches at all mission stations, as well as their admirable hospitals at Jowai and Cherrapunji, have been entirely destroyed. The total loss has been estimated at from £10,000 to £11,000, and I do not believe that the amount is overstated. The Mission Church in Shillong cost from Rs. 13,000 to Rs. 14,000, the schools in Shillong Rs. 10,000, while the three mission bungalows cost some Rs. 18,000. At Cherrapunji, the mission buildings must have cost between Rs. 45,000 and Rs. 50,000. There were two bungalows, two stone school-houses, a large hostel for students, a hospital and dispensary with houses for poor out-door patients, and a very large church which accommodated a thousand people. At Jowai, the buildings are estimated to have cost Rs. 30,000. There was a very fine hospital and a large church, also school buildings and two bungalows. At Shangpung, 12 miles from Jowai, there was a large bungalow, a church, and school buildings. In the Khási Hills portion of the district, there were bungalows and churches at Maofang, 14 miles west of Shillong, Mairang, 30 miles west, Nongrimmai, beyond Mairang, and also at Laitkynsew and Shella to the south-west. In many of the outlying villages there were stone and iron-roofed church buildings, which must have cost a considerable sum, for instance, at Sohbar, Maomluh, Maonai, Myllim, Maolai, Umsaw, and other places.

There has been great loss among the Khásis of the better class in Shillong, Jowai, Cherra and elsewhere, among whom the mission has numerous converts, a class who, though far from wealthy, staunchly supported the mission. These persons have, in many instances, lost their all. In any case, it will take years for the mission to recover its former position, even though it is liberally subsidised by the generosity of its supporters in Europe and elsewhere.

There has been much sickness, not only in Shillong, but throughout the district, due to exposure and an unhealthy season, and great assistance has been rendered by the mission in dispensing medicines to the sick.

As regards the Roman Catholic Mission, which is of much more recent date and whose operations are far less extensive, considerable loss has been occasioned by the destruction of buildings in Shillong.

14. In my tour through the district, I have been much struck by the way in which the ancient Khási monoliths, often of immense size, the antiquity of which is unknown, have been levelled with the ground, and in many cases snapped off two, three, and four feet from their base. It would possibly give people in England an idea of the severity of the shock, were the Druidical stones at Stonehenge and Stennis in Orkney similarly overthrown or broken in two.

15. From a long and elaborate report submitted by Mr. Rita, who came in to Shillong from Jowai on the 15th, and went straight on to Cherrapunji on the 17th, and remained there on special duty for about a month, and from my personal observations and those of Mr. Hodson during his tour among the villages in the valley below Laitkynsew, I have no doubt whatever that the measures taken for the relief of any temporary distress which may have existed were amply sufficient. There was no distress except in individual cases, and arrangements were made to cope with this by the distribu-

tion of rice to persons in real need by Mr. Rita and the missionaries at Cherra and Laitkynsew. While at Cherra between the 11th and 14th July, I visited Maosmai and Maomlu, where refugees from the valleys below were encamped. I came across one genuine case of a family at Maosmai, and Mr. Rita had previously dealt with a few others. The total quantity of rice imported from Sylhet was 100 maunds, and 53 maunds were purchased locally at Bholaganj Bazar near the foot of the hills; 140 maunds were brought up to Cherrapunji, and the balance, 13 maunds, sold at Therriaghat.

16. No damage to speak of has been done to the crops in the interior of the hills, either in the Jowai subdivision, where there is a considerable area of permanent rice cultivation under the plough, or in the Khási Hills, where plough cattle are not used at all, though there is much similar cultivation in the valleys in the interior, particularly at Sohiong, Mairang, Kanchi, Maokarsa, and Umiap near Nongstoin. Mr. Hart reported that there was perhaps 20 to 25 per cent. damage near Mairang, but that the crops were doing well when he went there in July. I know the cultivation here well. I have been over every inch of it, and feel sure the damage is exaggerated. I could find no damage at Myllim, 10 miles from Shillong, on the Cherra road, where there is considerable cultivation of rice, nor on the road between Gauhati and Nongpoh. There has been an excellent potato crop, and the crops of job's-tears, millet, and *sohplang* are excellent throughout the central plateau in all villages visited by me. Millet (*U Krai*), however, is a crop which is very largely grown on steep hillsides, and gathered in November. It has suffered accordingly in the landslips, particularly on the range opposite Cherra and on its eastern slope, and again on the slopes below Nongkredem on the range beyond down to the Wah Ru. I have alluded to this above in my remarks regarding Rangtama, Ksei, and the villages in what I have designated the Shyntiang group. Mr. Rita reports no damage from the "Bhoi" country in Jowai, nor is it likely that much damage has been done in the Mikir and Kuki *jhúms* in any part of the Jowai subdivision. The same is true of the western hills beyond Nongstoin, which I traversed from east to west and north to south last cold weather. The Gáro and Migam *jhúms*, I am sure, have not suffered to any appreciable extent.

The millet cultivation referred to above is not permanent. Crops are grown for one or two seasons on steep hillsides, the brushwood on which is cut and then burnt. The hillsides, which are excessively abrupt, are thus denuded, with the result that landslips are by no means of infrequent occurrence. Mr. Hodson has described the damage done to orange groves and betel-nut plantations in the area he visited, and has stated that it is, as a rule, very much exaggerated. This is the fact, though individual owners and families have in some instances, as stands to reason, had their groves largely, if not entirely, destroyed. The groves belonging to Sohbar have been little damaged, as they are below the village near Therria. The Wahlong and Therria groves have escaped, and much of those belonging to Laitiam. Further enquiries will, of course, be made as the season progresses. The Shella people were always exceptionally well-to-do and, as a whole, by far the richest community I have come across in Assam. Rice was on sale at Cherrapunji and Therria for about a month, and the balance imported had to be disposed of at a loss. Sirdars of villages would not buy it at Rs. 7 and Rs. 8 per maund, cost-price of importation, although they were offered four months' credit. They wanted it on credit at Rs. 6. Laitkynsew and Shella are only 9 and 12 miles from Cherra. The fact that rice was available was widely notified. As I have said before, I do not believe that there was any actual distress among the great majority, except for a few days at the outset, and this was unavoidable in the general débâcle at Cherrapunji and Shella and the neighbouring country side after the earthquake of the 12th of June.

17. In conclusion, I have the honour to annex a map of the southern hills, which gives my route and Mr. Hodson's, as well as the names of places visited by us in the course of our tours and referred to in this report.

APPENDIX.

Statement showing the Number of Deaths caused by the Earthquake of the 12th June 1897.

Name of place.	Village.	Number of deaths.		Total.	Total in each place.	Remarks.			
		Male.	Female.						
1	2	3	4	5	6	7			
1. Shillong station	European quarters ...	1	1	2	23				
	Upper Shillong ...	1	...	1					
	Police Bazar ...	5	2	7					
	Secretariat Press ...	10	...	10					
	Leban ...	...	1	1				
	Mawkhar ...	...	1	1				
	Garikhana ...	...	1	1				
	Cartonment ...	Regimental lines ...	3	3			6		
	2. Cherra	Cherrapunji ...	9	22			31*	6	* Includes 1 killed in the coal-mine.
		Tyrngai	1			1		
		Nongsteng ...	7	5			12		
		Keei ...	2	2			4		
		Rangtama ...	9	8			17		
		Umjet ...	3	2			5		
Wah Sohra ...		2	2	4					
Kongthong ...		...	2	2			
Thied-diing ...		1	1	2					
Tynglang ...		1	1	2					
Umsohmat ...		4	2	6					
Mawpuabnih ...		2	4	6					
Khrong ...		1	...	1					
Mawlyndiar ...		...	1	1			
Laitmawiang ...		...	2	2			
Laitlyndop ...		1	...	1					
Mawshnit ...		...	1	1			
Mawrela ...		...	1	1			
Byngimawsaw ...		...	1	1			
Shyntiang ...		1	1	2					
Kobiar ...	5	3	8						
Warbah ...	4	6	10						
Kdsit ...	2	6	8						
Pydei ...	2	...	2						
Bymmai ...	2	...	8						
Manbrin ...	...	1	1					
Umkut ...	...	1	1					
Laitiam ...	47	39	86						
Mawpat ...	1	1	2						
Carried over ...	123	131	257						

APPENDIX—continued.

Name of estate.	Village.	Number of deaths.		Total.	Total in each estate.	Remarks.
		Male.	Female.			
1	2	3	4	5	6	7
	Brought forward ...	126	131	257		
2. Cherra—contd. ...	Sohlywai ...	2	3	5	248	
	Laitsophiab ...	1	...	1		
	Japtyngao ...	1	...	1		
	Maomang ...	6	2	8		
	Lympuugsir ...	2	4	6		
	Maulat ...	3	5	8		
	Wahlekhiat ...	1	4	5		
	Nongryngkoh ...	...	5	5	
	Nongkynrih ...	3	2	5		
	Nongkrodem ...	3	3	6		
	Baongplang ...	2	...	2		
	Ryugi ...	...	2	2	
	Liting ...	...	8	8	
	Nobwet ...	4	7	11		
	Nongthymai ...	...	1	1	
3. Klyrim ...	Nongphiang ...	2	...	2		
	Shiliangjasbar ...	4	3	7		
	Sohlait ...	1	3	4		
	Nongakhen ...	6	5	11		
	Nongtymang ...	6	...	6		
	Nongmawlan ...	3	6	9		
	Nongkyntiatrau ...	3	4	7		
	Nonghakai ...	1	...	1		
	Nongpriang ...	1	3	4		
	Nongmawlyadan ...	...	1	1	
	Mynriang ...	1	6	7		
	Shabongpohriat ...	1	...	1		
	Mawkyrnat ...	...	6	6	
	Shatwit ...	...	2	2	
	Masar ...	1	1	2		
	Wahkhen ...	3	1	4		
	Myllat ...	1	...	1		
	Nongblai ...	1	2	3		
	Shutim ...	1	1	2		
	Mawlyngkneng ...	1	...	1		
Keshrymu ...	1	...	1			
Umphreop ...	1	...	1			
Manouna ...	2	1	3			
Umriah ...	1	...	1			
	Carried over ...	196	222	418	146	

APPENDIX—continued.

Name of estate.	Village.	Number of deaths.		Total.	Total in each estate.	Remarks.
		Male.	Female.			
1	2	3	4	5	6	7
	Brought forward	196	222	418		
4. Myllim	Sadu	8	...	3	20	
	Malki	4	1	5		
	Nongbysap	2	...	2		
	Umyngka	2	...	2		
	Nongumlong	1	...	1		
	Myllim	2	1	3		
	Mawpun	2	...	2		
	Umyngar	...	2	2		
5. Maharam	Rangthong	1	...	1		
	Ngunraw	1	1	2		
	Nongbaw	1	3	4		
	Nongkynbah	3	4	7		
	Raibah	1	1	2		
	Umtypu	...	1	1		
	Nongam	5	9	14		
	Nongtwah	1	...	1		
	Phodjand	2	2	4		
	Mawtyngam	1	...	1		
	Mawpud	1	1	2		
	Dom-mawlein	4	2	6		
	Jokrem	1	...	1		
	Diwa	...	2	2		
	Umkinsang	...	1	1		
Plaukatinam	...	1	1			
6. Nongklaw	Umsao	1	1	2		
	Mairang	...	1	1		
	Mulong	...	1	1		
	Binter	...	1	1		
	Kenchi	1	...	1		
	Naogun	...	1	1		
	Mautangiar	1	...	1		
	Merten	1	...	1		
	Laitkynsew	15	4	19		
	Nongsangrieng	4	7	11		
7. Nongtoin	Nongdamak	1	...	1		
	Nongjerang	...	...	...
	Maodum-dum	1	...	1		
	Maskwin	1	2	3		
	Carried over	260	272	532	16	

APPENDIX—continued.

Name of estate,	Village,	Number of deaths,		Total,	Total of each estate,	Remarks,
		Male,	Female.			
1	2	3	4	5	6	7
	Brought forward ...	260	272	532		
8. Mariaw	...	3	5	8	8	
	Mawwanang ...	2	5	7		
9. Rambrai	Synnia ...	1	2	3		
	Umjand ...	...	1	1		
	Mawdoh ...	3	1	4	15	
	Pynlang ...	...	2	2		
10. Maciong	Nonglait ...	...	2	2		
	Pariang ...	1	...	1		
	Umken ...	1	...	1	6	
11. Bhowal	Photremang ...	1	...	1		
	Tinbiang ...	1	1	2	3	
12. Maosyuram	Syntien ...	2	3	5		
	Maosynram ...	1	1	2	?	
13. Malai	Sohmat ...	3	4	7	7	
	Shella ...	55	62	117		
	Mastoh ...	2	2	4		
	Nongwar ...	24	35	59		
	Nongbah... }	1	3	4		
14. Shella circle	Luzteng ...	...	...	...
	Umtalong ...	1	2	3		
	Ramnong ...	...	1	1		
	Nongtrai ...	4	7	11		
	Dewasaw ...	4	6	10		
	Tynger ...	5	5	8	217	
15. Mauphlang	Mauphlang ...	...	1	1	1	
16. Marbisu	Marbisu ...	5	4	9	9	
17. Maosmai	Maosmai ...	10	17	27*	27	
18. Maolong	Ummal ...	5	5	10		
19. Ramdait	Ramdait ...	2	...	2	10†	
20. Tynroeg	Tynrong ...	1	2	3	2	
					3	
21. Mynteng	Mynteng ...	1	3	4		
22. Tyra	Remkindesaw ...	3	1	4	4	
23. Nongkroh	Nongkroh ...	2	5	7	4	
24. Maodon	Maodon ...	2	3	5	7	
25. Senai Nongeloid	Nongeloid ...	2	...	2	5	
26. Dewara-Nongtyrmen	Dewara and Wading ...	1	3	4	2	
	Carried over ...	407	466	873	4	

* In coal mines. 15 in village. 1 Thieria road 10

† Including 1 died since no deaths at Maciong.

APPENDIX—concluded.

Name of estate.	Village.	Number of deaths.		Total.	Total in each estate.	Remarks.
		Male.	Female.			
1	2	3	4	5	6	7
	Brought forward ...	407	466	873		
27. Sobbar	Sobbar ...	18	6	24		24
28. Nongjiri	Nongjiri ...	3	2	5		5
29. Jaintia Hills sub-division.	Jowai ... Pamtdong ...	1	...	1		
	Nongbareh ...	1	1	2		
	Amkoi ...	2	...	2		
	Nongtalong ...	2	1	3		
	Nongtalong ...	3	1	4		
Darrang ...	Darrang ...	1	1	2		14
	Grand total ...	433	478	916		

Report by T. C. HODSON, Esq., I.C.S., Assistant Commissioner, dated Laitkynsew, the 19th July 1897.

I have the honour to report that, being at Barisal, Backergunge, Eastern Bengal, on the 19th June, I received orders to proceed without delay to Sylhet, where I arrived on the 23rd June. I was there met by a telegraphic order to go to Cherrapunji, where late on the 28th June, I received a telegram from you ordering me to Laitkynsew to enquire into the mortality at, and present condition of, Shella and the neighbouring hill villages. I remained at Cherra till the morning of the 30th June, as I had reason to expect ampler orders and instructions from you by letter. I left Cherra on the 30th, travelling to Laitkynsew by the bridle-path as far as Mamluh, and thence by Khási paths. The bridle-path seemed to need only very slight repairs, while the Khási paths are, with the exception of a small portion, not more than three-quarters of a mile in length above Tarna, in excellent order. The portion which I have excepted is steep, narrow, and dangerous. Landslips on either side extend to the bottom of the valleys. Measures have been taken to render this as safe as possible.

2. The village of Laitkynsew, which I made my headquarters, is situated in a small plateau with gentle slopes to the east and south, and severe slopes on the west and north. It is, I gather, under the Scim of Nongkhlaw. The inhabitants supported themselves by work in the lime-quarries of Shella, which are, I hope, only temporarily closed to them. They do not own orange or *sufari* groves, nor do they cultivate any cereals to an extent worth notice. They are hardy, and, with a little practice, should become good workers at road repairs. The mortality* in this village was 19—15 men and 4 women; the men were killed while at work in the limestone quarries, while the women met their deaths either at or on the road from Shella. On the 1st instant, just as I was starting for Shella, I received demi-official letters from yourself and the Chief Commissioner, containing ampler instructions and valuable information. I did not go by the bridle-path, as I had been led to believe that it had been completely destroyed. At a later date I went down by it and found it to be almost uninjured. Although I recommended the sub-overseer to leave the repairs of this path, which is practically of value only to Europeans and the few natives who own ponies, it has been repaired, and is now less passable than before, as the heavy rain has made it in parts a mass of heavy clay. I utilised the Khási path which rejoins the bridle-path a mile above the village of Mostoh. In this village, the loss of life was slight: 4 only—2 men at the Shella lime-quarries, 1 man and 1 woman in the village itself. The

* The same figures were reported by the Scim of Nongkhlaw, to whom the village belongs.

J. C. A.

Mostoh, 1st July.

poorest class earns a livelihood by work in the lime-quarries, while the other classes own extensive, valuable, and almost undamaged plantations of oranges and pineapples to the south and south-west of the village. To the disgust of the people of Mostoh, about

The word is a corruption of 600 people from Shella, accompanied by one wahadadar, the Persian Uhdhadar.

J. C. A. here. About half a mile below Mostoh, I turned from the bridle-path into a Khási path, which traverses slippery limestone rocks, and after a steep climb down emerges above the southern portion of Shella.

3. I was aware that considerable anxiety was felt about this village, which, according to rumour, had slipped bodily into the river. I was much relieved to find that the damage had been much exaggerated, and that the report of 105 deaths is a fairly accurate estimate of the mortality. The village is situated on three slopes, the northern of which suffered most severely. It was covered by houses, many of which were built with stone walls. Possibly, as many as 30, certainly not more (even according to the statements of the residents), of the houses at the base slid into the river. I have seen and questioned some of their inmates whose escapes seem to have been miraculous. Later landslips on the hill and the rise of the river with its deposit of sand account for the destruction of 30 more. This later destruction did not involve any loss of life, as that slope had been deserted on the night of the 12th June. There were one or two houses situated close to the river's edge under the cliffs in the centre. These were destroyed by falls of earth, and I am told 15 persons lost their lives there. The damage in the centre and southern portions of the village is slight, but was much intensified by the fall of houses with stone walls. Had all the houses been *kutcha*, I do not doubt that they would have suffered little or no damage. I estimate that one-fourth of the houses have been totally destroyed, one-fourth are habitable without repairs, one-fourth need slight repairs, and one-fourth are seriously damaged, and need extensive repairs. The business portion of the village, which included the post office and high school, was situated on the west bank of the Shella river. All *pucca* buildings were levelled to the ground, happily without loss of life. The *hát* was held on this side, and a great number of deaths of people from outlying villages occurred on the paths leading from this bazar, northwards, under the cliffs. In the table of mortality appended to this report, I have given one column showing the actual number of deaths in each village, as well as a column showing the number of the inhabitants who lost their lives at the time or in consequence of the earthquake. I think it right to note one curious effect of the earthquake, the evils of which have now greatly diminished. At a point about half way down the village, high waves seemed to form with a periodic interval of about 40 seconds, and when the river was in flood, rose to an alarming and dangerous height. The navigation of the river was, for a time, almost suspended. I thought, and still think, it highly desirable that villagers from outlying places should have easy access to the Shella *hát*, and ordered the wahadadars to supply a ferry boat, which should ply at fixed and proper rates. These gentlemen, although the chosen of the people, seem hopelessly inert, selfish, and incompetent. They have permitted a few boatmen to ply at exorbitant, and to the poorer classes prohibitive, rates. I have ordered them to refund

† Orders were issued by me at Cherra as soon as I heard of this to have a boat put on by the Public Works Department overseer. The wages of the boatmen will be deducted from the royalty on limestone due to the wahadadars. It is the only way to deal with the matter.

J. C. A. to the postal runner the sums extorted from him by these boatmen, who shelter themselves behind the wahadadars.† Mr. Williams, the representative of the Welsh Mission, stationed at Laitkynsew, who has given me a great deal of information on various points, assured me that the horrors of the night of the 12th June were increased by the bands of *budmashes*, who wandered through Shella, looting all they could lay their hands on. The only foundation for this story seems to be that, after the earthquake, Mr. Williams' boxes and almirahs in the ruins of the mission house at Shella were broken open seemingly by persons who knew perfectly well where Mr. Williams was in the habit of keeping money and valuables. My own belief is that the whole community were thinking much more of their personal safety than of their money. I also received from the same source the information that people had rescued their hoards of money, but that their stores of rice had been destroyed by the rain and the *débris* of the houses. The people of Shella own extensive orange, *supari*, and pineapple plantations, many of which are situated in the plains. The rise of the river accumulated a deposit of sand in some of these groves, which need not cause harm if the owners will go and remove it. The community of Shella is a wealthy one, and, though very clamorous, does not, I think, really need extensive help from Government. One-half of the villagers with two wahadadars have gone across the river, and have settled at Lyba and Mowjong. Six

hundred, as I have said, with one wahadadar, have migrated to Mostoi. The remainder are in Shella. I understand that, previous to the earthquake, it had been proposed to move the village elsewhere,* as the present site was found to be excessively unhealthy, but that the darbar had been unable to come to any definite conclusion. In the course of my climbs about Shella, I came across a cavern newly brought to view, some 30 feet deep and extending 40 feet at least laterally under the hill. It exposed massive strata of sandstone cracked, bent and doubled up. Immediately above this was an outcrop of limestone. If such was the formation of the northern hill, I think the landslip is, from a geological point of view, completely explained. The soft friable sandstone, continually weakened by the percolation of rain through the tough but porous limestone, was crushed by the earthquake into pieces. Dealing with the mortality in Shella, I must, I think, point out that, as seems to have been generally the case in these hills, the earthquake was preceded by a low muffled roar, which must have warned many that something out of the common was going to happen. Even from the houses which slid into the river people managed to escape. Only those who inhabited the one or two houses under the central cliffs had no chance of escape. From every side, I heard stories of marvellous adventures and escapes. I, therefore, am of opinion that the account given by the wahadadars is fairly accurate and credible.

4. On the 2nd July I went to the village of Nongwar, from which 60 deaths were reported. At a little distance from Laitkynsew, I passed the place whither the inhabitants of Nongwar migrated. It is a fairly level plain, and should give ample accommodation. The path to Nongwar is, for at least three-fifths of the way, very steep and bad, being over a ridge of hard slippery clay left by the heavy landslips on either side. I met a number of women bringing up very light loads of thatching and other materials for their new houses. Forty-nine persons were killed in or near the village, mostly in the orange groves above the village. About 20 houses were destroyed by a landslip. Here, as in similarly situated villages, the principal destruction of the orange groves took place in the upper parts of the slope. I look upon the hill slopes on the west of Laitkynsew, and also those on the east of the next range of hills, as capable of being divided into three fairly accurately-defined parts. The upper part is steep bare limestone. The central part extends from the foot of this sheer rock and reaches down to the 600 feet level. This portion may be subdivided into an upper area covered with jungle and the lower area cultivated with oranges. From the 600 feet level to the river is a somewhat steeper slope covered with groves of pineapples, oranges, and *suparis*. As I have said, the worst destruction has been in the upper part of the central belt. Where, however, the upper central slope was steep, the landslip has been worse than usual, and has passed unchecked by the jungle, and has swept in places down to the river, but the jungle has, in most cases, proved an efficient protection to the orange groves.

5. From various points along the road, I was able to see the villages of Nonglongkin, Tandrang, Ramdait, Minteng, Tarna, and Nongbah,† the condition of which I will describe when I give an account of my tours of the 6th, 7th, and 8th instant.

6. On my return to Laitkynsew, I saw Mr. Williams, who gave me information derived from teachers, pastors, and members of his communion in the several villages concerning the villages of Nongtraï‡ (11 deaths), Dewsaw‡ (10 deaths), Tandrang, which includes the villages of Umlang, Ramnong, and Nonglongkin (7 deaths), Synten (5 deaths), Dillung and Jatap (no deaths).

7. I stayed at Laitkynsew for the 3rd and 4th, and saw the sirdars of Nongkroh and Ramdait, who reported 6 and 2 deaths, respectively. Through Mr. Williams I received information concerning Lunkin, Nongbah (4 deaths), Tarna (4 deaths), Lunkom (1 death), Tunger, Mausanram, Synnai, Nongkroh, Minteng, Nongreat, Runkindew-saw, Mawlong, and Umwai.

8. On the 5th July, I went to Mawlong and Umwai, by a good and easy Khási path, which crosses four waterfalls and three landslips. None of these is in any way dangerous. I walked for nearly 3 miles through orange groves, which are quite unhurt. A considerable portion of these groves belongs, so I am told, to villagers resident in Nongkroh. No deaths occurred in the villages themselves, but in groves which were situated on the north bank of a small stream and which considerably

* I very much doubt this. The village has been there from time immemorial.

J. C. A.

Nongwar, 2nd July.

† British villages.—J. C. A.

‡ Shella Confederacy.

Halt Laitkynsew, 3rd and 4th July.

Mawlong and Umwai, 5th July.

§ Under Sirdars of Mawlong.

suffered, some 9 deaths occurred. The groves on the south are intact. Some of the inhabitants of these two villages have gone to Maomluh, where they will probably settle for good.

9. On the 6th July, I went to the villages of Nongbah and Lunking. The path turns off to the right through Mostoh, and goes for at least 3 miles through groves of oranges and pineapples, which have met with almost no damage at all. There were no deaths in these villages, but four villagers were killed at or near Shella. There were two landslips near the village, that on the north side reaching the river. Two houses about 80 yards from the river's edge stood on ground which appears to have subsided and to have been covered with sand deposited by the river, which rose to a distance of at least 100 yards from its normal level. I may just note here that the river did not begin to rise till the afternoon of the 13th June. From here I got a very good view of Nongtraï, which seemed unhurt, and Dosaw, where two or three houses had fallen over the cliff.

On the 7th July I went to Nongkroh by a Khási path, which I have no hesitation in calling the worst path in the neighbourhood. Two-thirds of it passes over landslips which are dangerous and difficult to cross. Here and there are outcrops of slippery clay which has all the polish and nearly the consistency of solid rock. There were 7 deaths here, but most of the houses are in really good condition. I noticed in one two very showy portraits of the Kaiser in cheap, gaudy frames, which, I learnt, had been purchased as mementoes of Her Majesty's Diamond Jubilee. The subtleties of European politics are evidently not appreciated in these valleys. There has been considerable damage to the groves in the vicinity of this village on the upper slopes, but, as I have above remarked, the Nongkroh villagers own extensive groves on the east of Laitkynsew. The path from the village to the river is good, and the groves on either side of it quite unhurt. A couple of *supari* trees form a bridge over the river, but I fear that if heavy rain continues, communication with the opposite villages will be stopped, unless a new bridge at some height above the river be erected. I am of opinion that the remains of the old bamboo bridge erected by the Khásis themselves at a height of 20—30 feet above the river could, with a little ingenuity, be utilised. From the river to Ramdait the path, though very steep, is in good condition. The groves of oranges, *suparis* and pineapples show at this height (500 feet) very few signs of damage. From Ramdait I went to Tandrong, which comprises the four villages Tandrang, Nonglongkin, Umlang, and Ramnong; the two former are under sirdars paying house-tax to Government, and the two latter are members of the Shella Confederacy. The path is on the whole good, though steep in parts. I got an excellent view of the west side of the Laitkynsew plateau and the villages of Nongwar and Nongkroh.

The loss of life in Tandrong group is 7, 3 of whom died at or near Shella. The damage to the groves to the south-west is a little serious, locally estimated as 30 per cent. I noticed also one or two fields of miscellaneous cultivation promising well and quite unhurt.

Ramdait is a small village about the 500 feet level, with cultivated groves above, around, and below it, which here and there have been damaged, but not to an alarming extent. There were two deaths here. I passed the night there in somewhat uncomfortable surroundings, and left the next morning for Mirteng, Runkindosaw, Tarna, and Laitkynsew.

10. The path to Minteng diverges from the path to Ramdait at a point about 250 yards from the river, and is fairly good, though steep of course. There were 4 deaths here—2 in the village and 2 missing. The plantations have not suffered severely, though the cultivated area of millet, here quite inconsiderable, has been badly damaged. Recrossing the river, I climbed by a steep, and at places unpleasant, path to Runkindosaw, a village situated on a small spur running south from the main hills. The old village was deserted, but it was never a large place. The inhabitants who have fled—some to Maomluh, some to a site a little higher—were well off. It is under the Sirdar of Tarna. The place selected as a refuge is in the immediate neighbourhood and nearly equidistant from Runkindosaw and Tarna, and is occupied by people from both these villages. The loss of life in these two villages is 4, 3 of whom died at Shella. The loss of orange groves, etc., has not been very great. I rejoined the Maomluh-Laitkynsew track by a path which, though traversing two landslips, is in very fair condition, and thence returned to Laitkynsew. Nongreat, a small village near Minteng, was not visited by me, because no deaths were reported thence. I was very near it, and obtained a clear view

of its position from various points of the path to Runkiadosav. It is situated on both sides of the river and a little above the level, and is thoroughly and efficiently protected by dense jungle and groves above it. Some of the orange plantations on the east bank have been destroyed.

In the evening I saw Mr. Williams, who gave me information concerning Warba (1 death), Mausemram (2 deaths in the road, none in the village), Synten (10 dead, 9 missing), Nongsel (2 deaths), Moupen and Synnae (no deaths).

11. On the 9th I went to Cherra to meet you, as I had received information that you would arrive that day. I halted there till the 13th, when, accompanied by you and Mr. Rita for quite half the way, I returned to Laitkynsew.

12. On the 14th I left Laitkynsew in very bad weather which I did not get away from till I came here (Shillong). I crossed the Shella river without any difficulty, and meeting the limestone check station clerk and the resident pastor of the Welsh Mission, carefully examined these gentlemen on the various points of interest. I have embodied the substance of the information thus acquired in my remarks above on Shella. At Lyba, the village opposite Shella, no deaths occurred, though all *pucca* houses were demolished. The refugees from the other side were able to cross till the afternoon of the 13th June, when the heavy rain produced a high spate. There is a considerable amount of sickness—dysentery and low fever—amongst these refugees, brought on by exposure and cold. The path from Lyba to Dumloh is good. The gradient is nowhere severe, and there is only one landslip to be circumvented. A good deal of the path is on the level, and, like all such paths, is very wet in the rainy season. Dumloh is quite a small place, though now deserted. The houses are good and habitable. The villagers have gone to a site a little lower down and a mile or so away from the old village. The cultivation—potatoes, millet—is uninjured, save in a few cases where the slope of a hill had been put into cultivation. At one place on the path from Dumloh to Mausemram an excellent ladder to surmount a small landslip had been erected by the Khásis themselves. I met some Synnae people, who confirmed the reports I had already received to the effect that no lives had been lost in their village. Driving mist alternating with pelting rain prevented me from seeing anything of the surrounding country. I halted at Mausemram during the 15th, as I suffered slightly from dysentery, brought on by the continual wetting to which I had been subjected. The report concerning the mortality of Mausemram was confirmed. Villagers* from Synten were brought to me, who stated that 5, and not, as one report had it, 19, had perished. People from Malai gave me an account of 7 deaths in their village, while others from Dewara and Wading told me that 4 only had died in their village. I had a conversation with the Seim of Bhowal, whose villages are numerous and very widely scattered. He only knows of 2 deaths in a village named Moupen. The cultivation in all these places has suffered a little. I carefully enquired about relief and help, and was told by a person, who assured me he was the leading *mahajan* of Mausemram, that he and others had subscribed to help their poorer brethren. I presume he meant me to understand that the rates of interest had advanced a little in consequence of the depreciation of the security.

13. I left Mausemram on the morning of the 16th for Maoflong. The paths were very wet, and on account of the heavy rain I am unable to say more than that I passed quite close to fields of paddy, potatoes, and other crops, which promised well and were unhurt. Here and there I came across nice-looking herds of cattle, sheep, and goats grazing on the hills. Some of the smaller streams, ordinarily fordable by stepping stones, were then knee-deep, and in one case breast high. The houses I saw were quite unhurt, and I should think that the mortality on this plateau is singularly slight. I saw outcrops of coal and a Khási dolmen of some size, quite intact, with representation in high relief of the midday sun.

14. I halted for the 17th at Maoflong, and spent the day in arranging my notes and material for this report. I saw the agent of the Seim of Maharam, who told me that Maharam is the name, not of a single village, but of a large area comprising some 20 villages. I, therefore, determined not to make arrangements for a visit to this area till I had seen you.

Shillong, 18th July.

15. On the 18th I came in to Shillong.

16. I have all along tried to keep distinct the enquiry into the mortality and the enquiry into the condition of the country and the people. I am aware that it was at first believed that the mortality in the Cherra hills had been appalling. I have tested, as carefully as I could with the means at hand, the returns, official and private, from the several villages. I have considered the question of the desirability of a census, but I have come to the conclusion that it would be valueless. We are not in a position to know accurately the exact population at the moment before the earthquake. The hill villagers are now scattered far and wide. Some are in their old homes, some are busy with the foundation of new settlements, others who have means to support them have fled to the plains.

General remarks.

All that I am able to say is that the earlier rumours, which obtained a dubious credence, are simply exaggerations. It is not probable that, even if we do distrust the returns, more than 200 died in Shella.*

*One hundred and ninety-eight is the total so far as is known for the 8 villages of the Shella Confederacy. The confusion in the first figures wired by Mr. Rita was due to the wahadadars not reporting the villages separately.

J. C. A.

On the whole, the reports are fairly accurate and trustworthy. To put it briefly, the loss of life began and ended with the earthquake; the damage to property began with the earthquake, but will not end till the cold weather has permanently set in and the rains, which, permeating into crevices formed by the earthquake, are still causing landslips, have entirely ceased.

17. I have had to deal with another question—the condition of the people. Here and there are women in a delicate state of health and children unable to work, who, in my opinion, have a right to help. These persons have obtained temporary relief from Mr. Williams, who received Rs. 200 and some maunds of rice from Mr. Rita. I have arranged that the sirdars of the villages must certify to the absolute helplessness of any applicant before Mr. Williams can consider himself (the trustee for Government in this matter) entitled to give relief. I have done this because I am very unwilling to see a hardy and self-reliant people pauperised or familiarised with the idea of momentary relief. I understand that the poorer Khásis are very poor indeed, and that these three months—August, September and October—are almost always times of distress with them. Those who own orange groves, pineapple plantations, and *supari* trees are well able to do as they had done in former years. Until the limestone quarries are reopened, Laitkynsew and a few Mostoh people will lose their employment. There are many hopeful signs, that they possess great powers of recuperation. The Khásis are remaking broken tracks, rebuilding bridges, holding darbars to consider their position, and are going about their daily work as if nothing had happened. I would recommend that Public Works Department sub-overseers should assist Khásis in choosing paths and in building bridges, and with advice, if asked for it. It is important to get trade back into its normal channels. We might, I venture to think, restore the direct communication between Laitkynsew and Bholaganj, as this would render Laitkynsew independent of Cherra and Shella. From Laitkynsew paths radiate out to the hill villages of Ramdait and Tandrong *via* Nongkroh; the path to Nongkroh is already being repaired at the initiative and by the labour of the villagers themselves. I wish to note that all trade, or very nearly all trade, is done by barter. Distress of a temporary nature has resulted from the refusal of the *mahajan* class to have anything to do with any but cash transactions. Undoubtedly there was a scarcity for a time of coined money. It is very difficult to form a really accurate estimate of the damage done to the cultivated area. The Khásis are by slow degrees working up their courage to go and visit their groves. In some places, there has been a good deal of damage done, in many others none at all. The destruction is almost confined to the western slopes.

18. In conclusion, I must confess that I have all along felt myself weighted by two difficulties—my ignorance of the language and my ignorance of the previous condition, nature, and area of the cultivated portion of these hills. As regards the damage done in and to the villages as distinct from the orange groves, I must point out that I did not visit these places until 18 days had elapsed since the earthquake, and that in many cases the villagers had, before my visits, begun to dismantle their old houses in order to get materials for their new houses, thus it may be creating false impressions of the havoc and destruction. I would like to thank you for your very kind help and Mr. Williams, representative of the Welsh Mission at Laitkynsew, for his hospitality and information. In justice, I would like to call your attention to the valuable help given me by constable Thakur Singh, a Behar Brahmin, who has a good acquaintance with vernacular Khási and a sound knowledge of these hills.

Villages visited in which deaths occurred.

Name of village.	Total deaths.	Died in the village.	Died elsewhere.	Males.	Females.	Remarks.
	I	II	III	IV	V	
Sheila*	106	106	I cannot get the detailed information from the wahanadars, although the Deputy Commissioner and myself independently issued <i>paravats</i> .
Motsh*	4	2	2	2	2	I have got all the information required with names of persons killed. Total deaths at Sheila 117. The wahanadars omitted to include 4 Bengali Sanyasis, 6 Roman Catholic orphans and 1 boy belonging to village Wai U Tim. The Nongwar figures are correct. I have visited both Sheila and Nongwar.—J. C. A.
Laitkynew (Seim of Nongkhlaw)	19	2	17	16	4	
Maolong	Umwai—One man has since died. The 10 deaths occurred near the orange grove as the people were returning from their millet fields. Umwai is under the Sirdars of Maolong. No deaths occurred at Maolong.—J. C. A.
Umwai }	9	9	..	4	5	
Nongwar*	59	49	10	21	38	British villages.—J. C. A.
Nongbah }	..	..	..	..	..
Luntiang }	4	..	4	1	3	
Randait }	2	..	2	..	2	
Tyurong }	3	1	2	1	2	
Umtiang* }	2	3	..	1	2	
Ramnoog* }	1	..	1	..	1	
Mynteng }	4	4	..	1	3	
Remkindomau }	4	1	3	1	3	
Tarna }	..	..	..	..	..
Mauspram (Seim of Mauspram)	2	..	2	1	1	Ditto ditto.—J. C. A.
Nongkroh }	7	7	..	2	5	
Total	227	144	43	The 43 in column III died at or near Sheila.

Villages not visited but from which reports have been received.

Name of village.	Total deaths.	Died in the village.	Died elsewhere.	Males.	Females.	Remarks.
	I	II	III	IV	V	
Nongtral*	11	5	6	Detailed reports were not received from any of these villages except Nongtral.
Dewano*	10	..	..	..	..
Lilong	0	..	..	..	..
Jitap	0	..	..	..	..
Syn en (Seim of Mauspram—J. C. A.)	6	..	..	..	..
Moudon (under Sirdar—J. C. A.)	5	..	..	..	..
Tynger*	4	..	..	..	..
Synd }	0	..	..	..	..
Nonglidd }	0	..	..	..	..
Malal (Seim of Malal—J. C. A.)	7	..	..	..	..
Warta (Seim of Bbowal—J. C. A.)	1	..	..	..	..
Mapes (I) (Ditto—J. C. A.)	0	..	..	..	..
Lo. ()	2	..	..	..	..
Jekram (Seim of Maharam—J. C. A.)	1	..	..	..	..
Dewara }	4	..	..	..	..
Wading }	..	..	..	..	..
Total	270	British villages.—J. C. A.

* These 8 villages form the Sheila confederacy. The wahanadars reported 106 deaths to Mr. Rita on 21st June, in reply to his *paravats*. Mr. Rita used the figures for Shilong. The deaths included 106 at Sheila, 4 at Motsh, 1 at Umtiang, 10 at Nongwar, Mr. Houdon reports 59 at Nongwar, so that the figures practically agree.—J. C. A.

Report by S. E. RITA, Esq., Subdivisional Officer, Jowai, dated Jowai, the 22nd July 1897.

I have the honour to submit a report on the results of the earthquake of the 12th June 1897 in the subdivision of Jowai and its neighbourhood.

2. As already intimated to you in my report dated the 12th June 1897, forwarded by special messengers on the night of the 12th, the subdivision, at about 5 p.m., felt the first shock of an earthquake, and within 3 to 4 minutes every stone building in the station of Jowai was more or less completely wrecked and in ruins. The shock was preceded by a perfectly distinct rumbling sound.

3. The following Government buildings have completely collapsed, and are level with the ground :

The military block-house, police station lines, and the serai.

The following buildings are injured to such an extent as to be no longer fit for occupation, *vis.* :

The court-house, or cutcherry. | The Subdivisional Officer's bungalow.

The court-house is a stone building, comparatively new, having been completed only in 1890. The Subdivisional Officer's bungalow is an old structure, having been built by the late Major Trotter over 20 years ago ; the greater portion of the latter building was *ekra*, but one room was of masonry ; this room fell in bodily, and the rest of the building was badly damaged. The walls and foundation of the court-house have all cracked and fallen in ; the wall of the office room to the north has completely fallen down ; and the walls of the treasury room have bulged in and partially fallen. The Jowai *dak* bungalow stood the shock exceedingly well, the walls only being cracked, and the ceilings down ; otherwise it is in fair condition, and capable of being rendered habitable at a little cost.

4. The damage to private property is very great. The Welsh Mission Chapel, the pastor's bungalow, and the school house, are level with the ground, the medical missionary's house and the hospital have every wall heavily cracked and portions fallen down, and are quite unfit for occupation.

5. The shock was felt at Shangpung, Nongbah, Raliang, Nartiang, Muskong, Nongjingi, Shilliangmyntang, Amvoi, Nongtalang, Lakadong, Mynsaw, Rymbad, Sutunga, Darang, Saipung, Mynriang. Authentic reports have not been received as yet from Bhoi, Langsoh, Nongphullut, Nongkhlrip, Narpub, and Satpator, but I have ascertained from persons who have travelled through these places during the past month that they had heard that no serious damage or loss of life had occurred there. Probably this information is correct, for, with the exception of the Bhoi and Satpator *elakas*, the other four circles are very sparsely inhabited, and the hamlets, consisting of 3 or 4 houses each, situated at considerable distances from one another, have not felt any ill-effects from the shock.

6. As soon as the first shock was over in Jowai, I went through the village to ascertain if any one had been killed or injured, and was glad to find that no casualties had occurred. I despatched a report to you the same evening by special messengers. Early next morning, messengers were sent to Nongbah, Nartiang, Shangpung, and Raliang, to ascertain how these places had fared, but prior to their return I obtained information that the mission buildings at Shangpung and Raliang had been seriously damaged, and that the rest-houses there and at Nongbah and Nartiang had been damaged. On the 13th, 14th, and 15th June I removed the office records and furniture into the Unitarian school house, and opened office as usual on the 14th June. The police staff were provided with temporary huts on the bazar site, near the court-house. The guard over the treasury strong-room was also doubled.

7. Mortality due to the earthquake in the subdivision has fortunately up to the present date been found to be only 14, *vis.*, 11 persons in the Nongtalang *elaka*, 2 in Darang (1 male, 1 female), and 1 male at Pomtadong, a village south-west of Jarain belonging to the Jowai circle.

8. The cultivation throughout the subdivision has scarcely suffered. The *hali* lands in Jowai, Nongbah, Shangpung, Raliang, Nartiang, Muskut, Mynso, and Shilliangmyntang were partially injured by fissures running through the fields, but these openings have been since filled up, and no great decrease in the outturn of the crops is expected. The *pan* gardens and betel groves on the sides of the hills below Darang, Bataw, Rymbai, and Nongtalang have sustained some damage, owing to landslips. The cultivation in other circles is chiefly of a shifting nature (*jhums*), which are not affected by the disaster.

9. No cases of suffering for want of food have occurred, and there is no need for anxiety on account of scarcity in the subdivision. The Syntengs generally have a store of *dhan*, sufficient for six months or more, in their houses, and their houses, being substantially built of stout timbers, have not collapsed, although much shaken, and their granaries not seriously injured. The local markets, such as Jowai, Nartiang, Shangpung, Mynso, have resumed their usual condition, and are well attended, as well as that at Jaintiapur, which is situated at the foot of the hills on the southern extremity of the district.

The people have long since resumed their various occupations, and trade is progressing steadily, though not to the same extent as before the earthquake, but now that the excitement has passed away, it will soon resume its normal condition.

10. The Kopili road was not extensively damaged, but all the small bridges fell in. These have been temporarily repaired, and communication has not been interrupted, either on this road or the Shillong-Mukhtapur road. The Shillong-Jowai road suffered to some extent, chiefly between the fifth to seventh miles, mile 19 to 20, and again between the 29th and 33rd miles; the landslips and breaks on the way, however, are nowhere so serious as those on the road to Cherra. All the rest-houses along this road were levelled with the ground, *viz.*, at Rachi, Mawdama, Mawlyngkneng, and Pamura. The road has since then been made passable for horses and pedestrians, and temporary huts have been erected at the former resting places. Considering everything, the subdivision may be said to have escaped without any very great loss, compared with the extensive damage and loss in the Khási Hills.

I am now starting on a tour throughout the subdivision, and will communicate any fresh facts that may come to my notice.

APPENDIX VII.

Report by Captain A. A. HOWELL, I.S.C., Offg. Deputy Commissioner of the Gáro Hills, on the effects of the earthquake in his district, No. 100G., dated Tura, the 24th July 1897.

PART I.

TURA.

1. To make this part of the report clear, I have begun with a short description of Tura station, of which, too, a map (not printed) is herewith sent. In this map, only the portion south of the Ronkon stream has been accurately drawn. The contours are at 5 feet intervals. The rest was surveyed with a chain and compass, the contours being roughly put in, merely to show the general formation of the ground,

2. On referring to this map, it will be seen that the station is a very small one, and built mainly on three spurs running from east to west. The station has an elevation of about 1,300 feet above sea-level. It is situated at the foot of the western end of the main range of hills in this district, which rises immediately and steeply above it to a height of some 4,000 feet above the sea, and thence continues almost due east to the ranges of the Khási Hills. The conformation of the spurs consists of a backbone of sandstone covered, more or less, deeply with a loose reddish sandy soil, plentifully mixed with boulders of (what I am told is) gneiss. The crests of the spurs are broad and fairly level, but the sides are steep and occasionally precipitous. At the bottom of each ravine is a small (hill) stream flowing over a rocky bed.

3. The week preceding the earthquake began with fine weather, a clear atmosphere, and not much rain. On the 10th there was a change, heavy masses of cloud gathered round the top of Tura *pahar* (*i.e.*, the high hill above the station), and the air had a feeling of thunder in it, though there was no rain until noon of the 12th, when a smart shower fell. This cleared off about 2 P.M., but was followed, after a vivid sunset, by heavy downpours lasting until the morning of the 13th. Below is a table of rainfall from the 6th to the 13th of June, inclusive:

The fall is measured daily at 8 a.m., and refers to the preceding twenty-four hours—

6th June	...	...	0'28	10th June	...	...	0'00
7th "	...	...	1'20	11th "	...	...	0'00
8th "	...	...	0'32	12th "	...	...	0'00
9th "	...	...	0'00	13th "	...	...	3'26

4. There being no telegraph wire to Tura, there is no means of checking our local time. We depend chiefly on a sun dial, but as it was inaccurately put up, the result is unreliable. The guard-room clock stopped at 5.5 P.M., and this was the time of the first shock by my watch.

5. The exact time the earthquake lasted was not noted by any body in Tura. The consensus of opinion fixes it at five minutes or longer. The shock began with a sharp vibration, increasing in about 20 seconds to a violent rocking and heaving motion of the earth, which lasted about three minutes; in about two minutes more it gradually subsided to a gentle but distinct tremor. A few persons assert that the shock was preceded by a loud rumbling noise, but this is doubtful (personally I did not hear it). Every body, however, agrees that such a sound was audible during the shock.

This tremor of the earth continued almost without intermission through the night of the 12th June, increasing at irregular intervals of some minutes to a strong and jerky shake of sufficient force to make houses rattle and trees quiver. These shocks were, and still are, almost invariably announced by a distinct rolling sound as of far-off thunder.

Nobody has kept any record of their number, but from several hundreds in the twenty-four hours, they have decreased to ten or twelve a day; even now some are nearly as strong as those immediately following the first and severest shock.

6. The effects of the earthquake, as seen on the ground, are (1) landslips, (2) cracks and fissures, (3) ridges and furrows, (4) depressions of the surface.

(1) *Landslips*.—Landslips are now visible from the station in every direction, but are fewest to the north. They have occurred wherever the ground was steep and not formed of solid rock. In the station itself, the southern spur has suffered most, and more on the south side than on the north. There is a large slip at the head of the *nala* to the south of the Deputy Commissioner's bungalow. From this point, as far as the parade ground (on the western extremity of the spur, not shown in the map), the whole hillside has slipped more or less; on the northern face the landslips are both fewer and smaller. The small spur on which the inspection bungalow and charitable dispensary stand, display similar effects. On the south side half the knoll on which the clerks' houses were built has come down, and there is a smaller slip within a few feet of the charitable dispensary. On the northern face, only a few rocks have fallen.

The large spur on which the cemetery and Forest Officer's bungalow are situated, has small landslips on both sides. The spur on which the mission compound lies has suffered least of all, there being only one small slip on its southern face. On the other hand, the high hill immediately behind it is scarred all over.

(2) *Cracks and fissures*.—Cracks in the ground are to be seen everywhere, but chiefly in the vicinity of landslips and along the upper edges of sloping ground. Their direction follows the line of the hills. Besides these, however, there are a good many on the level crests of the spurs far from any sloping ground, and running in various directions. In some, a walking stick can be pushed down to a depth of 2 or 3 feet.

Ridges and furrows.—In the western portion of the southern spur and all round the Civil Surgeon's quarters, to the distance of a mile down the Mankachar road, where the soil is sandy and the surface fairly level, the ground looks as if a steam plough had passed over it, tearing up the turf and throwing the clods in every direction, some up hill and some down, and in many cases turning the sods completely over, so that only the roots of the grass are visible. In other places, the earth seems to have first opened and then closed again with great pressure, forcing up the turf along the line of cleavage into ridges; thus:



In other places, again, large pieces of turf are found lying on the grass with no mark or sign to show the place from which they had been torn.

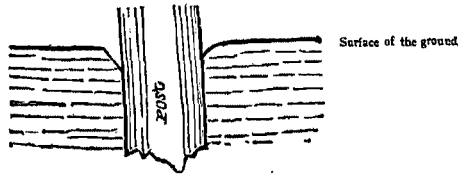
(4) *Depressions of the surface.*—Depressions of the surface of the earth are only a few inches deep and apparently of small area. Their edges at first were clearly defined, but now have become worn down by the weather and by the feet of men and animals. Those near sloping ground are due, no doubt, to the slipping of the earth or displacement of some large boulder below, but others occur in the centre of the most level places, and indicate perhaps an actual subsidence of some substratum of the spur itself.

Trees have not, as a rule, been damaged, except on steep hillsides and in sandy soil, where in many cases the earth seems to have been shaken away from the roots.

A stone on the parade ground, about 20 inches in diameter and 10 inches thick, partly imbedded in the ground, was thrown to a distance of about 3 feet, and turned upside down. A cylindrical metal rain-gauge on the Deputy Commissioner's lawn was also similarly displaced.

7. All buildings in Tura, both Government and private, may be divided into four classes:—*First*—Those built on wooden piles from 10 to 20 inches in diameter, driven several feet into the ground and reaching up to the roof. These have a raised board floor, mud and reed walls supported by timber battens, and a roof of thatch or corrugated iron. Of this class are the houses of the Deputy Commissioner, District Superintendent of Police, Forest Officer, and Sub-Engineer, the inspection bungalow, cutcherry, and the houses of the American Baptist Mission.

The houses of the Deputy Commissioner, District Superintendent of Police, Forest Officer, and Sub-Engineer are damaged more or less severely in the same fashion. Several posts have sunk from a few inches to a foot deeper into the earth, causing the floor to buckle and the roof to sag. Many, too, are out of the perpendicular. At the point each post enters the ground, a cup-shaped depression from one to six inches in depth and diameter has been worn round it, thus, as though the post had been given a circular movement :



Many of the timber battens supporting the walls have been wrenched loose, most of the plaster has fallen, and, where old and rotten, the reeds have come down with it. The bungalows of the Deputy Commissioner and District Superintendent of Police have suffered most. The former was built in 1872-73, the latter in 1875. The Forest Officer's bungalow was built about twelve years ago. Its walls have been badly damaged, and, to a smaller extent, also the posts, floor, and roof.

The Sub-Engineer's house was built in 1883-84; it has suffered in the same degree as the Forest Officer's.

The inspection bungalows and cutcherry were erected in 1889 and 1889-90, respectively. They are both in fair condition as regards posts, floor, and roof, but the walls have been almost destroyed.

While Government buildings have fared so badly, it is curious to note that the houses of the American Baptist Mission have withstood the shocks with comparative immunity. The reason perhaps is that the posts, instead of being driven deep into the ground, mostly rest on stones almost flush with the earth, or flat on the earth itself. Their walls, too, on the sides exposed to the weather are protected with stout planks, which no doubt increase the strength of the structure.

The second class of buildings differs only from the first, in that they have a stone and cement plinth, instead of a raised board floor. In this class are the Civil Surgeon's house, the charitable dispensary, the post office, the treasury, and some shops in the bazar. The most remarkable point about them is the manner in which the plinths have cracked and broken up. It is most noticeable in the treasury. This building stood on a gentle slope a few feet from the top of a steep hill-side. It had a strong frame of timber, walls and roof of corrugated iron, and a massive plinth of cement and large stones. The plinth was 70 feet long, and 32 feet 6 inches wide, with a maximum and minimum height of 8 feet and 1 foot 6 inches, respectively. The floor was of concrete and cement

to a depth of 9 inches. Solid as it was, it crumbled away like a pile of sand before the first shock had stopped. The stones rolled out on all sides, and the floor was broken into little pieces. The whole building tilted over towards the *khud*, wrenching the main posts in every direction, and up-rooting or breaking the smaller ones which supported the verandah. The plinths of the other buildings also cracked up, and the sides fell away, leaving gaps under the walls, but they do not show signs of such violent action as the treasury. The frame and roofs are almost all sound; in the Civil Surgeon's house only, the thatch has parted along the ridges of the roof, and slipped to the ground. The walls have been denuded of plaster, and the battens have in some places been loosened. These buildings were erected as noted below:

Civil Surgeon's quarters built in 1897.	Post office built in 1887-88.
Charitable dispensary " " 1890-91.	Treasury " " 1887-88.

The third class consists of buildings with the ground for the floor, timber or bamboo frames, walls of mat or reeds lightly plastered over, and roofs of thatch or corrugated iron. The out-offices of the different bungalows belong to this class. Being old and badly built for the most part, they have been reduced to ruins. Other buildings of this class, consisting of the police barracks, clerks' quarters, and the majority of the houses in the bazar, have stood well. Some have collapsed, owing either to their original rickety condition, or to the ground having fallen away under them.

The fourth class consists of the Gáros' houses with a raised floor and built entirely of wood, bamboo, cane, and thatch.

These houses, when on level ground and in fairly good repair, have not been at all affected by the shaking. Unfortunately, many of them were built (in a hilly district like this) on steep hill-sides, or at the base of cliffs, and numbers of them have been destroyed by landslips. In all the houses in the station, furniture was thrown about in great confusion, pictures fell, the pendulums of clocks were shaken off, chairs and tables shifted about like grains of rice in a winnowing basket. Almirahs and book cases were overturned; in short, no moveable article, however big and heavy, was left in its original place.

8. The station roads and bridges have been badly damaged; that part of the road running past the District Superintendent of Police's house, marked A B C in the map, has slipped away altogether, and the path from the jail to the point marked D is covered by a landslip. The stone abutments of the bridges over the Ronkon and the Mafikol have been shaken down, but the bridge over the Rengri has escaped untouched.

To sum up. The damage done by the earthquake has been greater on the southern than on the northern sides of the spurs, while it is also most noticeable on the southern spurs, decreasing gradually towards the north. The small collection of houses near the mission compound, marked Chandmari in the map, shows no signs of any disturbance, nor do the bridle-paths to Rongrengiri and Salmara for the first 3 miles from Tura. On the other hand, the cart-roads to Dalu and Mankachar are blocked with landslips right up to the station.

PART II.

THE DISTRICT.

9. Owing to the difficulties and the deficiencies in the means of communication in this district, full reports of the damage done have not yet been received from all sides.

In the plains portions of the district deep cracks and crater-like pits appeared in the ground; one of the cracks is as much as a mile long, 2 or 3 feet wide, and 16 feet deep. The pits average about 6 feet in diameter, though one is said to be as much as 40 feet across. Through these fissures jets of sand and water were thrown up to a height of 6 or 7 feet, in a few cases accompanied by pieces of coal, peat, resin, masses of semi-petrified timber, and a black earth, hitherto unknown in those localities. The bed of the Ganai was upheaved 20 feet, and so was the bed of the Jinjiram, but not so much. Both have since settled down again, though not to their normal level.

Many houses sank into the ground bodily, the roof alone being visible, but no loss of life has yet been reported. Several villages were, and still are, partly submerged, and some thousands of *bighas* of cultivated land have been made useless. Of the crops, jute has suffered most; in some fields plants as high as a man have been completely buried in sand. The *ahu* crop has suffered a great deal less, and, where

not destroyed, promises to be up to the average. Several *bhils* have silted up, and the newly-formed land is now being ploughed for *sali*; as the soil is excellent; good results are expected. The earthquake caused a regular panic amongst the plains people. Whole villages were deserted for days, while the inhabitants took refuge in the hills. A few Gáros took advantage of this to loot their granaries. Considering, however, the extraordinary facilities for thieving afforded, very little crime was committed.

10. In the hills, landslips have caused a great deal of damage, granaries have been wrecked, and much grain lost. The cultivated slopes of the hills have cracked so as to injure the crop, and in some places the earth has been so severely shaken as to destroy it.

It is generally stated that some hills have sunk bodily many feet, while others have risen. In the case of two hills between Tura and Rowmani, this assertion is corroborated by the signallers of the Military Police, who have been constantly practising with the helio from these two places.

11. I regret to say there have been more lives lost than was at first supposed. Up to date the number is 27, but as the reports arrive from the more inaccessible parts of the district, this number will, I fear, be considerably exceeded. The greatest loss has occurred in the lower part of the Someswari Valley in the circles of Bong and Damjing *Lashkars*; the latter with his whole family was buried in his house by the fall of the hill above it.

12. The Gáros generally were thrown into a state of stolid bewilderment by the earthquakes. They left their fields, and retired into their village houses to await further catastrophes. The Gáro belief is that the world is a square flat body, hung up by a string at each corner. There is a squirrel always trying to gnaw these strings, but to prevent it, a demon was appointed. This demon, however, neglected his duty, and in order that his attention might not in the future be diverted from his work, he was struck blind. Now that he can't see, the squirrel of course has the best of it, and it is feared that when one or two of the strings are gnawed, the earth will be turned upside down. Another story is that Her Most Gracious Majesty, not content with the last earthquake, has ordered another and more vigorous one to be followed by a cyclone. That it is in the power of the *Maharani* to do so is never doubted. One man asked for a *parwana* to forbid the hill behind his house from slipping down on to him. Had the houses of the European officials in Tura not been wrecked, the Gáros would have made up their minds without doubt that the recent catastrophe was the work of the *Sakhs*, and excited by the wild stories in common circulation they might have given some trouble.

13. The district roads have all been badly damaged; the cart-roads to Dalu and Mankachar were impassable for weeks, except by foot passengers. In the hills they were blocked by landslips, and bridges had nearly all subsided more or less. At the 22nd mile of the Mankachar road a timber bridge, 80 feet long, was heaved up to a height of 8 feet above its proper level.

PART III.

MEASURES TAKEN SUBSEQUENT TO THE EARTHQUAKE.

14. Within a few minutes after the first and severest shock of earthquake, the "fall in" was sounded, and the men of the police battalion paraded on the road between the cutcherry and the lines, a double guard was posted on the treasury, which was in ruins and unsafe, and the prisoners were removed to the thana. Strong fatigue parties were sent to the lines, and smaller ones to the houses of European officers to render all possible assistance. The police hospital orderly, with considerable presence of mind, immediately removed his patients to the *hat* shed which was intact. The clerks whose houses had been destroyed were given quarters in the Public Works Department lines, and the post office was removed there too. Those people in the bazar who were houseless were placed in the drill-shed. All the Europeans in the station were given shelter in the houses of the American Baptist Mission, and before night fall every one in Tura had a roof to sleep under, if he wished it. Several persons, however, prepared to spend the night in the open, but were driven under cover by the heavy rain.

During the following week the police were employed in repairing their lines and the quarters of the native officers. The prisoners built new quarters for the jailor, and a new jail-shed 38' X 16'. All material of any value in the old jail and treasury was collected and stocked. The thana was converted into a treasury; the lock-up cage being used as strong-room for the chests containing cash and notes.

On Monday, the 21st, the men of the police began the work of clearing the slips near the station on the Dalu road. They were employed for four hours a day for five days a week. They were paid on the evening before market day at the following rate :

						Annas.
Native officers	...	...	...	...	...	8
Non-commissioned officers	...	...	...	...	...	4
Sepoys	...	...	...	...	...	2

} per diem.

15. The work was popular, as it gave the men an opportunity of earning a little money with which to meet the rise in prices. Taking it all round, this rise was not so great as might have been expected. On the 15th it was found there was a six weeks' supply of rice in Tura. Babu Ganga Ram Agarwalla, of Tura, the principal holder, very sportingly agreed to sell his stock at 6 seers per rupee, and this, of course, kept down the prices of the other shopkeepers. Some *dal*, which was much required, was brought up by two police elephants, which at the time were at Mankachar. Below are the prices-current for the six weeks ending the 15th July 1897 :

		Rice, best.	Rice, common.	Lahar.	Gram.	Makhali.	Salt.
		1	2	3	4	5	6
		Srs.	Srs. ch.	Srs.	Srs. ch.	Srs. ch.	Srs.
10th June	...	4	8 0	5	6 0	9 0	7
17th "	...	4	6 0	5	6 0	9 0	7
24th "	...	...	6 0	5	6 0	...	6
1st July	...	...	6 0	5	6 0	...	6
8th "	...	...	6 0	5	6 8	7 8	6
15th "	...	...	7 8	5	...	7 8	6

16. It may seem strange that the Gáros were not called upon at once to supply labour, but to have done so might have led to difficulties. They were absolutely bewildered by the unexpected and unprecedented occurrence. Nothing short of force would have moved them, and each coolie would have required a sepoy to bring and keep him. It seemed more profitable and politic to leave them alone. Poor people, many of them, have suffered severely as regards both houses and crops. The time of year, too, is a very busy one with them, and it seemed only fair to give them a chance of pulling themselves together, before calling on them to leave their houses and families.

On the 25th June notices were sent round to the leading *lashkars*, urging them to persuade their people to resume their usual occupations without delay, and pointing out that before long unusual calls for labour must inevitably be made on them.

On the 1st July *parwanas* were issued to the *lashkars*, and by the 7th, coolies had begun to come in for work in satisfactory numbers. The Dalu road is only waiting the completion of one bridge to be opened for cart traffic.

The Mankachar road, it is hoped, will be open by the end of this week (*i.e.*, 24th July 1897).

Such repairs and works in the station as are absolutely necessary to take us through the rains are being pushed on, and it is expected that every thing will be finished by the end of this month.

17. In conclusion, I would beg to bring to the notice of the Chief Commissioner the services of Mr. Andrews, of the Military Police (then in charge), and of Babu Srinath Barua, of the Civil Police, and the men under their command, and also the great assistance rendered by Mr. Phillips and Mr. Mason, of the American Baptist Mission, in allaying the fears of the Gáros and in contradicting the numberless terrifying reports current.

APPENDIX VIII.

Report by P. H. O'BRIEN, Esq., I.C.S., Deputy Commissioner of Sylhet, on the effects of the earthquake of 12th June, No. 655G., dated Sylhet, the 6th August 1897.

I have the honour to submit the following report on the earthquake of the 12th of June 1897.

The earthquake took place about 4.50 P.M., the apparent direction being between north-east and south-west. The duration was about one minute and three-quarters, but during this time there were three distinct shocks, one slight preliminary one, and two severe ones. The catastrophe appears to have been preceded by no warning generally speaking, though the inhabitants of a village at the foot of the hills north of Sunámganj state that for a fortnight before the date of occurrence they had heard continual explosions to the north-east, that is, in the direction of Shillong.

2. The severity of the seismic disturbance was greatest in the tracts lying along the foot of the Khási and Jaintia Hills. In the south of the district it was not so much felt, and comparatively little damage seems to have been done. The loss of life occurred almost entirely in the northern subdivisions of North Sylhet and Sunámganj.

3. The effects of the earthquake were chiefly manifested in the demolition of houses, both brick-built and thatched, the falling in of river banks, and the cracking of the earth in the vicinity of watercourses, a fine dark grey sand being ejected through the apertures. The amount of sand thus thrown up was large in some localities, and overspread considerable areas. Where the sand covered up the crops, the latter were usually destroyed.

4. Although reports of the creation of fissures in the soil are numerous, I have been unable to learn of any authentic case of such fissures having occurred in solid ground, as distinguished from river banks or soil that had been disturbed, such as embankments and *bari* sites, or from the imperfectly consolidated soil of new *chars*, or recent alluvium, as in West Sunámganj. This tract is at present a net work of *khals* and *chars*, and was the scene of considerable changes in the face of the country, many existing watercourses being closed, while new ones were formed.

5. The reason of the cracking of the earth in the neighbourhood of rivers seems to be the caving in of the banks, and the consequent loss of the support afforded by them to the ground behind, which naturally slipped and subsided. There was no general subsidence of the country.

6. I am informed that the channels of the navigable rivers will be considerably changed by the late shock, owing to the falling of immense masses of earth into the beds, but nothing can be said definitely until the dry season arrives. It is quite possible that steamer navigation may be obstructed, if not actually blocked, and it is also possible that accumulation of these masses of earth in the river-beds may cause floods next year.

7. Very little effect, if any, upon the rivers can be attributed to the earthquake. There was a slight rise in the level of the main rivers for a few days after the 12th June, but this was probably due to normal causes.

8. Subsequently to the great shock of the 12th there were several minor shocks, but none of sufficient strength to merit notice.

9. I now proceed to consider the loss of life and damage to property caused by the earthquake:

MORTALITY.

The total number of deaths of human beings reported as directly due to the earthquake is 545. This figure may be taken as approximately correct. The deaths were distributed as follows:

Sylhet	...	...	...	...	...	55
North Sylhet (rural area)	...	...	...	...	...	178
Sunámganj	...	...	...	...	...	287
South Sylhet	...	...	...	...	...	8
Habiganj	...	...	...	...	...	7
Karimganj	...	...	...	...	...	10

The deaths in Sylhet town were mostly caused by the fall of buildings.

The earthquake very fortunately occurred in the evening, at a time when the population were mostly out of doors; otherwise the mortality would have been very heavy. The large number of prisoners in the jail were in the yard waiting to be locked up in the sleeping wards. If the shock had been a quarter of an hour later, hundreds of them would have been killed.

In the rural area of North Sylhet and in the Sunámganj subdivision the deaths were chiefly due to drowning, the victims being on the river banks when these collapsed and precipitated them into the river. In a few cases, boats were swamped, the occupants, if unable to swim, being drowned.

The places which suffered the most from the shock are Jugigaon, opposite Sunámganj, and Jainagar Bazar. The banks at both these places gave way in large masses, and numbers of persons were drowned.

The police took up many of the reports of deaths due to the earthquake as unnatural death cases, so that there is some guarantee of the accuracy of the figures.

There are several apparently authenticated instances of persons having been swallowed up by the earth opening near them. In one case, in Habiganj, an old woman was sitting in an *akhra*, when the ground opened exactly beneath her, and she disappeared. In another case, in Sunámganj, a man and his wife were standing on a river bank when the earthquake took place, and a fissure opened under the woman, who fell into it. The husband caught hold of her hair to save her, but finding his own position insecure let go his hold, and the woman fell into the aperture, and her body was not recovered.

DAMAGE TO PROPERTY.

10. This must be distributed under the heads of—

(a) damage to buildings,	|	(c) damage to crops,
(b) damage to roads,	|	(d) damage to food-stocks.

(a) Damage to buildings.

Generally speaking, it may be said that the majority of the *pucca* buildings in the district were overthrown by the earthquake. A notable exception, however, occurred in the case of the tea gardens in the south of the district, very few of which sustained any substantial injury, while many escaped altogether unhurt.

The following Government buildings in Sylhet station were either demolished or were partly damaged:

The old collectorate.	|	The Church.
The new collectorate.	|	The Government School.
The Judge's court.	|	The circuit-house.
The Police and Department of Public Works office.	|	The Deputy Commissioner's residence.
The Forest office.	|	The Jail.
The Honorary Magistrates' court-house.	|	The Post Office.
	|	The Telegraph Office.
	|	The dâk bungalow.

Among non-Government buildings, the charitable dispensary and the Town Hall were both levelled with the ground.

In Sunámganj, the new cutcherry, in course of construction, was thrown down. The old cutcherry and the Subdivisional Officer's residence were badly shaken—these are *kutchra* structures. It is quite possible that the station of Sunámganj may have to be removed to a new site. It is built on a narrow strip of land along the river bank. As a considerable portion of this strip has fallen into the water and more will follow when the river falls, there will be no ground left to build on.

In Habiganj, the Subdivisional Officer's residence was ruined. The cutcherry was somewhat damaged, and the dispensary, a small *pucca* building, also suffered to some extent.

Maulvi Bazar and Karimganj report no damage to public buildings.

The destruction of thatched houses, such as the cultivators usually inhabit, has been very general. I do not, however, apprehend any great amount of hardship to the people on this account, as thatching and building materials are easily procurable in almost all parts of the district, so that the work of rebuilding will involve little beyond the necessary labour.

(b) Damage to roads.

This has been separately reported on by the various officers directly concerned. It is, therefore, unnecessary for me to enter into details. It is sufficient to say that, considering the violence of the disturbance, very little damage to our roads was done. The Sunámganj-Pagla-Govindganj road, which consists for the most part of a high bank running through low country, has been badly injured, and a very large sum will be necessary to put it into order again. The Salutikar-Companyganj road also suffered, six of the new *pucca* bridges having fallen in. With these exceptions, I cannot hear of any but petty damage. As regards the injury to the Railway, I have no detailed information. That the line was seriously damaged throughout its length, and that it was practically obliterated where it crosses the Juri Valley, appear to be facts. It is, however, said that the line will be restored for passengers and goods traffic very shortly.

(c) Damage to crops.

The reports under this head have been absurdly exaggerated. The crop at present being harvested is the *aus*, or early rice crop. This is not extensively cultivated in this district, so that its loss would not have been of paramount importance. It appears that some crops were lost in the case of riparian fields, where the river banks fell into the water, and also by the cracking of the soil and ejection of sandy matter which overspread the crops in the vicinity of the fissures. The total loss due to these causes is, however, infinitesimal throughout the greater part of the district, though in the west of Sunámganj, where the land is apparently still imperfectly consolidated, some limited areas are reported to have been rendered unfertile by sand deposit, or to have collapsed altogether into the water. As, however, the *aus* is not an important crop in this district, and least of all in Sunámganj, the loss of crop caused by the earthquake can hardly be said to have been felt by the people at large.

It is noteworthy that the part of the district which suffered most from the earthquake, *i.e.*, the Sunámganj subdivision, is that where the condition of the people is best and the price of rice is lowest. Such distress as there is in the district can hardly be attributed to the earthquake.

(d) Damage to food-stocks.

Reports as to damage to the stocks of food-grains have been as absurdly exaggerated as those relating to the destruction of crops. Seeing that the granaries are almost invariably thatched sheds, it is obvious that there can have been no wholesale destruction of food-stocks. The mere fall of a granary would not involve destruction, or even necessarily damage, to the grains stored within.

I have received no local complaints of any such destruction.

11. I now turn to the (a) moral, (b) physical, (c) material effect of the earthquake on the people.

The immediate moral effect of the earthquake was to keep everybody at home. The population at large thought that the end of the world had come. There was, for a few days, a complete stoppage of business; gradually confidence was restored, and now matters have almost resumed their normal condition.

One remarkable effect of the earthquake was to put a complete, though temporary, stop to the epidemic of fever that prevailed throughout the district. After the excitement had worn off there was a recrudescence of the disease, but not to the former extent. The villagers have in almost all cases been able to find shelter either in boats or in the houses of friends, and I have not heard that the sum total of sickness in the district has been increased by exposure owing to the earthquake. Of course there must have been numerous such individual instances of suffering, but the fact remains that the public health has been better since than before the earthquake.

The material losses of the people have not been great. The *hutchas* houses that fell were mostly old and unsound, and would have required rebuilding or substantial repairs. There has been no general loss of crops, and the mortality among cattle is, comparatively speaking, slight. Taking the price of rice as an index, it does not appear that the condition of the people has deteriorated perceptibly by reason of the earthquake. It must be remembered that rice is still being largely exported from the district, and this naturally forces prices up week by week.

12. I have made provision for the assistance of the people, both by gratuitous pecuniary relief and in the shape of loans. The amount spent under the first head amounts to less than Rs. 100 in the tracts mainly affected by the earthquake, and the applications for loans have been few. I gather from these facts that the people are not without resources of their own.

13. My information has been collected from numerous sources. All police officers sent in daily reports relating to their respective jurisdictions. I have also received the tour diaries of Inspectors, Sub-Deputy Collectors, and Extra Assistant Commissioners who were out in camp either at the time of the earthquake or immediately after it. Other officers also have furnished me with information, and I have also acquired a considerable amount of fact from the general public, European and native. I was unfortunately prevented by ill health from proceeding on tour myself, but I think that nevertheless my knowledge of the state of affairs is as complete as need be.

PROVISION FOR CARRYING ON OF WORK AFTER THE EARTHQUAKE.

14. The problem of carrying on work after the demolition of our offices by the earthquake at headquarters solved itself owing to the people being panic-struck and to the consequent cessation of business. By the time the people began to recover from their fright, we had made temporary arrangements, and, except in the Treasury Department, were always able to cope with the work as it grew. I am afraid that some inconvenience was felt by a section of the public owing to the closure of the treasury, but this it was beyond our power to prevent. The treasury building, a very massive one, completely collapsed, burying the treasure chests and paraphernalia under tons of *débris*. We had no implements to deal with the removal of such masses of masonry, and the work of rescuing the chests had to be done practically by the main force of large gangs of men. Under the circumstances, I consider that the work of recovering the chests and records was carried out with commendable expedition. In connection with the work of rescuing treasures and records, I have to mention favourably the names of Mr. Abercrombie, District Superintendent of Police, Mr. M. N. Ghosh, Extra Assistant Commissioner, Babu Joy Chandra Bhadra, Inspector of Police, Babus Rukmini Kanta Gupta, my Revenue sheristadar, and Mohesh Chandra Majumdar, Revenue record-keeper. The staff of the treasury and record-room also did excellent work.

15. The brunt, however, of the work was upon the shoulders of Mr. Borrah, the Executive Engineer. He had to build temporary offices and residences at a moment's notice under the most unfavourable circumstances, at a time when it was difficult to obtain building materials and labour in sufficient quantities. The rapidity with which the buildings were prepared, and the excellence of their construction, are creditable to his energy and resources.

Report from Babu SAGAT BANDHU NAG, Subdivisional Officer, Sunámganj, No. 180, dated Sunámganj, the 13th July 1897.

With reference to your telegram of the 6th instant, calling for a full report on the injury done by the earthquake, I have the honour to say that the total mortality caused by the earthquake, as reported by the police, has aggregated to 279, as follows:

	By drowning.	By fall of buildings.	By fall into cracks.	Total.
Sunámganj police station ...	146	18	...	164
Tahirpur outpost ...	2	12	5	19
Derai police station...	3	...	3	6
Jagannathpur outpost ...	...	8	...	8
Chhátak police station ...	25	48	2	75
Dharmapassa ditto ...	3	1	3	7
Total ...	179	87	13	279

The above were formally taken up by the police as cases of unnatural death, and they were regularly enquired into; there is, therefore, hardly any room for error on the side of exaggeration. On the contrary, it is very likely that many cases of death have remained unreported, as the casualties among the boat population and workers in

the jungle and forest, who are not residents of the subdivision, could not reach the notice of the police. I think I may not be much beyond the mark if I say that about 20 per cent. of the actual mortality remained unreported. The total number of deaths thus comes to 303.

While there were so many deaths, it is very likely that there were several cases of personal injury, but I am unable to give an estimate of their number.

2. The police attribute only 74 cases of cattle death to the earthquake, but I am inclined to hold this to be far below the actual number of deaths among cattle attributable to earthquake.

3. The crops have suffered considerably. Many of the paddy fields have been covered over with sand that sprung up, and a good many fields have either sunk down or been damaged, more or less, by the cracks. The police report that about one-fourth of the crop in the subdivision has been destroyed. I think this is somewhat above the mark. The *boro* fields have not been damaged. *Aus* and *aman* crops only have suffered. I think about one-eighth of the standing crops has been destroyed.

4. A list [not printed] of the villages that have wholly or partially subsided in this subdivision is herewith enclosed :

	Number of villages wholly or partially subsided or gone under water.			
Sunámganj police station	31
Jagannathpur outpost	18
Tabirpur „	8
Chhátak police station	47
Derai „	39
Dharmapasa „	Figures not received yet.

Besides these, several other villages in Sunámganj have sunk, but have not actually gone under water or been submerged. The above figures have been received from the police, and my impression is that they may have erred on the side of omission, but not on the side of exaggeration.

The entire subdivision may be said to be the valley of the Gáro and Khási Hills. It is generally very low and swampy, and is intersected by innumerable rivers, *khals*, and other water channels. Villages had been formed on the banks of the rivers, and *khals* as they had been raised up by silt. These villages are of comparative recent growth, and they have suffered the most. Most of the villages on both sides of the Surma, Poinda, and Balai rivers, from Govindganj to Sunámganj and from Sunámganj to Gaglajur, have either sunk down or been partially depressed or submerged. Owing to the nature of the soil or to its proximity to the hills, the subdivision has felt the shocks most severely, and has suffered more, both in respect of life and property, than any tract excepting of course the Khási and Jaintia and Gáro Hills districts. North Sylhet and Mymensingh have, no doubt, suffered very much, but their loss is mainly confined to the destruction of masonry buildings, their mortality being far less than that of Sunámganj. All the villages and places in this subdivision have been cracked more or less, the width of some of the cracks being 15 or 16 feet. The Surma and other rivers seem to have been widened. A serang told me that they could easily ply the steamers at night from Lalpur to Chhatak in other years, but they can only do so now under great risk and difficulty, as the river sides have been depressed or submerged. Most of the riverside villages were entirely deserted after the severe shock of the 12th June, and the people either took to boats or took shelter in the houses of their friends or relations in the interior. The people of some villages have not yet returned to their homes, as they are still afraid to remain on the river sides. The village of Jugirgaon, opposite to Sunámganj, sank down, and there were 39 deaths in this village alone. The Joynagar Bazar went bodily down into the bottom of the river with the houses and their inmates, there being 29 deaths. The apprehension was that the town of Sunámganj would share the same fate, and the people, pleaders, mukhtears, shopkeepers, and others—were so panic-stricken that most of them left by the morning of the 13th or took to boats. My *amlas*, being dissatisfied with my order disallowing them to leave the station, all in a body petitioned the Deputy Commissioner, but their joint petition was rejected.

5. Of the *pucca* buildings in this subdivision, 84 have been reported to be in ruins, and only 5 or 6 buildings in the interior are yet standing. Five thousand eight hundred and fifty thatched buildings have been reported to have been completely broken, and almost all the rest have been more or less damaged. There are very few buildings which have escaped quite unhurt.

Extract from the tour diary of Babu GIRIS CHANDRA NAG, Extra Assistant Commissioner and Second Officer at Sundmganj.

* * * * *

12th June, Saturday.—Visited Maidyanagar. While a few miles off Maidyanagar in the *haor*, a terrible shock of earthquake was felt. It lasted about 3 minutes. The boat shook violently. Visited the bazar, and saw gaping cracks everywhere, and many houses had fallen. Fissures opened out in the villages adjoining the bazar, vomiting black sand and water. People were terror-stricken. The dispensary building was found to have sunk many feet. Wherever I went I saw people lamenting over their losses, and in panic. Shocks felt at short intervals. Passed night in boat. Distance travelled 20 miles.

13th June, Sunday.—Many well-to-do persons had lost their property by yesterday's earthquake. Granaries of people were in many cases found to have sunk with the rice. There was a subsidence of village sites on both sides of the Maidyanagar river. Reports of loss of property were coming in from all quarters. So far, I did not hear of any loss of life. Distance travelled 20 miles.

14th June, Monday.—Visited Joysree, Kamlabaz, and other villages. It is strange that village Joysree, although in the midst of *haor* on all sides, had escaped unhurt from the earthquake of the 12th. There was not a single crack in any building, nor a fissure seen anywhere.

15th June, Tuesday.—Visited Sukhair. This village too had escaped almost unhurt. Saw cracks only in a single *bári*. Reached Lalpur at about 11 a.m., and saw dead bodies floating down the river. Saw Noahalot, Lalpur, Kalipur, Poinda, Jaynagar and other villages on both sides of the Poinda river had sunk several feet. Some of these places were under water, people living in small boats, while the paddy-fields at the back of these villages were raised several feet with layers of sand upon them. An immense damage had been done to the standing crops. In many fields, not a vestige of a crop could be seen, so thick had been the layer of sand upon the field. The Sachna bazar had sunk a little. The steamer office is under water. The steamer agent escaped miraculously. By a surging wave, he, with his house and everything, was washed away several hundred feet, and by a returning wave he was, with the house over him, brought below a tree, whereupon was perched a man. The roof of the agent's house suddenly broke into two, and the man upon the tree saw the body of a man floating. He got down and recognised the agent. The latter had been stunned, but life was not extinct. The man nursed him and brought him to life.

The Jaynagar bazar was under water. It had sunk with everything in it. The number of deaths in this bazar alone was 17. The tin houses were seen carried away by the current. Some people of Lalpur came to me with heaps of *khattas*, cloths, etc., they had caught while the same were being carried by the current. These were the property of the shopkeepers of Jaynagar bazar.

APPENDIX IX.

Report by B. B. NEWBOULD, Esq., I.C.S., Deputy Commissioner of Cachar, on the effects of the earthquake in his district, No. 1909, dated Silchar, the 31st July 1897.

With reference to your telegram of the 21st June, I have the honour to submit the following report, giving an account of the earthquake of the 12th June last, and of the injury done by it in the district of Cachar.

2. This terrible earthquake occurred at about 5-30 p.m. at Silchar. Its apparent direction seemed to be north-east to south-west. It lasted about 3 minutes, and though less severe than the memorable earthquake of 1869, was of longer duration than that or any other earthquake on record in Cachar. The shock

was followed by a heavy stormy shower an hour after. Seismic disturbances continued for several days following the 12th.

The Deputy Commissioner has since reported that the telegraph clock stopped at 5-20 local time.

3. The injury done has been reported as follows :

Public buildings.—At Silchar, the old cutcherry building cracked in several places, but slightly, and the church also is damaged. No noticeable harm was done to any other buildings. At Hailakandi, the Subdivisional Officer's residence and the dák bungalow have been rendered uninhabitable, the residence, which was built on pillars, being completely ruined, and the minor walls of the dák bungalow and one side-wall of the Local Board office, which was of single brick, falling down completely. The circuit bungalow was very little damaged. At Haflong, the Subdivisional Officer's bungalow and the dák bungalow were completely wrecked. The dák bungalow, which was just completed, has been since re-erected with the old materials and from the savings of the sanctioned grant in hand, and it is now again habitable, and is likely to last for about eighteen months.

Roads and bridges.—An account of these will follow as soon as I get the information from the Local Public Works Department officers.

4. *Mortality.*—Only three lives have been reported to have been lost. A man and a woman died by the falling of an old Hindu temple at Silchar. Another woman, while landing from the ferry boat at the Singirband ferry *ghát*, was swept away by the seismic wave of the Barak river and drowned.

5. *Private property.*—In the Katigora tahsil, a large quantity of land, both cultivation and village land, with houses on it and with the moveables in them, mostly lying alongside the Barak river, has slipped into the river. In all three tahsils, but mostly in Sadr and Katigora, much land has been damaged and crops destroyed by deep and extensive cracks and sand thrown out from them in streams.

The following is a rough estimate arrived at by the tahsildars, by enquiry, of the extent of loss sustained by the people :

	Area.			Value.		Number.
	Hál*	keyár	powá.	Rs.		
(a) Land thrown into the river ...	42	1	3	...	...
(b) Houses thrown into the river ...	...			...	108	
(c) Land damaged by sand and cracks	149	3	2	...	...
(d) Crops damaged by sand or otherwise	229	2	2	...	...
(e) Houses thrown on to the ground ...	...			...	649	
(f) Other property destroyed ...	...			5,389	...	
Total ...	420	7	3	5,389	757	

The above estimate is, no doubt, exaggerated. It appears that the greatest damage was done in the Katigora tahsil, and the least in Hailákandi.

6. *Tea gardens.*—In several of the gardens, either the manager's bungalow or the tea house or the tea machine was damaged, and in a few cases destroyed. Serious damage has been done on the Hathicherra tea estate by the bursting of a *bund*, which had been constructed to form a large tank to work a turbine.

* A *hál* is equal to about 4½ acres.

APPENDIX X.

Report by A. W. DAVIS, Esq., I.C.S., Deputy Commissioner, Naga Hills, on the effects of the earthquake in his district, No. 504G., dated Kohima, the 28th June 1897.

With reference to your telegram of the 21st June 1897, I have the honour to submit the following report on the earthquake of the 12th June :

2. The earthquake commenced at 5-24 p.m. local time, and lasted for 3 minutes. Its direction was apparently from west to east. The shock, which was at its commencement quite gentle, quickly increased in intensity until it became so severe as to render it impossible to stand up without support.

3. Comparatively but small damage was done in the station of Kohima itself or in the district. This may be attributed to the fact that every building in Kohima, with the exception of the magazine, is of a semi-permanent nature only, *i.e.*, the houses have corrugated iron roofs supported on wooden posts, the walls being of *ekra* plastered. What masonry there is in the station suffered more or less.

4. Neither at Wokha nor Mokokchang was any damage done.

5. The hill cart-road suffered in no way whatever, but considerable damage was done on the road between Dimapur and Golaghat. At Borpathar, 19 miles from Golaghat, the old masonry block-house, which had been converted into a rest-house, was wrecked, and will have to be dismantled. At Deopani, 27 miles from Golaghat, the temporary bridge over the river was destroyed. The iron girder bridge over the Noajan was badly damaged, the piles at either end sinking considerably. At the 48th mile, where the road runs on an embankment over a small *bhil*, the embankment has been much damaged, two deep dips have formed, and half the road has sunk to ground level. The sand bank at the Dhansiri at Dimapur has sunk 2 feet.

6. Immediately after the earthquake, three loud explosions were heard from the direction of the *Pullebadsi* hill, 3 miles south-west of the station, but what was the cause of them remains unascertained.

7. Slight shocks were felt every day for about a week after the 12th, one at 1-30 a.m. on the night of the 12th being fairly severe.

APPENDIX XI.

Report by Captain H. W. G. COLE, I.S.C., Offg. Political Agent in Manipur and Superintendent of the State, on the effects of the earthquake in Manipur, No. 183, dated Manipur, the 2nd July 1897.

In accordance with the instructions contained in your telegram dated the 21st June, I have the honour to submit the following report on the earthquake and its results as regards Manipur.

2. It may be stated at the outset that the shock experienced in Manipur, while severe and of unusual duration, was not sufficient to cause any serious damage. The Residency, a large new masonry building, was absolutely uninjured. The damage, which was very slight, was confined to *kutcha* buildings, and only a few of these suffered.

3. At the time of the shock, Mr. Mitchell, Executive Engineer, was in camp at Makhan on the Manipur-Kohima cart-road, and Major O'Donnell was at Kunjupkhul. These two officers have kindly related their experiences, which are given below.

4. Mr. Mitchell, who was at Makhan, states as follows:

On the date of the occurrence of the great earthquake, *vis.*, Saturday, the 12th of June 1897, I travelled from Kairong to Makhan; both these places are halting stages on the Manipur-Kohima cart-road, and 46 and 31 miles, respectively, from Kohima. The morning was cloudy, but the rain held up till about 10 a.m., after which, however, it simply poured till 3-30 p.m.; the time of the earthquake was, as near as I can make it, 5-30 p.m. I was sitting in the verandah of the Makhan grass inspection hut in an arm chair, the back of which, when the movement began, commenced rattling against the wall of the house. At first I imagined it was only a dog shaking off fleas. The movement instantly became stronger, followed by a small shock. A chaprasi now kept shouting to me to run out, as the house was swaying dangerously and might fall. I rushed out. At the moment of descending the verandah steps, the second shock occurred, and all but threw me on my face on the ground. I went reeling forward in the effort to recover my balance for about 20 feet, and stopped myself against a big stone. From this point I turned towards the bungalow and watched the ridge. The third and fourth shocks occurred at intervals of a minute or so, and on both occasions the house rocked heavily north and south. The bungalow has received a permanent set out of the perpendicular, and is leaning to the north. The total duration between the first and fourth shocks was, I should say, about 3 minutes, but a gentle tremor continued for a further period of 10 to 15 minutes. During the occurrence of the shocks the valleys and hill sides for miles around kept resounding with the wild shouts of Nágas working in their fields, who evidently were terribly alarmed. Several Marram Nágas, who were talking to me at the time, kept on making frightful weird noises. The sub-overseer in charge of the Marram bungalow, who was coming to me to make his daily report, was thrown off his pony. This is the worst earthquake that I have ever felt.

5. Major O'Donnell describes the effects of the earthquake as experienced at Kunjupkhul in the following terms:

We felt the earthquake at Kunjupkhul on 12th June about 5-30 p.m. It had been raining very steadily all the day till about 4-30 p.m., when it cleared up, and became, rather quickly, quite clear and very still. The earthquake gave no warning of its coming. It began suddenly and

severely, and lasted, I should say, some 4 minutes. At first the motion was an up and down one, and one I have never before experienced. This by degrees gave way to the ordinary side-to-side kind of motion, which was at first a long and slow motion, gradually becoming shorter and quicker, till it suddenly ceased. The house was shaking from side to side in a very alarming way. The hill immediately behind I could distinctly see moving, and appeared to move turn about with the knoll we were on. It was a very disquieting sight, and I expected every moment to see our hill slide away to the bottom, but as far as I could see afterwards, no harm was done. At the first shock we all ran outside, and for most of the time it lasted it was difficult to stand. I saw the others in motion as you see a person on deck in rough weather. The natives all lay down and kept up a mournful howl all the time. None of us felt any other shocks, though I believe there was one again during the night and early next morning.

6. Colonel Molesworth has kindly furnished me with a copy of his report to the Deputy Assistant Adjutant General, Assam District, which I attach. This report embodies the observations of the military officers, who were mostly in cantonments when the disturbance took place.

7. My own observations were as follows :

The first tremor was brought to my notice by a servant, but even after he had pointed it out, it was some seconds before I noticed any motion. The motion then became rapidly more severe, and I went out on the lawn. By the time that I reached it, the motion was sufficiently severe to render standing very difficult, if not impossible. The ground seemed to undulate from north to south. Trees waved, and my bungalow and out-houses, which are *kutchas* buildings, swayed generally in the same direction. I momentarily expected the cracking of the straining timbers to be followed by the crash of their breaking, but just as severe damage seemed inevitable, the undulating motions decreased in severity, and were succeeded by what seemed to me to be a tilting motion from north to south. I feel convinced that had the shock continued in its severity for ten to twenty seconds longer than it did, very serious damage must have resulted. I took the time when the shock began to diminish, and it was 5-26. The shock must have lasted for some three or four minutes from first to last, but the severe undulations did not last more than a minute, if so long. The water in a small tank was in a disturbed state certainly five minutes after the first tremor. The natives, especially the old women in the evening bazaar, were much frightened, and made a good deal of noise.

8. The damage done was confined to the following buildings :

Dak bungalow.—Interior wall of mud and grass in wooden frame work entirely collapsed. Direction of wall north-east and south-west.

Fire place cracked, and lost its perpendicular by some inches.

Johnstone School.—Interior walls of grass and mud cracked, but not seriously. Direction of walls north and south.

Major O'Donnell's bungalow.—Chimney so badly cracked that it has had to be pulled down.

Surgeon-Captain Wood's bungalow.—Outer walls (*kutchas*) collapsed, or else so badly damaged that all exterior walls had to be taken down.

9. In all the buildings in which damage has occurred, the damaged portions are either old or of poor workmanship. In my opinion the shocks were not severe enough to cause damage to well-built buildings, either *kutchas* or *puccas*.

10. I have heard nothing of any fissuring or of fountains of sand and water such as were seen all over Assam.

11. A subsequent shock took place at 1-30 a.m. on the morning of the 13th instant, and slight tremors were experienced on one or two occasions on the succeeding days.

No. 386, dated Manipur, the 28th June 1897.

From—Lieutenant-Colonel E. H. MOLESWORTH, I.S.C., Officer Commanding Manipur,
To—The Deputy Assistant Adjutant General, Assam District.

I have the honour to forward a report of the late earthquake, in case it may be wanted. At about 5-30 p.m. on Saturday, the 12th instant, Manipur was visited by a severe earthquake; it was accompanied by no noise whatever, and lasted for a considerable time, I should say about one or two minutes, but opinions differ, some saying it lasted at least five minutes. During the earthquake it was difficult to stand, and trees swayed about as if a severe storm was blowing; the wave seemed to travel from north to south, but about this, again, there is a diversity of opinion, some saying the direction was exactly the reverse. For some hours before it occurred there was a strange calm, and clouds hung low and dark all over the valley and birds were silent. Very little damage was done, chiefly, I fancy, owing to the fact that most of the houses are *kutchas*, and that what brick ones there are are fairly low. One chimney was so cracked that it had

to be taken down; the dāk bungalow was damaged; part of the walls of Surgeon-Captain Wood's house fell in, and the remainder had to be taken down; the heads of all the arches of the Quartermaster stores, which is a Manipuri temple very solidly built of brick, show slight cracks, and the plaster of most of the houses is cracked in places, but, beyond what I have already stated, there appears to be no damage of any consequence. The shock was severely felt at Kunjupkhul, but not at all at Ukrul to the east of Manipur. The road from here to Kohima is untouched, and from what I can gather, so is the road to Silchar. Slight shocks were felt subsequently, one at 2 p.m. on the 12th, 7-45 a.m. 13th, and 1-15 p.m. on the same date, besides many others, which were so slight as to be hardly noticeable. Much greater damage appears to have been done beyond Kohima and at Silchar.

APPENDIX XII.

Report by Major J. SHAKESPEAR, I.S.C., C.I.E., Offg. Political Officer, North Lushai Hills, on the effects of the earthquake in the North Lushai Hills, No. 281, dated Aijal, the 2nd July 1897.

In reply to your telegram of the 21st June 1897, I have the honour to state that the recent earthquake was observed by European officers at three places in this district, *vis.*, in Aijal itself, in the valley of the Dhalleswar river, and at Hrangliena's village, about 11 miles north of Aijal.

2. I was at the last place myself, and was standing at the eastern edge of the small level spot on which part of the village was built, looking almost east across the valley of the Sonai, when I felt a slight movement of the earth followed by a prolonged swaying motion. I pulled out my watch at the first moment, and noted the time. The motion of the earth was sufficient to make it impossible to stand when facing either east or west, and the sepoys who came running out of the Zalbuk fell down several times in getting down the rough slope of logs leading down from it. There were several isolated trees about 9 inches or a foot in diameter standing close by, and these swayed from east to west as if they were being moved by a high wind. The village being built of timber, no damage was done. It was hard to say exactly when the shock actually stopped, as the motion ceased gradually, and the sensation of being rocked lasted after the earth had stopped moving, but, as far as I could judge, the motion lasted a little over $1\frac{1}{2}$ minutes. My watch was not right at the time, so I can't say the hour at which the shock occurred.

3. At Aijal, I have received accounts of the shock from Captain Loch, Mr. Knight, and my wife. Captain Loch was in his house, which is of stone; he stood in the verandah, and placed his hand against the wall, and the whole house seemed to heave towards him from north to south or *vice versa*; he then went outside, and looked down a tank which is in course of construction near his house. The tank is 20 feet deep and 12 feet in diameter, and there was water in it to the depth of about 2 or 3 feet. Captain Loch describes this water as being much agitated, as if it was boiling. Mr. Knight also thought that the motion of the earth was north to south or south to north, and also timed the shock as lasting $1\frac{1}{2}$ minutes. Some minutes after the shock had ceased, he went out and noticed that the water in the largest of the tanks, one about 80' x 60' and some 8 or 10 feet deep, was still in a state of movement, waves, some 6 inches high, moving across the tank from north to south. Mr. Knight has inspected the stone buildings, and reports that there has been no damage done. A few slight cracks exist, but they in no way endanger the buildings and will cost nothing to repair. Mrs. Shakespear was sitting at a table, looking east, when she suddenly felt the table heave towards her, and, running outside, she saw the whole house swaying. I may mention that Captain Loch and Mr. Knight were both on spurs running out from the main ridge to the east, whereas our house is on the main ridge itself, which runs north and south; this may account for the different direction of the motion felt. The telegraph clock showed 5-27 (local time).

4. Surgeon-Captain MacLeod and Lieutenant Bridges were at Sairang on the day, and in the afternoon, about 1-30, while sitting in the bungalow, which is raised about 8 feet on piles, they felt a distinct oscillation from east to west, which lasted about 10 seconds. About 5-30 p.m. the same day, when these two officers were in a boat about half a mile below Sairang, they noticed waves breaking up the left or western bank of the river with sufficient force to throw small fishes up on to the rocks. At the time they were busy poling and did not pay much attention, thinking that the waves

were caused by the progress of their own boat. Since then, however, Surgeon-Captain MacLeod has passed the same place in a boat in the same way, and has not seen these waves. It is evident that the shock was felt less at the bottom of the valley. Mr. Bridges' servant, who was in the bungalow at Sairang at the time, said the house rattled as a train does when in motion.

5. Mr. Knight says he felt a slight tremor on the next day, 13th, at 1-21 p.m.

APPENDIX XIII (a.)

(a) Surgeon-Major E. F. H. DOBSON'S demi-official report to the Personal Assistant to Chief Commissioner, dated Dhubri, the 29th July 1897.

I regret I am unable to send you particulars regarding the time and frequency of the several shocks of earthquakes we have had since 12th June. I only recorded them since 18th June, and stopped doing so on the 22nd. They are as follow:

Dhubri, 18th June 1897.

9-30 a.m.
12-15 p.m.
1-45 "
1-55 "
4-0 "
6-10 "
7-26 "
10-30 "
11-55 "

Dhubri, 20th June 1897.

7-0 a.m.
9-45 "
11-35 "
1-15 p.m.
1-50 "
10-30 "

Dhubri, 19th June 1897.

3-0 a.m.
5-15 "
6-8 "—Very severe.
6-34 "
10-28 "
11-20 "

Three between this time and the next were felt by others, but the times were not recorded.

9-0 p.m.
9-20 "
10-15 "

Dhubri, 21st June 1897.

1-55 a.m.
7-0 "
7-12 "
11-45 "
11-47 "

I then left Dhubri by steamer at 3-30 p.m. for Goalpara.

Goalpara, 22nd June 1897.

5-46 a.m.—I was out in the open at the time.
6-48 "—Severe.
7-36 "
7-39 "
8-7 "
8-20 "
8-35 "
10-7 "
10-11 "
11-37 "
11-43 "
11-49 " }—Between these two
12-55 p.m. } shocks I was out in
1-7 " } the open.

1-14 p.m.
1-34 "
2-57 "
3-18 "
5-22 "
5-34 "
5-43 " }—Severe.
5-55 " }
6-31 "
6-35 "
6-42 "
7-5 "—Very long and severe.
Within 10 minutes after this I embarked on board the mail steamer for Dhubri.

Since receipt of your letter I have arranged to keep a record of all shocks felt in Dhubri and at several outlying stations by fairly reliable men, and these, as requested by Mr. Cotton, will be sent direct to the Director, Geological Survey of India, in accordance with the instructions issued by that department, and received by me only two days ago. Most of the shocks recorded by me between 18th and 22nd June

would come under the designation "Smart," several only just falling short of being "Severe." I regret I discontinued recording them when I did, but the fact is they were so frequent that one got quite used to them, and missed them when they did not follow at short intervals. Many of the shocks were preceded by a sort of rumble. At Goalpara, most heard this rumble, and frequently a rumble was heard there, but no earthquake felt. For quite three weeks I seemed to notice a tremor continuously present, and others bore me out in this opinion.

Perhaps the statement given above may be of interest to the Geological Department.

APPENDIX XIII (b).

(b) *Observations by Mr. H. CORKERY, Assistant Secretary to the Chief Commissioner.*
ROUGH REGISTER OF EARTHQUAKE SHOCKS.

12th June 1897.

5-12 p.m.—Great earthquake shock. All nine pillars of seismometer fell, direction from south-west by south (five degrees) to north-east; lasted $2\frac{1}{2}$ minutes roughly. (No record of numerous subsequent shocks, which averaged from 300 to 400 per diem up to 18th.)

18th June 1897.

1-30 a.m.—Sharp shock; 1 pillar fell. (No record of other shocks.)

19th June 1897.

5-15 $\frac{1}{2}$ p.m.—Severe shock, lasting 80 seconds, 3 pillars fell. Nos. 0 and 2 fell from west to east, and No. 1 from south-west by west to north-east by north. (No record of other shocks until 24th June.)

24th June 1897.

8-47 a.m.—Short and sharp, like a Barisal gun.
1-27 " —Slight rumble.
2-33 p.m.—Prolonged rumble.
3-44 $\frac{1}{2}$ " —Slight rumble.
3-51 $\frac{1}{2}$ " —Sharp shock.
4-20 " — Ditto.
6-19 $\frac{1}{2}$ " —Slight rumble.
8-50 $\frac{1}{2}$ " —Long rumble.
9 o'clock—Long rumble. No record kept between 24th June and 12th July.

12th July 1897.

8-33 p.m.—Two pillars fell west to east, severe, 30 seconds.
Record of other shocks on 12th not taken and no record kept until 15th July.

15th July 1897.

6-12 a.m.—Barisal gun, sharp and short.
7-6 " } —Slight booms, short duration.
7-30 " }
8-19 " —Two consecutive shocks, short, sharp and severe.
12-15 p.m.—Slight bumpy shock.
1-15 $\frac{1}{2}$ " —Distant and prolonged rumble.
1-30 $\frac{1}{2}$ " —Slight rumble.
2-8 " —Short sharp shock.
5-6 " —Slight rumble, continuous.
8-55 " —Fairly sharp shock, short.
9-56 " —Sharp shock, short.
11 p.m. to 12 midnight—Five more or less severe shocks (time not recorded).

16th July 1897.

7-5 a.m. } —Gentle under-ground tremors,
7-21 " } short.
8-5 " —Distant and prolonged shock, slight.
2-3 p.m.—Slight and short shock.
9-39 " —A long tremor.
10-41 " —A sharp shock followed by prolonged tremor.

17th July 1897.

8-42 a.m.—Sharp shock with prolonged tremor 60 seconds.
8-45 " —Slight and longish tremor.
12-59 $\frac{1}{2}$ p.m.—Slight short shock.
8-12 " —Long low rumble.
10-32 " —Slight shock and tremor.
11-7 " —Bumpy shock, prolonged.
No record kept between 18th and 21st.

21st July 1897.

6-55 a.m.—Long and bumpy shock.
7-2 " }
7-56 " } —Short and slight tremors.
8-57 " }

22nd July 1897.

6 to 7-30 a.m.—Three shocks, slight (time not registered).
12-33 p.m.—Long shock.
1-7 " —Long rumble.
1-53 " —Slight shock.
7-6 " —Slight rumble.

23rd July 1897.

- 7-12 a.m.—Smart and longish shock.
 7-27 " —Smart and short.
 8-51 " —Long and tremulous, 45 seconds,
 fairly sharp.
 10-38 " —Short and slight.
 1-38 p.m.—Long and slight.
 6-53 " } —Slight shocks, short.
 7-12 " }
 11-8 " —Ditto ditto.

24th July 1897.

- 5-13 a.m.—Slight, 30 seconds.
 6-41 " —Slight, 10 "
 8-42 " —Slight, 15 "
 8-54 " —Sharp, 12 "
 3-0 p.m.—Slight, 5 "
 3-20½ " —Low rumble, 12 "
 3-42½ " —Sharp bumpy, 3 "
 4-48 " —Slight, 2 "
 7-4 " —Slight, 2 "
 7-47 " —Slight, 3 "
 9-35 " —Slight and bumpy, 3 seconds.

25th July 1897.

- 9-38½ a.m.—Slight shock, 3 seconds.
 1-16½ p.m.—Slight shock, 3 "
 1-20 " —Slight rumble, 4 "

26th July 1897.

- 9-3½ a.m.—Slight, 2 seconds.
 12-12 p.m.—Sharp and bumpy, 2 seconds.
 2-2 " —Slight and bumpy, 2 "
 7-20 " —Ditto ditto, 3 "
 9-29½ " —Slight rumble, 3 "

27th July 1897.

- 6-40 a.m.—(Approximately). Slight
 bumpy, 5 seconds.
 3-38½ p.m.—Slight rumbling, 25 seconds.
 10-9½ " —Slight bumpy, 20 seconds.
 10-32 " —Slight bumpy, 15 "
 10-54½ " —Slight rumble, 5 "
 11-5 " —Sharp bumpy, 30 "

28th July 1897.

- 4 p.m.—Slight, 3 seconds.
 8-24½ " —Sharp bumpy, 2 seconds.

29th July 1897.

- 12-42½ p.m.—Slight, 2 seconds.
 1-27 " —Slight, 4 "
 2-2 " —Slight rumble, 2 seconds.
 2-16½ " —Slight rumble, 3 "
 10-8 " —Slight and bumpy, 2 seconds.

30th July 1897.

- 12-35 p.m.—Slight tremor, 6 seconds.
 5-32½ " —Slight and bumpy, 2 seconds.
 8-48 " —Slight tremor, 10 seconds.
 8-56 " —Slight and bumpy, 25 seconds.

31st July 1897.

About 4 a.m.—Long and sharp. (Exact time
 not recorded.)

- 1-9 p.m.—Sharp, 8 seconds.
 2-3½ " —Slight rumble, 3 seconds.
 5-29½ " —Slight rumble, 3 "
 5-57 " —Slight rumble, 3 "
 6-48 " —Slight rumble, 2 "
 11-8 " —Sharp and prolonged shock, 50
 seconds.

1st August 1897.

- 5-57 a.m.—Slight, 2 seconds.
 7-37 " —Slight, 2 "
 7-40½ " —Fairly sharp, 6 seconds.
 8-25 " —Fairly sharp, 3 "
 9-6½ " —Slight, 2 seconds.

2nd August 1897.

- 6-50 a.m.—Slight, 3 seconds.
 10-12½ " —Slight, 2 "
 8-53½ p.m.—Very slight, 2 "
 9-2 " —Slight, 3 "
 9-13½ " —Severe bumpy, 90 seconds.
 Three pillars fell—Nos. 0 and 2 west to
 east, and No. 1 south-south-west to north-
 north-east.
 9-22 p.m.—Slight boom, 2 seconds.

3rd August 1897.

- Two slight shocks between 6 and 7 a.m.
 12-12 p.m.—Slight, 5 seconds.
 12-55 " —Rather sharp, 10 seconds.
 8-3 " —Slight, 2 seconds.
 8-39 " —Slight, 2 "
 10-42 " —Slight, 2 "

4th August 1897.

- 9-42 a.m.—Slight, 3 seconds.
 6-25 p.m.—Slight, bumpy, 6 seconds.
 7-41 " —Fairly severe, 8 seconds.
 9-4 " —Slight, 2 seconds.
 10-50 " —Sharp, 6 "

5th August 1897.

3-30 a.m.—Sharp, 10 seconds.
 5 " —Slight, 5 "
 9-44 p.m. }
 9-48 " }
 9-50 " }
 9-54½ " }
 10 " }
 10-4 " } —Slight shocks like distant
 10-4½ " } Barisal guns.
 10-5 " }
 10-27 " }
 10-30 " }
 10-32 " }

6th August 1897.

Two slight ones between 6 and 7 and two between 9 and 12, time not recorded.

4-32 p.m.—Slight rumbling, 6 seconds.
 4-38 " —Slight rumbling, 5 "
 6-40 " —Slight bumpy, 4 "
 8-57 " —Slight rumble, 3 "
 9-27 " —Slight rumble, 2 "
 10-27 " —Slight rumble, 3 "

7th August 1897.

Between 10 and 11 (time not recorded) long, slight rumble, 15 seconds.

1-29 p.m.—Slight rumble, 11 seconds.
 7-29 " —Rather sharp rumble, 7 seconds.
 7-31 " —Rather sharp bumpy, 15 seconds.
 9-12 " —Rather sharp bumpy, 12 "

8th August 1897.

10-3 a.m.—Very slight, 3 seconds.
 10-10 " —Slight bumpy, 8 seconds.
 12-10 p.m.—Rather sharp, 12 "
 4-31 " —Slight (Barisal guns), 2 seconds.
 5-27 " —Slight, 2 seconds.
 7-50 " —Fairly severe, 35 seconds.
 8-6 " —Slight rumble, 2 "
 8-8½ " —Slight rumble, 4 "

9th August 1897.

8-17 a.m.—Slight rumble, 4 seconds.
 8-40 " —Slight rumble, 3 "
 10-21 " —Slight rumble, 6 "
 6-49½ p.m.—Slight but bumpy, 7 "
 7-25 " —Slight rumble, 3 "
 9-37 " —Somewhat sharp shock, 14 seconds.

10th August 1897.

Between 3 and 4 a.m. (time not recorded) a long and fairly sharp shock.

4-48 p.m.—Fairly sharp, 8 seconds.
 9-0 " —Fairly sharp, 6 "
 9-43½ " —Slight rumble, 2 "
 10-44 " —Slight rumble, 5 "

11th August 1897.

10-32½ a.m.—Fairly sharp shock, 15 seconds.
 3-17 " —Slight rumble, 6 "
 7-4½ " —Fairly sharp, 10 "

12th August 1897.

3-5 p.m.—Slight tremor, 4 seconds.
 4-53 " —Slight tremor, 3 "
 6-7 " —Slight tremor, 2 "
 8-22 " —Slight and rumbling, 16 seconds.
 11-2 " —Distant Barisal gun, 2 "

13th August 1897.

1-25 p.m.—Rather sharp, 7 seconds.
 2-14½ " —Fairly sharp, 4 "
 9-33 " —Sharp, 12 "

14th August 1897.

7-18 a.m.—Rather sharp, 8 seconds.
 6-19 p.m.—Slight rumble, 5 "
 6-44 " —Prolonged but slight rumble, 18 seconds.
 8-23 " —Fairly sharp shock, 10 seconds.
 9-53 " —Fairly sharp shock, 25 "
 10-35 " —Sharp shock, 35 "

N.B.—Time given is local time which was checked periodically by telegraph.

APPENDIX XIII (C).

(c) Returns from the Subdivisional Officer of Goalpara.

Date.	Time of occurrence.	Duration.	Apparent direction.	Extent of damage, if any, and general remarks.
1	2	3	4	5
13th June to 30th June 1897.	Day and night at intervals.	Varying from 2 seconds to 1 minute.	South-east ...	No damage reported.
1st to 10th July 1897.	Ditto ditto...	Ditto ditto ...	Ditto ...	Ditto.
11th July 1897 ...	8 to 11 a.m. 4 shocks.	Ditto ditto ...	Ditto ...	Ditto.
	11 a.m. to 3 p.m. 5 shocks.			
	4 p.m. to 7 p.m. 3 shocks.			
	8 p.m. 1 shock.			
	9 " 1 "			
12th " " ...	6 to 11 a.m. 4 shocks.	Ditto ditto ...	Ditto.	
	12 a.m. ...			
	4 p.m. ...			
	6 " ...			
	12 " ...			
	4 a.m. ...			
	6-6 " ...			
13th " " ...	10 a.m. ...	Ditto ditto ...	Ditto.	
	4 p.m. ...			
	6 " ...			
	7 " ...			
14th " " ...	6 a.m. ...	Ditto ditto ...	Ditto.	
	8 " ...			
	9 " ...			
	3 p.m. ...			
	5 " ...			
	8 " ...			
	11 " ...			
	4 a.m. ...			
	5 " ...			
15th " " ...	7 a.m. ...	Ditto ditto	
	8 " ...			
	9 " ...			
	11 " ...			
	2 p.m. ...			
	4 " ...			
	5 " ...			
	8 " ...			
	10 " ...			
	12 " ...			
	3 a.m. ...			
16th " " ...	7 a.m. ...	Ditto ditto ...	South-east.	
	7½ " ...			
	10 " ...			
	11 " ...			
	3 p.m. ...			
	5 " ...			
	8 " ...			
	9 " ...			
	10½ " ...			
	11 " ...			
	5 a.m. ...			

(c) Returns from the Subdivisional Officer of Goalpara—continued.

Date.	Time of occurrence.	Duration.	Apparent direction.	Extent of damage, if any, and general remarks.
1	2	3	4	5
17th July 1897 ...	7 a.m. ...	Varying from 2 seconds to 1 minute.	South-east.	
	11 " ...			
	12 " ...			
	2 p.m. ...			
	3 " ...			
	5 " ...			
18th " " ...	8 " ...	Ditto ditto ...	Ditto.	
	4 a.m. ...			
	5 a.m. ...			
	7 " ...			
	7½ " ...			
	9 " ...			
19th " " ...	12 " ...	Ditto ditto ...	Ditto.	
	4 p.m. ...			
	2 a.m. ...			
	6 " ...			
	7 a.m. ...			
	8 " ...			
20th " " ...	11 " ...	Ditto ditto ...	Ditto.	
	1 p.m. ...			
	4 " ...			
	5 " ...			
	9 " ...			
	9½ " ...			
21st " " ...	10 " ...	Ditto ditto ...	Ditto.	
	3 a.m. ...			
	6 a.m. ...			
	7 " ...			
	8 " ...			
	10 " ...			
22nd " " ...	10½ " ...	Ditto ditto ...	Ditto.	
	2 p.m. ...			
	3 a.m. ...			
	5 " ...			
	8 a.m. ...			
	9 " ...			
23rd " " ...	5 p.m. ...	Ditto ditto ...	Ditto.	
	8 " ...			
	9 " ...			
	9½ " ...			
	6 a.m. ...			
	7 " ...			
24th " " ...	11 " ...	Ditto ditto ...	Ditto.	
	7 p.m. ...			
	7½ " ...			
	8 " ...			
	7 a.m. ...			
	11 " ...			
24th " " ...	8 p.m. ...	Ditto ditto ...	Ditto.	
	8½ " ...			
	11 " ...			
	6 a.m. ...			
	6½ " ...			
	9 " ...			
24th " " ...	10 " ...	Ditto ditto ...	Ditto.	
	10 " ...			
	1 p.m. ...			
	2 " ...			
	6 " ...			
	10 " ...			

(c) Returns from the Subdivisional Officer of Goalpara—continued.

Date.	Time of occurrence.	Duration.	Apparent direction.	Extent of damage, if any, and general remarks.
1	2	3	4	5
25th July 1897 ...	6½ a.m. ... 7 " ... 8 " ... 8½ " ... 9½ " ... 10 " ... 12 " ... 1 p.m. ... 5 " ... 8 " ... 9 " ... 10 " ... 5 a.m. ...	Varying from 2 seconds to 1 minute. 2 minutes ...	South-east. 	
26th " " ...	7 a.m. ... 8 " ... 10 " ... 11 " ... 11½ " ... 3 p.m. ... 4½ " ... 8 " ... 9 " ...	Varying from 2 seconds to 1 minute. 	South-east.	Very severe shock, with rumbling sound.
27th " " ...	6 a.m. ... 8 " ... 8½ " ... 12 " ... 5 p.m. ... 8 " ... 9 " ... 9½ " ... 12 " ... 1 a.m. ...	Ditto ditto ...	Ditto.	
28th " " ...	7 a.m. ... 7½ " ... 8 " ... 9 " ... 11½ " ... 2 p.m. ... 3 " ... 7 " ... 1 a.m. ...	Ditto ditto ...	Ditto.	
29th " " ...	6 a.m. ... 8 " ... 9 " ... 2 p.m. ... 2½ " ... 4 " ... 7 " ... 8 " ... 8½ " ... 3 a.m. ...	Slight ... Nearly one minute	Ditto. Ditto ...	With rumbling sound.
30th " " ...	6 a.m. ... 7 " ... 9 " ... 12 " ... 1 p.m. ... 5 " ... 8 " ... 9 " ... 9½ " ... 3 a.m. ... 4 " ...	Slight ... Severe, nearly one minute,	Ditto. Ditto ...	With roaring sound.

(c) Returns from the Subdivisional Officer of Goalpara—continued.

Date.	Time of occurrence.	Duration.	Apparent direction.	Extent of damage, if any, and general remarks.
1	2	3	4	5
31st July 1897 ...	6 a.m. ...	Slight ...	South-east ...	Slight shock with low sound. Severe shock with rolling sound. Slight ditto ditto. Severe ditto ditto.
	6½ " ...	} 30 seconds ...	} Ditto ...	
	7 " ...			
	7½ " ...	} 1 minute ...	} Ditto ...	
	9 " ...			
	10 " ...	} 30 seconds ...	} Ditto ...	
	11 " ...			
	1 p.m. ...	} 1 minute ...	} Ditto ...	
11 " ...				
1st August ,, ...	3 a.m. ...	30 seconds ...	Ditto ...	Slight ditto ditto. Severe ditto ditto.
	3 a.m. ...	1 minute ...		
	6 " ...	} 30 seconds ...		
	7 " ...			
	7½ " ...	} 1 minute ...		
	8 " ...			
	8½ " ...	} 30 seconds ...		
	9 " ...			
	11 " ...	} 1 minute ...		
	12 p.m. ...			
	1 " ...	} ½ minute ...		
	3 " ...			
	4 " ...	} 1 ditto ...		
	6 " ...			
8 " ...	} ½ ditto ...			
10 " ...				
1 a.m. ...	} 1 ditto ...			
4 p.m. ...				
2nd " " ...	7 a.m. ...	} 1 minute ...	North-west ...	Slight shock. Severe shock. Somewhat severe. Slight. Very severe, with rumbling sound, second only in severity to that of 12th June 1897, but no damage reported except that part of the walls of the school came down and a <i>kutch</i> house fell. Slight. Ditto.
	7½ " ...			
	9 " ...			
	10 " ...			
	12 " ...			
	2 p.m. ...			
	2 " ...			
	3½ " ...			
	4 " ...			
	8 " ...			
	9½ " ...			
	½ " ...			
	10 " ...			
	1 a.m. ...			
4 " ...				
5 " ...				
3rd " " ...	6 " ...	} ½ minute	Ditto ...	With low rumbling sound. Somewhat severe, with low rumbling sound.
	6½ " ...			
	7 " ...			
	7½ " ...			
	8 " ...			
	10 " ...			
	1 p.m. ...			
	4 " ...			
	9½ " ...			
10 " ...				
10½ " ...				
11 " ...				
3 a.m. ...				
4th " " ...	5 " ...	} ½ minute	North-west.	Ditto. Ditto. Ditto. Ditto.
	6 " ...			
	8 " ...			
	8½ " ...			
	9 " ...			

(c) Returns from the Subdivisional Officer of Goalpára—concluded.

Date.	Time of occurrence.	Duration.	Apparent direction.	Extent of damage, if any, and general remarks.	
1	2	3	4	5	
4th August 1897— <i>contd.</i>	11 a.m. ...	$\frac{1}{2}$ minute ...	North-west.		
	2 p.m. ...	Ditto ...	Ditto.		
	4 " ...	Ditto ...	Ditto.		
	7 " ...	1 Ditto ...	Ditto.		
	9 " ...	$\frac{1}{2}$ Ditto ...	Ditto.		
	9 $\frac{1}{2}$ " ...	Ditto ...	Ditto.		
	1 a.m. ...	Ditto ...	Ditto.		
	4 " ...	Ditto ...	Ditto.		
5th " " ...	7 " ...	About $\frac{1}{4}$ minute...	Ditto.		
	8 " ...	Ditto ...	Ditto.		
	9 " ...	Ditto ...	Ditto.		
	10 " ...	Ditto ...	Ditto.		
	11 " ...	Ditto ...	Ditto.		
	11 $\frac{1}{2}$ " ...	Ditto ...	Ditto.		
	4 p.m. ...	Ditto ...	Ditto.		
	7 " ...	Ditto ...	Ditto.		
	10 " ...	Ditto ...	Ditto.		
	10 $\frac{1}{2}$ " ...	Ditto ...	Ditto.		
	2 " ...	Ditto ...	Ditto.		
6th " " ...	5 a.m. ...	$\frac{1}{2}$ Ditto ...	South-east.		
	6 " ...	Ditto ...	Ditto.		
	7 " ...	Ditto ...	Ditto.		
	9 " ...	Ditto ...	Ditto.		
	10 " ...	Ditto ...	Ditto.		
	12 " ...	$\frac{1}{2}$ Ditto ...	Ditto.		
	4 p.m. ...	$\frac{1}{4}$ Ditto ...	Ditto.		
	7 " ...	Ditto ...	Ditto.		
	8 " ...	Ditto ...	Ditto.		
	9 " ...	Ditto ...	Ditto.		
	11 " ...	Ditto ...	Ditto.		
	4 a.m. ...	Ditto ...	Ditto.		
	7th " " ...	6 " ...	Ditto ...	West.	
8 " ...		Ditto ...	Ditto.		
9 " ...		Ditto ...	Ditto.		
9 $\frac{1}{2}$ " ...		Ditto ...	Ditto.		
11 " ...		Ditto ...	Ditto.		
4 p.m. ...		Ditto ...	Ditto.		
6 " ...		Ditto ...	Ditto.		
8 " ...		Ditto ...	Ditto.		
9 " ...		Ditto ...	Ditto.		
12 " ...		Ditto ...	Ditto.		
8th " " ...		5 a.m. ...	Ditto ...	Ditto.	
		6 " ...	Ditto ...	Ditto.	
	6 $\frac{1}{2}$ " ...	Ditto ...	Ditto.		
	8 " ...	Ditto ...	Ditto.		
	9 " ...	Ditto ...	Ditto.		
	9 $\frac{1}{2}$ " ...	Ditto ...	Ditto.		
	11 " ...	Ditto ...	Ditto.		
	4 p.m. ...	Ditto ...	Ditto.		
	6 " ...	Ditto ...	Ditto.		
	8 " ...	Ditto ...	Ditto.		
	9 " ...	Ditto ...	Ditto.		
	12 " ...	Ditto ...	Ditto.		
	9th " " ...	6 a.m. 1 shock	Ditto ...	South-east	
7 " 1 "		Ditto ...	Ditto.		
8 $\frac{1}{2}$ " 1 "		Ditto ...	Ditto.		
8 " 1 "		Ditto ...	Ditto.		
9 " 1 "		Ditto ...	Ditto.		
10 " 1 "		Ditto ...	Ditto.		
12 " 1 "		Ditto ...	Ditto.		
4 p.m. 1 "		Ditto ...	Ditto.		
6 " 1 "		Ditto ...	Ditto.		
8 " 1 "		Ditto ...	Ditto.		
9 " 1 "	Ditto ...	Ditto.			

APPENDIX XIII (D).

(d) Returns from the Deputy Commissioner, Sibságar.

Date.	Time of occurrence.	Duration.	Apparent direction.	Extent of damage, if any, and general remarks.
1	2	3	4	5
12th June 1897 ...	5-25 p.m. ...	6 minutes ...	Roughly speaking east and west.	A vibratory motion was first experienced, which was succeeded by undulations conveying the sensation of being on a ship at sea. Racks in the record-rooms of my office tumbled down. No report has yet been received from the interior.
13th " " ...	1 a.m. ...	15 seconds ...	Ditto ditto ...	Slight jerking was felt. No damage reported.
	1 p.m. ...	1 minute ...	Ditto ditto.	
	2 " ...	5 seconds ...	Ditto ditto.	
	2-30 p.m. ...	15 " ...	Ditto ditto.	

APPENDIX XIII (E.)

(e) Returns from the Subdivisional Officer, Golághát.

Date.	Time of occurrence.	Duration.	Apparent direction.	Extent of damage, if any, and general remarks.
1	2	3	4	5
12th June 1897 ...	5-15 p.m. ...	About 3 minutes	West-South-West to East-North-East.	A severe shock, lasting about 3 minutes, was experienced in nearly every part of the subdivision. The area of greatest intensity appears to have been that included in a strip 10 miles broad (5 miles on either side of Golághát) running roughly north-west and south-east through Golághát. In Golághát station the outer wall of the treasury was cracked and broken. The subdivisional bungalow was badly shaken, but not severely injured. Brick buildings in the tea gardens of the subdivision suffered considerably, the damage being apparently most severe in the area referred to. One death only is reported, that of a boy in the Badlipar tea house. Considerable damage is reported from the Khumtal, Missamara, Rangmati, Badlipar, Halmira, Hautly gardens. Slight damage from Nigriring, Socklatenga, Doeria, Barkathani, and Golághát gardens. No damage done.
	10-0 " ...	Momentary ...	Unknown ...	A sharp shock. No damage done.
13th " " ...	1-25 a.m. ...	10 seconds ...	Ditto ...	
	1-50 " ...	Ditto ...	Ditto ...	
	9-0 " ...	Ditto ...	Ditto ...	
	11-30 " ...	Ditto ...	Ditto ...	
	1-25 " ...	8 Ditto ...	Ditto ...	
14th " " ...	8-15 " ...	5 Ditto ...	Ditto ...	

APPENDIX XIII (F).

(f) Returns from the Subdivisional Officer, Forhát.

Date.	Time of occurrence.	Duration.	Apparent direction.	Extent of damage and general remarks.
1	2	3	4	5
12th June 1897 ...	5-23 p.m. ...	7 minutes ...	West to East...	Please see this off. 524G., dated the 12th June 1897.
	11-10 " ...	2 seconds ...	Ditto ...	<i>Nil.</i>
	1-15 a.m. ...	3 " ...	Ditto ...	<i>Nil.</i>
	5-3 " ...	2 " ...	Ditto ...	<i>Nil.</i>
13th " " ...	1-15 p.m. ...	2 " ...	Ditto ...	<i>Nil.</i>
	2-12 " ...	2 " ...	Ditto ...	<i>Nil.</i>
	About 2-40 p.m.	1 " ...	Ditto ...	<i>Nil.</i>

APPENDIX XIII (G).

(g) Returns from the Deputy Commissioner, Lakhimpur.

Date.	Time of occurrence.	Duration.	Apparent direction.	Extent of damage, if any, and general remarks.
1	2	3	4	5
12th June 1897 ...	About 5-30 p.m.	About 4 minutes..	North to South	The shock was severe. of the <i>pucca</i> building been slightly damaged. shock was continued the time stated. done in the interior known.
13th " " ...	Between 1 and 1-30 a.m.	About 2 seconds..	Ditto ...	The shock was slight. damage is reported.
	Between 1 and 1-15 p.m.	Ditto ditto ...	Ditto ...	Ditto di