M.R.O. 1—77,006—8-6-37.

(1) Number of pages 7

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MADRAS RECORD OFFICE.

Government of Madras.

(Public works) **DEPARTMENT.**

G.O. No. 293 Press / Mis.,
583-584

Dated 31- 1 1871.

Not to be folded or roughly handled

No. 583. Read the following letter from the Deputy Secretary to the Government of India, Public Works Department, (Buildings and Roads—Military,) to the Secretary to the Government of Madras in the Public Works Department, dated Fort William, 20th December 1870, No. 1,390, B—M :—

I AM directed to forward herewith for circulation amongst all the officers and subordinates of the Public Works Department in ——— the accompanying copies of the Resolution of the Government of India noted on the margin, on the subject of a late accident to a Store-room of the Gun Carriage Factory at Allahabad.

Nos. 1,294—5 B—M, dated the 30th Nov. 1870.

Proceedings of the Government of India, Public Works Department, (Buildings and Roads—Military,) dated Fort William, 30th November 1870, Nos. 1,294—5 B—M.

Accident to Store-room of Gun Carriage Factory in course of construction at Allahabad.

Read the following:—

Telegram to Colonel Alexander, dated 3rd June 1870.

From Superintending Engineers, 3rd Circle, North-Western Provinces, No. 1,774, dated 1st July 1870.

,, ,, ,, No. 1,809, dated 5th July 1870.

Public Works Department Resolution, Nos. 681—85 B.—M, dated 6th July 1870.

Telegram to Lieutenant-Governor, dated 5th July 1870.

From Government, North-Western Provinces, No. 1,998, dated 2nd July 1,870, and enclosures.

Public Works Department Resolution, No. 686 B.—M., dated 7th July 1870.

From Government, North-Western Provinces, No. 1,618, dated 14th July 1870.

From Government, North-Western Provinces, No. 2,403-A, dated 13th August 1870, and enclosures.

RESOLUTION.—At the end of June last, the attention of His Excellency the Governor-General in Council was drawn to a report in the public papers that an accident, accompanied by loss of human life, had occurred to one of the buildings in course of construction at the Gun Carriage Factory at Allahabad.

2. His Honour the Lieutenant-Governor being at the time absent from Allahabad, the Superintending Engineer at that place was called upon for an immediate report, which was shortly received. From this report it appeared that the accident was of so serious a nature that the Governor-General in Council considered it necessary to appoint a special Committee to investigate the matter fully. The Committee was composed as follows:—

PRESIDENT:

Major-General TRAVERS, V. C.,
Commanding the Allahabad Division.

MEMBERS:

Colonel J. C. ANDERSON, C. S. I., R. E.,
Officiating Inspector-General of Irrigation.

Mr. R. M. BRERETON, *Chief Engineer, G. I. P. Railway, North-East Extension.*

The last-named gentleman having consented to undertake the duty, his services were placed at the disposal of Government for the purpose, through the courtesy of the Agent of the Railway.

3. The Committee were directed to report, through the Government of the North-Western Provinces, on the causes which had led to the catastrophe, and on the responsibility of the several officers of the Public Works Department, contractors, or others, in any way connected with the design or construction of the building.

4. The Committee were also instructed to examine all the other buildings of the new factory, particularly those that would be subject to the vibration caused by machinery in motion, and to report on their state.

5. The Committee were further directed to inspect any buildings at Allahabad constructed lately, wholly or in part, by the same agency (whether officers of the Public Works Department, or contractors) as that employed on the building which had failed, and to examine and report separately on the general condition of the new Soldiers' Barracks.

6. The appointment of this Committee was communicated by telegraph to the Lieutenant-Governor on the 5th July.

7. The Committee assembled at Allahabad on the 13th July, and submitted their report on the 22nd idem to the Lieutenant-Governor, by whom it was sent to the Government of India, with a Minute by himself and a Note by the Chief Engineer.

8. The primary object of the appointment of the Committee will first be considered.

9. The building to which the accident occurred was intended for a store-room, and consisted of three compartments, each compartment being 170 feet long × 45 feet wide, the width being divided by a longitudinal arcaded wall down the centre, having piers 2½ feet square with arches of 14½ feet span and rise of 4 feet, the springing of the arches being at a height of 13 feet above the floor-level.

10. The walls, piers, and arches were all of brick-work throughout, as were also the foundations.

11. The roof was flat and composed of sâl beams 13 inches × 9 inches placed 3½ feet apart from centre to centre, resting on the outer and centre walls, and supporting stone slabs 2 inches thick, which were covered by terracing 4 inches thick.

12. The Superintending Engineer estimated the weight of the roof covering, allowing for absorption and the weight of work-people employed, at about 120 lbs. per foot superficial.

13. At the time of the accident (the 23rd June) the west compartment had been roofed in; the centre compartment was about three-fourths covered; and the walls of the third compartment were finished, but the roofing of it had not been commenced. Twenty-two work-people were employed in terracing the centre compartment when the whole roof of this compartment gave way, owing, it is supposed, to the failure of the centre wall, and eighteen out of the twenty-two work-people who had been on the roof fell with it, and had to be extricated from the ruins. Of these eighteen, four were reported to have died by the 1st July, and seven others to have sustained serious injuries.

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14. The walls of this building were begun in February 1868, and finished in September of the same year, but were left unroofed till February 1870, owing partly to delay in the supply of timber, and partly to the reduction made in the Public Works grant.

15. There appears, from the report of the Committee, to be no doubt that the failure of the centre wall was the cause of the accident. The Committee further report that the brick-work of this particular building in question, and, indeed, of all the other buildings of the factory, so far as the quality of the bricks and their setting is concerned, is excellent; that the pointing of the joints is particularly good and clean, but that the mortar used is of the most inferior description, and that it is to the worthless character of this mortar that the failure of the wall is mainly to be attributed.

16. The weakness of the walls, due to their construction with bad mortar, was, in the opinion of the Committee, increased by the exposure of the walls to the rains of 1869, which, had the mortar been of good quality, would not have been in any way the cause of injury. As a minor cause, which might possibly have contributed, in some degree, to the catastrophe that occurred, the Committee mention that the terracing, being in progress from one side only of the compartment, might have exercised a side thrust on the central longitudinal wall.

17. The bad quality of the mortar was not confined to the one building, but was observable in all the other buildings of the factory, including sheds for machinery to be driven by steam-power and a chimney-shaft 123½ feet high.

18. There was no sign of settlement in the foundations of any of the buildings, though the Committee turned their particular attention to this point; and as regards the designs, the Committee, referring to the factory buildings generally, say they consider the whole to be very good; one or two points are mentioned in which improvement is considered by them to be possible, but their suggestions are unimportant, and refer chiefly to the machinery sheds.

19. As regards the mortar, it is reported that it was composed of kunkur burnt with oopla (cow-dung cakes) and soorkhee (pounded brick), the specified proportions being one part of lime to one part of soorkhee. From evidence adduced, however, there can be no doubt that the lime, which was burnt by a contractor near the site of the works, was delivered with a large admixture of wood-ashes and the refuse of soap-boiling operations, in both of which materials, it seems from the Committee's report (which has been fully confirmed by a subsequent enquiry made by the Magistrate in conjunction with the Superintending Engineer) a regular trade had long been carried on.

20. But in whatever way the deterioration of the lime was effected, it is clear that the mortar was quite unfit for the purpose for which it had been used, for an analysis made by Assistant Surgeon Hamilton, R. A., of specimens taken at random from one of the walls, showed that it contained only 6 per cent. of lime.

21. Subsequent analyses made by Dr. Murray Thomson also showed that the mortar contained a large proportion of alkaline salts, and that the per-centage of lime was very small.

22. The analyses confirm what was evident from an inspection of the mortar, and the Governor-General in Council is satisfied that the accident may be attributed almost entirely, if not altogether, to the bad quality of the mortar. It remains, therefore, to enquire in what degree the responsibility for the use of the bad mortar rests on each of the individuals concerned in the execution of the work, both in the building which fell, and in the other buildings of the factory.

23. The person in immediate charge of the construction of the buildings in question was Supervisor Bartram, who is a fitter by trade, and who passed out of the Roorkee College and entered the Public Works Department as Overseer in 1862. He appears to have been first employed on the Deccan road, where a number of masonry bridges were erected under his superintendence, the experience gained on which should have rendered him thoroughly acquainted with the qualities of mortar.

24. In his evidence before the Committee, he stated that he did not consider a specimen of mortar which was shown to him to be good, and that he had, on various occasions, rejected mortar brought for use on the works. Still the fact remains that the building which failed, and many others in the factory, were built under his immediate superintendence with absolutely worthless mortar.

25. His length of service and practical experience on masonry works leave him no excuse for ignorance as to the quality of the mortar he saw daily used on an extensive scale on the works under his charge. The Committee and the Lieutenant-Governor consider that he has proved himself thoroughly unfit for the place he holds.

26. The Governor-General in Council is of opinion that Supervisor Bartram has failed in the proper discharge of one of the simplest, yet most important, of the duties assigned to members of the Upper Subordinate Establishment, and deems it necessary to remove him from the Public Works Department. His removal should be ordered by the Local Government.

27. The Executive Engineers in charge of the works were Major W. Jackson of the Bengal Staff Corps from the time the buildings of the factory were commenced in March 1867, until the 5th February 1870, when he made over the charge to Mr. R. J. Clarke, the present Executive Engineer.

28. Under the former Officer, therefore, the whole of the work which has failed was carried out, and also the majority of the other buildings in which bad mortar was used.

29. Both the Committee and the Lieutenant-Governor bear testimony to this Officer's diligence, to his almost daily attendance at the works, to the general good quality (with the one important exception of the mortar), of the brick-work executed under his orders, to the pains and forethought evinced in his correspondence and specifications, and to his unquestionable anxiety to discharge his duties to the best of his ability.

30. The Lieutenant-Governor, however, has stated that Major Jackson is wanting in the qualities essential to a successful service in the Department of Public Works, particularly in energy and power of control, and that he trusted too much to his subordinates. It may be further noticed that the unfitness of

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this officer for the important post of Executive Engineer is borne out by the unskilful manner in which, as brought to light in the papers submitted, he designed an ordinary scarf for a beam; the error made was a very flagrant one, evincing ignorance of the elementary principles of carpentry. His Excellency the Governor-General in Council considers that the opinions expressed regarding Major Jackson are amply borne out by the evidence adduced, and that it is impossible to arrive at any conclusion but that this officer should be removed from the Public Works Department. He will accordingly be re-placed at the disposal of the Military Department.

31. Mr. Clarke is not in any way responsible for the work in the walls of the building that failed. The Committee however report that they saw no improvement in the quality of the mortar used in the factory buildings during the four-and-a-half months that Mr. Clarke had been in charge of the division, but mention the fact that he had stopped certain of the contractors' works elsewhere, in consequence of being dissatisfied with the mortar, which, the Committee add, was much superior to what was being used in the Gun Carriage Factory buildings. The Governor-General in Council accepts the opinion of the Committee with reference to this Officer, to the extent that it might reasonably be presumed that he would not much longer have delayed effecting an improvement in the work at the factory also; but it nevertheless appears to His Excellency in Council that Mr. Clarke is not free from blame, as he should have made a thorough inspection of all buildings in progress immediately after assuming charge of his division, and that had this duty been properly discharged he ought not to have failed to discover the bad quality of the mortar at once. He should be warned that this instance of remissness will be recorded against him in the promotion rolls, and that any further shortcoming on his part that may be brought to the notice of the Government of India will be dealt with severely.

32. The Superintending Engineers in charge of the Circle whilst the various buildings for the factory were in progress, were—

Lieutenant-Colonel C. D. Newmarch, R. E. (since dead), from 6th January 1868 to 31st October 1868.

Major F. H. Cobbe, R. A., from 1st November 1868 to 13th April 1869.

Lieutenant-Colonel H. Rose, S. C., from 13th April 1869 to 2nd May 1870.

Lieutenant-Colonel F. Alexander, S. C., from 2nd May 1870 to the present time.

33. The work on the store-room, the failure of which led to the present enquiry, was all carried out during the incumbency of the first of these officers. He joined the circle in bad health, having shortly before met with a severe accident, and in consequence of this was permitted by the Local Government, when proceeding on inspection to Raneekhet in April 1868, to remain there for two months to arrange about the laying out of the new station. In ordinary course, he would have returned to his head-quarter station in June of the same year, but his medical advisers would not permit this, and His Honor allowed him to continue to perform his duties at Nynee Tal on its being represented to him by Colonel Hodgson, the Chief Engineer, that he (Colonel Hodgson) would be present at Allahabad in case of any emergency arising. Colonel Newmarch's health did not improve, and he was unable to leave Nynee Tal till late in October

1868, when he was transferred to Oudh as Chief Engineer, and not long after was obliged to take leave on medical certificate, and died on his way home. He had previously proved himself to be an efficient Officer. On his case, it is unnecessary to make further comment.

34. Major Cobbe did not assume charge of the circle until the wall which fell had been completed; but during the whole of the cold season of 1868-69 he held the post of Superintending Engineer, and failed to ensure any improvement during that time in the quality of work. An Inspection Report sent in by him in March 1869 makes no mention of any inferiority in the work. The opinion of the Committee, that this officer failed in his duty in not having detected the defects of the mortar used generally in the numerous buildings under construction during his incumbency, is fully concurred in by the Governor-General in Council, and the Lieutenant-Governor has recorded his opinion that "neglect of duty is more attributable to Major Cobbe than to any other of the Controlling Officers."

35. It is submitted in extenuation that he had for a long time been, as indeed he now is (having been obliged lately to take leave on medical certificate) in an infirm state of health; this fact may be admitted, but taken in connection with the reports in this case, and in that relating to bad work in certain buildings in the Cantonment (to be noticed in a separate Resolution), it is clear that it is not desirable to retain him in the Department Public Works. His services, therefore, will also be re-placed at the disposal of the Military Department.

36. Lieutenant-Colonel Rose, who was the next Superintending Engineer, and who held charge of the circle for a year, reports that he visited the works at the factory four or five times, but that he never made what he calls a "formal inspection" of them, saying that he deferred doing so until he had visited the various other out-lying divisions of his charge. The division, the inspection of which was thus left to the last, was, in regard to works in progress, the most important one in his circle, and the one in which he usually resided.

37. He, however, commenced the formal inspection of this particular division; but before he had completed it, he heard of his probable transfer to another province, and therefore thought it useless to go on with it. In his replies to the Committee he also says that, as he had not occasion to make a "formal inspection," he never thought it necessary to scrutinize the work very closely, and he never brought forward any cases in which he was dissatisfied with Major Jackson's work.

38. The Committee remark with regard to this Officer that, in their opinion, he had no authority for considering an inspection by a Superintending Engineer to be other than a formal one, and that he had ample opportunity for becoming acquainted with the defects of construction noticed. These remarks have the entire concurrence of His Excellency in Council. A Superintending Engineer who inspects works under his charge without satisfying himself as to the quality of the materials used, omits one of the fundamental duties of his office, a duty the necessity for which must be at once apparent to any officer who has a proper sense of the responsibility attaching to a Superintending Engineer, and which is, moreover, fully impressed upon Superintending Engineers in the Public Works Code.

39. In the course of a whole year Colonel Rose appears never, in the proper sense of the term, to have inspected the factory, though many of the buildings then in progress were of an important nature, including a chimney-shaft 123½ feet

high, a structure requiring a very superior description of brick-work, and the most careful and constant supervision.

40. It appears, moreover, from his examination before the Committee that Colonel Rose had never even taken an opportunity to make himself acquainted with the arrangements for lime-manufacture that were in force in the Allahabad Division; and the neglect of duty, to which he has confessed, in having avoided an important inspection because he was about to be removed to the Central Provinces, shows that he cannot have a proper appreciation of the interests of the public service. In fact, apart from the accident now under review, Colonel Rose must stand convicted on his own evidence of having signally failed to pay due regard to the responsibilities and duties of the important post of Superintending Engineer.

41. His Excellency in Council would have had doubts whether an officer, who has shown such remissness as is apparent in this case, ought to be allowed to remain in the Public Works Department, but in consequence of Colonel Rose's long service would have been content with depriving him of his position as Superintending Engineer, had he given no other cause for dissatisfaction. Two other serious instances of failure in duty while he was an Executive Engineer at Rawulpindee have, however, been very lately brought to the notice of the Government of India, which, taken in connection with the present case, have led His Excellency in Council to the conclusion that it would not be right to retain this Officer in the Department. His services will accordingly be re-placed at the disposal of the Government of India in the Military Department.

42. Lieutenant-Colonel Alexander, the present Superintending Engineer, joined the circle only two months before the accident occurred; his responsibility is therefore less than that of any of his predecessors. The Committee, however, report that no improvement was apparent in the mortar used in the chimney-stack since he assumed charge.

43. His Excellency in Council, moreover, cannot consider Colonel Alexander's own evidence to be satisfactory or worthy of an officer of his standing and experience, for he, too, makes use of the term "formal inspection," and under the plea that his visits to the works were not of this nature, attempts to excuse himself for not having looked more closely into the quality of the mortar.

44. In the late re-arrangement of Superintending Engineers that was necessitated by the change in the number of grades, Colonel Alexander has, in consequence of his proceedings in this case, been placed in a grade lower than that in which he would otherwise have appeared.

45. Colonel Hodgson held the combined offices of Chief Engineer and Secretary to the Government of the North-Western Provinces, in the Public Works Department, during the whole of the period under review; he resided frequently at Allahabad, and on one occasion undertook for a short period the duties of Colonel Newmarch at that station.

46. His very onerous duties are doubtless mainly administrative; still His Excellency in Council cannot admit that they are purely so, and is of opinion that, in failing to visit frequently and to inspect carefully the work in progress on the very extensive and costly ranges of buildings which were being constructed close to his residence, he omitted an important part of his duty.

47. Colonel Hodgson is an officer of long service and great experience, and had he made such inspections of these particular works as might fairly have been expected of him, the bad quality of the mortar that was being used could not have escaped his notice. It is also a serious reflection upon him that, as the local head of the Engineering Staff, he failed to secure such efficient supervision of the work as would have prevented the discreditable failure that has led to this enquiry.

48. The responsibility attaching to him was, moreover, increased by his having undertaken to carry on Colonel Newmarch's duties at Allahabad during this officer's absence on account of ill-health.

49. His Excellency in Council further considers that it is a blot in the administration of the Public Works Department in the North-Western Provinces, for which the Chief Engineer must be held mainly responsible, that officers who evidently were physically unfit for the proper discharge of their duties should have been allowed to retain their charges. This occurred with reference to both Colonel Newmarch and Major Cobbe.

50. The Governor-General in Council sympathises fully with officers who, after many years good service, may be obliged through ill-health to abandon valuable posts which they may have well earned, and the loss of which may be to them a source of great hardship, but these are the severe conditions which attach themselves to all efficient service, and more especially to service in India; and His Excellency in Council deems it right here to record his opinion, that all Heads of Departments fail in their duty when, under any circumstances whatever, they sanction, directly or indirectly, the retention in active employment of any officer who is physically or mentally unfit for the proper discharge of his duty.

51. The Governor-General in Council quite appreciates the ability, zeal, method, untiring industry and devotion to his work which have characterized Colonel Hodgson's long service in the Public Works Department, and regrets that a sense of duty renders it necessary to animadvert thus strongly on his proceedings in this case; but His Excellency in Council feels it impossible, under the circumstances, to absolve the Head of the Department from blame for a failure which has resulted in the severe punishment of so many of the officers subordinate to him.

52. With regard to the lime contractor, separate instructions will be issued for prosecuting him on a criminal charge, as there can be no doubt, from the evidence that has been adduced, that the lime delivered at the works was largely adulterated.

53. Separate instructions will also be issued in respect to the other buildings of the factory that have been completed, or that are in progress, and the uses to which they should be eventually put. It appears from the Committee's report that, with a few exceptions, the whole of these buildings require considerable works of repair and renewal; and that, in consequence of the bad quality of the mortar, the buildings in which it was intended to work the machinery will have to be turned to account for some other purpose.

54. In conclusion, His Excellency the Governor-General in Council desires to record that he has reviewed with great sorrow this deplorable history of negligence, incapacity and corruption—negligence in the conduct of every superior officer who was connected with the supervision of these buildings from

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the beginning,—incapacity, to a greater or less extent, of almost every subordinate concerned in the work of construction,—corruption on the part of those who supplied the worthless materials,—and it is impossible to avoid the suspicion that some of the inferior subordinates must also have been aware of the organized system in the adulteration of the lime which was practised throughout.

ORDER.—Ordered that this Resolution be forwarded to the Government, North-Western Provinces, with request that a copy may be furnished to each of the officers concerned now serving in the Department Public Works of the North-Western Provinces; also that a copy of the Resolution be sent to the Chief Commissioner, Central Provinces, for information and communication to Lieutenant-Colonel Rose.

Ordered also that this Resolution, together with the connected papers, be sent to the Military Department for information, and for the issue of any orders that may be necessary in that Department.

(Signed) W. A. CROMMELIN, Colonel, R.E.,
Offg. Secy. to the Govt. of India.

No. 584. ORDER THEREON, 31st January 1871, No. 293.

MILITARY WORKS, No. 8.

COMMUNICATED to the Superintending Engineers.

(True Extract.)
(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To Superintending Engineers.
,, Major R. B. Kennedy.
To the Chief Engineer for Irrigation.

Ed. E. C. Shunker.

P.W. 1871 Apl
(26) No. 16

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

BUILDINGS AND ROADS.
Military.

To

No. 309 B—M.

Read 4th January 1871
Encl: 1

Accident to a Store-room of the Gun-carriage Factory at Allahabad.

P. W. D. Press. 13-12-70—790.

No 293 - 31 Dec 1870.

Nothing under

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Commanding Officer
Allahabad

Lieut Col Lewis Secy
31st Dec 1870

Lieut Renny
Chief Engineer

No 2

Lieut Col Pollock
Chief Engineer

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Govt of [1871] Madras.

PUBLIC WORKS.

To

The Superintending Engineer

Dated

Recd. 1872

G. O. 31st July, No. 293.

Nos. 583 - 584

Stores Room. Letter from the
Board of Public Examiners
& Resolution on the subject
of the accident to a Store
Cart on the Gun carriage
Factory at Allahabad,
Copied to the Supt.