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MADRAS RECORD OFFICE.

Government of Madras.

Public works DEPARTMENT.

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ANNUAL PROGRESS REPORT of Public Works in India for the year 1862-63, *by* A. B. SAMPSON, ESQ., *Asst. Secy. to Govt. of India, P. W. Dept., dated* 13*th April*, 1864.

INTRODUCTORY REMARKS.

Late appearance of the Report.

The following report will have lost much of its public interest from the very late date at which it is issued. Before the close of the year to which it refers, a Circular was issued, directing that these reports from the Local Governments should no longer be accompanied by the usual figured statements of expenditure on each individual work, and it was hoped that the omission of these details, which necessarily cannot be supplied till a considerable time after the close of the year, would ensure greater punctuality in their submission. This has been the case to a certain extent, but that due from the Government of the Straits Settlements has not been received up to the present time, and others were later than they should have been.

Cause of this.

Since the publication of the general report for 1854-55, compiled by Colonel Yule, and published as No. XIII of Selections in this department, no general report has been prepared, chiefly owing to excess of work thrown on the Secretariat of the Government of India, and partly it must be confessed from the feeling that by the time all the constituent reports have been received, the work has become as it were dead work.

Objects of the Annual Progress Report,

The object of the Annual Progress Report is two-fold. It is chiefly designed to show in a general way how far actual work has been commensurate with the promises made in the Budget Estimate; and also to give a comprehensive view of the actual state of all the more important works at the close of the year under report.

How secured.

To ensure the first of these objects, it is necessary that the sanctioned amount allotted in the Budget orders to each work should be stated, and if the amount is not expended, the reason should be given, or if additional funds are re-appropriated to it during the year, that fact should be stated, and although strictly accurate accounts of expenditure are not required, it will be very easy for Executive Engineers to give the amounts approximately, and these should be supplied. The amount of work done during the year, as the equivalent of the expenditure, should also be stated. In the case of roads, for instance, the progress of the various stages of construc-

tion, namely, lining out, earth-work, and metalling, should be given in miles, together with the local limits within which the work has been done. A general statement of the number and class of culverts and larger bridges, with a state of progress of the more important works, should also be given. The same with canals, barracks, civil buildings, &c. The information supplied by the Bombay Government in this respect is generally valuable, and in a concise form; that too regarding the important roads in progress in the Central Provinces is tangible and useful.

The second object of the report, that of giving a comprehensive view of the actual progress towards completion which the works have attained at the close of the year, which should be given, not as a separate report, but simultaneously with the report of actual progress during the year, seems to call for no special remark. The main use of this information is to afford an answer to the question, what is the present state of such a road, canal, barrack, cutcherry, &c?

Important works only to be noticed.

In all cases the reports should be confined to the more important works, whether as regards their object, their cost, or the specia Engineering points of interest involved in them.

Local Funds works not to be separated from Imperial works.

Local Funds works should not be separated from Imperial works, but the fact that they are constructed from Local Funds should be stated, and they should be treated in the report in other respects exactly as Imperial works.

If in the present report some important works should appear to be passed over with slight notice, it is because sufficient information is not supplied, or is not considered of a character to be of public interest.

Progress of Railways and works under other companies under Government control, to be briefly reported.

The reports should include an account of the operations of the Railway Companies, and other Companies working more or less under Government control. Such a general account as has been indicated above with regard to works carried out by the Public Works Department would not be lengthy, and would not involve much time or labour in its preparation. A brief statement of the length of line on each Railway opened, in progress, or sanctioned on 31st July 1863, is appendel as a starting point.

Reports to be arranged according to main heads, and not geographically.

The reports moreover should be divided according to the nature of the work, or the main head or class under which it falls in the Budget Estimate, and not geographically. Some of the reports for the present year are vitiated by the adoption of the latter system, so that the history of a road

during the year sometimes appears in fragments in different sections corresponding to Collectorates, divisions, and even sub-divisions, the limits of these portions being sometimes indicated only by the names of remote villages, well known doubtless in the locality, but utterly unknown to the rest of the world. The Bengal report consisted of the reports of the Superintending Engineers bound together, and one of these component reports was divided geographically down to sub-divisions, so that the information was given in a very scattered kind of way.

Annual Progress Reports to be strictly a history of the past.

An Annual Progress Report should not be the medium for submitting questions for the orders of the Government of India, and no comments made in these reports will be laid before the Government for orders. If any such present themselves to the Heads of Local Governments or Administrations on a review of the operations of the department they should form the subjects of separate letters. This rule excludes from the reports general discussions of the wants of the country in the way of public works, and limits them to a history of the past, which they ought strictly to be.

At this late date, any further remarks on individual reports do not seem to be called for.

A. B. SAMPSON,

Asst. Secy. to the Govt. of India.

13*th April*, 1864.

PROGRESS REPORT.

MILITARY.

ARMY.

FORTIFICATIONS.

With the exception of the Bombay Harbour Defences, no very extensive works were in progress during the year.

Fort St. George.

Madras.—One important work in Fort St. George was brought to a close, though the expenditure within the year 1862-63 was trifling, viz., the re-building of the sea face of the fortifications at a total cost of Rs. 2,19,999, which was about Rs. 19,000 within the estimate. The re-building of the St. Thomé Ravelin was also completed at a cost of Rs. 46,702.

Bombay Harbour Defences.

Bombay.—A sum of 5 lakhs was allowed for the year for the Bombay Harbour Defences. The expenditure was as follows:—

	Rs.
Oyster Rock Battery	1,79,218
Cross Island ditto	58,443
Colaba Point ditto	8,165
Apollo Pier Magazine...	1,266
Pan Pir Quarry	36,130
Reclamation Pier	40,019
Total	3,29,701

exclusive of repairs. The Oyster Rock Battery was brought up to high-water level. "The main walls and the gorge, (22 feet and 4 feet thick respectvely) having been raised on an average 5 feet in height and the interior of the battery, about $1\frac{1}{4}$ acre in extent, brought up to the same level." The Cross Island Battery was expected to be ready for its armament by the end of 1863.

Delhi Fort.

Punjab.—Rs. 22,295 were alotted for making a glacis round the Fort at Delhi, the work was put in hand. Half-a-lakh was proposed for expenditure on the defences of the new Arsenal at Ferozepoor: the work, of which the original estimate is Rs. 5,15,554, is now well advanced.

Ferozepoor Arsenal.

Tounghoo Redoubt.

British Burmah.—Rs. 50,000 was entered in the final Budget Estimate for expenditure on the Redoubt at Tounghoo. The original estimate for this work was Rs. 1,39,013, of which Rs. 1,19,129 had been spent up to the end of 1861-62, leaving a balance of Rs. 19,884. At this stage, however, a revised estimate was framed for completing the work, which amounted to Rs. 72,793, so that the whole estimated cost should be Rs. 1,19,129+Rs. 72,793=Rs. 1,91,922.

250—15, 4, 64.

ARMY.

The work was finished, except the glacis and the parapet of the western curtain.

CANTONMENTS.

Dum-Dum.

Bengal.—Work was put in hand in the Dum-Dum Cantonments for the purpose of improving the drainage and the general sanitory condition of the station estimated at Rs. 75,000. Work was commenced early in 1863, and before the 30th April good progress was made.

Clearances at Delhi.

Punjab.—A sum of Rs. 42,000 were appropriated for continuing the clearances in and about the palace at Delhi on which Rs. 63,000 had been spent already. The work went on, and within the palace, under modified arrangements made at the visit of the late Viceroy in March, the clearance is nearly completed. Some delay has occurred outside pending a decision regarding certain buildings.

ACCOMMODATION FOR TROOPS.

Bellary.

Madras.—An allotment of Rs. 30,000 was made for carrying on the construction of married men's quarters for European Infantry at Bellary, commenced in 1860-61; the amount spent was Rs. 36,669, which sufficed nearly to complete two ranges, making six in all. The Madras Government proposed to allot Rs. 75,000 to the new Dragoon Barracks at Bangalore, and the Government of India suggested that the appropriation should be increased. The actual expenditure was Rs. 87,523, bringing the whole outlay on these buildings, which have now been several years in progress, up to Rs. 3,58,596. An outlay of Rs. 21,910 for raising the whole of the huts in the Perambore lines was sanctioned on emergency during the year.

Dragoon Barracks, Bangalore.

Perambore Lines.

Kirkee.

Bombay.—Family quarters for the Artillery at Kirkee; estimate for 100 families Rs. 1,15,400; spent up to 30th April 1862 Rs. 46,000; proposed for expenditure in 1862-63 Rs. 46,000; actually spent Rs. 30,708. Two ranges were built in 1861-62, and two others were almost completed in 1862-63. The four will afford accommodation for 80 families, which will suffice for the present. The accommodation is in the form of permanent patcherries. Artillery Barracks at Kirkee; estimate Rs. 95,085; proposed outlay Rs. 40,000; actual Rs. 36,046. These buildings were intended to be nine in number; eight were under construction. They are lower storied barracks on an economical plan, first tried at Sattara, and approved by His Excellency Sir W. Mansfield. It was proposed to spend two lakhs in building new double-storied Dragoon barracks at Mhow, estimated to cost Rs. 3,25,941. The Government of India allowed 1½ lakhs;

Dragoon Barracks, Mhow.

ARMY.

the actual expenditure was Rs. 1,46,309, which sufficed to complete the main buildings of the barracks to the level of the upper floor, and the masonry of the out-buildings. The only expenditure authorized at Aden in the Budget orders under this head was Rs. 20,000 for European barracks. Several new works, however, were sanctioned during the year, and the whole outlay was Rs. 95,086.

Aden.

Debroogurh.

Bengal.—A sum of Rs. 25,000 was proposed for Artillery barracks at Debroogurh, estimated at Rs. 63,000. The Government of India advised that the work should be pushed on as fast as possible, and increased the allotment to Rs. 55,000. The work, however, was postponed. A swimming bath was made in Fort William at a cost of Rs. 12,186. A large iron-framed barrack at Dum-Dum for the accommodation of 27 families of Europeans was rapidly built at a cost of about Rs. 30,000. Gun-sheds, stables, &c. for a Battery were about one-third completed, involving an outlay of Rs. 21,400. Neither of these works were entered in the Budget. Raneegunge was ordered to be given up as a Military station in January 1863. The dismantlement of the buildings was in progress.

Dum-Dum.

Raneegunge.

Allahabad.

North Western Provinces.—Rs. 99,111 were proposed, but only Rs. 80,000 ultimately appropriated, for Military works near the Fort of Allahabad. Nearly all the buildings in the old entrenchment were dismantled, and some compensation paid. The outlay was Rs. 64,751 against which must be set Rs. 19,642 realzed by the sale of old materials and other valuable material brought into store.

Agra.

Gun-sheds in the Fort at Agra were passed in the Budget orders at an estimated cost of Rs. 14,603. These have not been built.

Delhi Fort.

Punjab.—Rs. 20,000 were passed for expenditure on the new barracks in the palace at Delhi, commenced in 1861-62, to finish the work already in hand. The lower stories of the four barracks, and two blocks of married quarters were brought to completion Rs. 20,000 for a hospital at Dugshai were passed, but the work is not mentioned in the Progress Report. For completing the restoration of the two barracks at Kussowlie that were burnt down Rs. 30,000 were allotted. They are now restored and re-divided into three. Rs. 50,000 were passed for restoring the barracks and connected buildings at Jullundur. Five of the best of them were selected for temporary restoration, but designs for new barracks were being prepared. Rs. 16,148, the amount of the estimate for a hospital and

Dugshai.

Kussowlie.

Jullundur.

ARMY.

Fort of Govindgurh. Grant's system of punkah-pulling.

medical subordinates' quarters in the Fort of Govindgurh at Umritsur, were passed. The building was nearly completed. Mr. Grant's system of punkah-pulling was tried at Peshawur. The punkahs are hung on Mr. Grant's plan, but it is found more convenient to pull them in the usual manner. The system was also tried at Delhi, but a pendulum was found more effective than the treddle.

Oudh.—The buildings that were required for the whole European force in Oudh were originally estimated at Rs. 63,42,782, of which Rs. 46,63,149 had been spent up to the end of 1861-62. The force was then intended to be:—

1 Regiment Cavalry.
5 „ Infantry.
6 Batteries Artillery.

This has been reduced by one Regiment of Infantry, and the whole amount of the estimate will consequently be somewhat reduced. The whole allotment for Military works in 1862-63 was 4 lakhs, distributed as follows:—

Lucknow	Rs.	2,47,528
Fyzabad	„	48,000
Seetapoor	„	73,472
Roy Bareilly	„	31,000

Except at Lucknow, few new buildings were put in hand, the efforts of the Department being mainly directed to the completion of work already begun. The information is scant, and is contained in a "Tabular Statement of the buildings on which work was executed during 1862-63," which gives only the number of buildings operated on without any information as to how much work was done during the year.

Kamptee. *Central Provinces.*—It was proposed in the Budget Estimate to spend Rs. 60,000 in providing 32 family quarters at Kamptee Rs. 32,000 were passed for accommodation on a reduced scale. The money was devoted to completing such buildings as had been already commenced on the original design. There are now six double bungalows holding 12 families of the Infantry and the same amount of accommodation for the Artillery. Rs. 15,000 were passed

Mohtoor. for providing accommodation at Mohtoor, with the view of testing the capabilities of the place as a sanitarium. Probably not much of it was spent. Temporary barracks were run up for a Company of Sappers, and arrangements were made for commencing permanent barracks.

Rangoon. *British Burmah.*—The shingling of the European Infantry barracks at Rangoon was completed. The sum allotted was Rs. 59,779, the unexpended balance of an estimate amounting to Rs. 1,40,202. For similar work at Tounghoo Rs. 37,668 were allotted. The work was completed. Rs. 42,779 were appropriated for the extension of the barracks at Rangoon; this was the unexpended balance of an estimate of Rs. 1,35,384; this work also was finished. A grant of Rs. 75,000 was made towards constructing permanent married barracks for the Infantry and Artillery at Thayetmyo. Two barracks for the Infantry and one for the Artillery were commenced, but work was unavoidably retarded.

ARMY.

Tounghoo.

Rangoon.

Thayetmyo.

Hyderabad.—Barracks at Trimulgherry; estimates Rs. 11,27,098; already spent Rs. 5,04,530; sanctioned for the year Rs. 2,50,000. Four half-company barracks were built by the native contractor for the second European Regiment; two ranges of officers' quarters for the same. One half-company barrack for Artillery at Trimulgherry was finished. Quarters for nine officers of the 1st Battalion Royal Regiment were in various stages of progress.

Trimulgherry.

CIVIL ADMINISTRATION.

REVENUE.

Land and Miscellaneous.

REVENUE.

Madras.—No works of any magnitude. Rs. 32,618 were spent on Collector's and Talook Cutcherries.

Chuprah. *Bengal.*—Collector's Cutcherry at Chuprah, estimate Rs. 39,016. A sum of Rs. 29,016 was assigned for this work. Fair progress was made, and the building was expected to be finished before the rains of 1863. A small assignment (Rs. 4,072) was made for the completion of a similar building, estimate Rs. 29,072, at Mozufferpoor, which was nearly finished.

Mozufferpoor.

Jhansie. *North Western Provinces.*—Upwards of 1 lakh was appropriated for the completion of 20 Tehseels and Thannahs, &c. They were for the most part either completed or nearing completion. The Deputy Commissioner's Cutcherry at Jhansie, to which Rs. 16,000 were assigned, was almost completed.

Mysore.—Rs. 28,073 were allotted for seven Talook Cutcherries, four were already in progress and it was intended to finish them, but work was much retarded by want of labourers, and none of them were completed. Only one of the other three appears to have been put in hand.

Customs.

Rangoon. *British Burmah.*—A building was purchased at Rangoon to serve as a Bonded Warehouse, until a proper build-

REVENUE.

ing should be provided. Rs. 65,000 were reserved for this purpose. The permanent building for Custom House and Bonded Warehouse was commenced. Rs. 50,000 had been assigned for the work, but the allotment was subsequently reduced to Rs. 25,000 owing to the delay in getting sanction to the estimate.

SALT.

Sulkeah Salt Works.

Bengal.—A tramway and jetty at the Sulkeah Salt Golahs were commenced and finished within the year. The work consists of a tramway 8,424 feet long, of light angle iron on longitudinal sleepers, and a jetty 140 feet long and 29 feet wide. The cost of the jetty was Rs. 26,100 and of the tramway Rs. 14,062. No provision was made in the Budget Estimate for this work

OPIUM.

Oudh.—One lakh was sanctioned for opium buildings in Oudh. Those at Fyzabad and at Busrah ghat near Seetapoor were entirely completed within the year; those at Roy Bareilly nearly finished: and others at Oonao in progress.

GENERAL.

PUBLIC DEPARTMENTS.

GENERAL.

Madras.—The Madras Government proposed to reserve Rs. 30,000 for commencing the erection of an Engineer's Storeyard for machinery, with carpenters' and smiths shops, estimated at Rs. 76,390. It was intimated that the Government of India had just judged it expedient to abolish a similar establishment in Calcutta, and provide for the work being done at the Cossipoor Foundry. The Madras Government apparently re-considered the subject, and the money was not spent.

Copper Mint, Calcutta.

Bengal.—New Copper Mint, with out-offices. Estimate Rs. 2,66,934; spent up to 30th April 1862 Rs. 1,50,000. The balance Rs. 1,16,934 were allotted for the work in 1862-63. This building was commenced in 1860-61, and was made over completed so far as the actual building was concerned to the Mint Master in December 1862, who since then has been making the preparations necessary for fixing and fitting the machinery. The whole expenditure on the building was Rs. 2,15,385, but there is some work still left to be done, which will be supervised by the Mint-Master.

Iron Bridge Yard.

The Iron Bridge Yard works were stopped in August 1862, the stores sold, and the premises made over to the Telegraph Department.

Public Offices, Allahabad.

North Western Provinces.—New civil Offices at Allahabad. An allotment of 3½ lakhs was made for the preparation of material. The cash expenditure is reported at Rs. 34,000. Sixteen lakhs of bricks, and 1½ of rubble stone were brought to the ground. Quarries for the latter were opened at Purtabpoor, 40 miles from Allahabad.

GENERAL.

Public Offices, Rangoon.

British Burmah.—Public Offices at Rangoon, estimated at Rs. 3,18,831. Rs. 75,000 were allotted. Considerable progress was made, the whole of the foundations and plinth was completed, and the superstructure had been raised to a height of about 3 feet all round the block.

Public Offices, Bangalore.

Mysore.—One lakh was assigned for Public Offices at Bangalore. The site was cleared, but any further work was postponed until the designs and estimates should be approved by Government.

CHARITABLE INSTITUTIONS.

General Hospital, Madras.

Madras.—A sum of Rs. 20,000 was assigned for the Military Orphan Asylum at Madras and the Lawrence Asylum at Ootacamund, but the money was not used for the purpose. Rs. 15,000 were allotted for the new wing to the General Hospital at Madras, estimated at Rs. 1,01,966. Rs. 41,995 were spent, and the work was completed at a total cost of Rs. 1,07,794. Two hospitals were nearly completed at Calicut at a cost of Rs. 11,650; one for small pox, and the other for lepers.

Calicut.

Surat.

Bombay.—A new hospital was being built by the Executive Engineer at Surat at the sole expense of Mr. Cowasjee Jehangeer, a wealthy merchant of Bombay. The total cost will be Rs. 66,500, of which Rs. 23,952 were expended in 1862-63. The building was approaching completion.

MISCELLANEOUS.

Chepauk.

Madras.—The following two sums were disbursed which found no place in the Budget Estimate:—Purchase of land between Chepauk and the sea Rs. 49,120, and of Devan's property in Chepauk Rs. 65,000.

Akra Brick Yard.

The following is the report of the Superintending Engineer of the operations of the Akra brick yard during the year: "Akra Brick Factory has turned out more bricks this year than during any previous season, 185 lakhs of table-moulded bricks and a large number of ornamental bricks for St. James' Church and the market at Sealdah have been clamped and will be all burnt. The bricks made are of the very finest quality, far superior to anything to be seen about Calcutta."

"All the clay used was put through pug-mills, of which there are twenty-five at work, and all the bricks were mould-

GENERAL.

ed on tables, of which 150 are in use. There was great difficulty in getting the Bengallee moulders to work at tables; but the difficulty has been quite overcome, they now work at them freely. They are all paid for the quantity moulded, and, as they earn good wages, they seem content. The intention was to have made 200 lakhs of bricks this season; in the beginning of April there seemed every prospect of making even more; but about that time a few cases of cholera occurred among some Ooriahs employed. 300 of them immediately left, they could not be kept: this was a great interruption. Again rain fell this season much earlier than usual, which also interfered with the work. However, on the whole, the season's work is successful,—there will be abundnce aof bricks for all the demands of the Department. As far as can be ascertained the cost of the bricks made this season will not exceed Rs. 7-8 per 1,000 on the ground. This I think satisfactory, considering the very superior quality of the bricks and the large outlay which had to be incurred for preparing the ground. A Committee appointed for the purpose valued the bricks @ Rs. 8-0 per 1,000. The Clayton's brick-making machine for which a new engine was purchased last year has been kept working all through the season. After watching it very carefully. I am convinced it should not be worked next year. The bricks turned out by it are not as good as those now made on tables, and they are a little dearer. The machine requires fully two-thirds of the manual labour necessary for table-making, and, as the quantity turned out by it is so small compared with the whole out-turn, the saving of manual labour is not of importance. It requires much attention, and thus for a very insignificant result takes up much of the time and attention of the Superintendent, which might be much better employed on the main source of out-turn."

ECCLESIASTICAL.

Churches and other buildings.

ECCLESIASTICAL.

Madras.—Two new churches were built (Bimlipatam and Kurnool) costing between Rs. 6,000 and Rs. 7,000 each, of which one-half was made up by private contributions, Rs. 5,168 were contributed to the new church in Black Town.

St. James' Church, Calcutta.

Bengal.—Construction of a new church for the district of St. James, Calcutta; estimate Rs. 3,50,000; spent up to 30th April 1862, Rs. 25,000. The sum granted for expenditure in 1862-63 was Rs. 1,50,000. The foundation stone was laid by the Lieutenant Governor on 7th June 1862. The work was somewhat retarded by the rains and other

causes, till January 1863, since when rapid progress had been made. On 30th April 1863 it was up to the top of all principal arches of the chancel and nave; upwards of 24 large and 26 small gothic arches had been turned, and the height of the walls was 17 feet. The expenditure in all is reported to have been only Rs. 53,000 up to the end of 1862-63. The Government of India has declared its intention of limiting its grant to two lakhs. The church in progress at Cuttack was nearly completed. ECCLESIASTICAL. Cuttack.

North Western Provinces.—Bareilly church was finished at a total cost of Rs. 39,000 of which Rs. 19,318 were spent during the year, the sum of Rs. 12,600 only having been allotted. But the unexpended balance of the estimate at the end of 1861-62 was greater than had been anticipated, and certain alterations were ordered by the Lieutenant Governor. Bareilly.

Punjab.—Money was sanctioned for new churches at Kangra (Rs. 3,606), Abbottabad (Rs. 10,000), Attock (Rs. 10,000), and Nowshera (Rs. 6,500), all of which were in progress, as also was a Roman Catholic Chapel at Umritsur (Rs. 7,028). Kangra. Abbottabad. Attock. Nowshera. Umritsur.

Central Provinces.—Rs. 10,000 were set apart for the church at Seetabuldee, but no information is given in the Progress Report as to the progress made. Seetabuldee.

British Burmah.—Trinity church, Town of Rangoon. Estimate Rs. 43,452; Rs. 20,000 were given as a grant-in-aid. Good progress was made; the walls were raised to an average height of 14 feet. The brick-work is said to be excellent; bricks have been moulded in the proper forms fitted to the elaborate mouldings in the building in preference to cutting ordinary bricks to the required form. This was chiefly done by some soldiers of Her Majesty's 68th Regiment under the instruction of the Executive Engineer. Rangoon.

JUDICIAL.

Police.

JUDICIAL.

Madras.—The expenditure for Police purposes in the Madras Presidency amounted to nearly 1¼ lakhs, viz., for police stations and constables' quarters in every district of the Presidency, 140 in number. Three-fourths of them were commenced and completed within the year, and the remainder were well advanced. No special allotment was made for these buildings in passing orders on the Budget; the Madras Government was left to find funds by economizing elsewhere.

JUDICIAL.

North Western Provinces.—The estimated cost of Police buildings said to be required in the North Western Provinces was Rs. 4,19,478, of which 1 lakh had been spent up to 30th April 1862. An expenditure of 1½ lakhs was proposed for 1862-63; a sum of Rs. 75,000 was reserved under the orders of the Government of India, but expenditure was prohibited pending the issue of orders in the Home Department. It appears from the Progress Report that no more than Rs. 18,409 were spent.

Punjab.—The Lieutenant Governor proposed an expenditure of Rs. 60,000, but the allotment made was only Rs. 15,000, which was devoted chiefly to completing rest-houses for Police Officers on tour in the Districts of Umballa, Gogaira, Jhung, Goozerat, Jhelum, and Rawul Pindee.

British Burmah.—Seven Police guard rooms were built by contract in Rangoon. The allotment was Rs. 10,000.

Court Houses.

Canning Town. Meherpoor. Kooshtee.

Bengal.—Rs. 15,000 were allotted for a Court house at Canning Town; it was almost finished. Sub-divisional Cutcherries at Meherpoor and Kooshtee were commenced, but not much progress made, owing to delay in making over the land. An allotment of Rs. 26,012 was made to finish the Judge's Cutcherry at Chupra, estimated at Rs. 34,012. The building was nearly finished.

Chupra.

Lucknow.

Oudh.—Rs. 46,000 were passed for civil buildings. Kaiser Pussund at Lucknow, used as a Cutcherry by the Deputy Commissioner and his Assistants and the Police Officers, underwent extensive repairs. The Deputy Commissioner's Cutcherry at Seetapoor was commenced and some progress made with it; that at Fyzabad was almost completed, having been built up from the plinth during the year.

Seetapoor. Fyzabad.

Bhundara. Belaspoor. Chanda.

Central Provinces.—Small sums (Rs. 6,200 and Rs. 6,534) were appropriated to complete the Court Houses at Bhandara and Belaspoor, already in progress, but they still remained unfinished at the end of the year. Better progress appears to have been made at Chanda; Rs. 13,752 were passed for the Court House there, which was nearly completed.

Moulmein. Mergui. Kyouk Phyoo.

British Burmah.—The large new Court House under construction at Moulmein was finished. District Court Houses at Mergui and Kyouk Phyoo, for which small sums were assigned were nearly completed.

Jails.

JUDICIAL.

Madras.—A new Central Jail at Waltair estimated at Rs. 1,31,300 was sanctioned by the Madras Government during the year, and Rs. 8,756 spent in collecting materials; so also were specialr epairs to Chingliput Jail (Rs. 13,593,) and Jail warders' cottages at Ootacamund (Rs. 13,449.)

Waltair. Chingliput. Ootacamund.

Bengal.—Alterations and improvements to the great Jail in Calcutta. An allotment of Rs. 40,000 was made for this. The principal works put in hand were:—2 cells for European females, 14 feet square each, to hold three prisoners; 3 cells of the same size for native females; 16 cells for European convicts; 7 solitary cells. The progress was not rapid owing to the difficulty in procuring iron-work and bricks from Akra. In March 1863 the work was made over to the contractors, Messrs. Burn and Co., for completion. Hazut wards were nearly completed at Diamond Harbour, Ranaghat, Chooadangha, Narail, Jeindah, Kotechandpoor, and Satkheera.

Calcutta. Sundry. Hazut wards.

North Western Provinces.—Meerut Central Prison; estimate, Rs. 1,15,950; spent up to 30th April 1862, Rs. 79,296; sanctioned for expenditure in 1862-63, Rs. 20,000. The chief work done appears to have been the construction of three women's barracks, with two worksheds attached, the laying of the foundation of two ranges of solitary cells, and the re-construction of the whole system of drainage both within and without the prison.

Meerut.

Central Prison, Bareilly; estimate, Rs. 1,65,526; spent before 1862-63, Rs. 32,500; sanctioned for 1862-63, Rs. 20,000. The principal works in progress were a large double workshed, and two others; the Superintendent's dwelling house; and three barracks for the contingent guard. The foregoing were all finished. The Jail wall of the right block, and two prisoners' barracks were in progress.

Bareilly.

Central Prison, Agra, additions; estimate, Rs. 67,937, passed for the year, Rs. 20,000. The enlargement consists of the construction of two complete enclosed circles of barracks and workshops, each containing eight barracks, and four workshops. The enclosure walls, commenced before the mutiny, were completed and topped with a pucka coping; a heavy embanked piece of road and two wells were made to replace others that were on the jail site; the site was cleared, and two barracks and one workshed were erected, and the foundations of two other barracks were in.

Agra.

Central Prison, Allahabad; estimate, Rs. 2,75,663; expended up to end of 1861-62, Rs. 45,000; allotment for

Allahabad.

JUDICIAL.

1862-63, Rs. 20,000. Three barracks were brought to completion, and one nearly so; the enclosure wall of the second block was finished, and that of the hospital in progress.

Lahore.

Punjab.—Lahore Central Jail, estimate, Rs. 1,00,589; spent before the end of 1861-62, Rs. 80,589; granted for 1862-63, Rs. 20,000. The second circle of the jail was all but completed. The whole consists of six radiating wards for native prisoners, with six work-sheds, two wards for Europeans, 27 solitary cells, and a central watch tower.

Lucknow.

Oudh.—Lucknow Central jail; Estimate, Rs. 3,20,911; spent before end of 1861-62, Rs. 80,000; allotted for 1862-63, Rs. 80,000. A little work remained at the beginning of the year in the 1st circle, which was completed. In the second circle, six barracks were built, and two nearly so. The central hospital was completed and some progress made with the out-offices and enclosing walls; accommodation was afforded for upwards of 2000 prisoners.

Fyzabad. Seetapore.

Central Jails at Fyzabad and Seetapoor; estimate for each, Rs. 1,44,510; spent before 30th April 1862, Rs. 60,000; sanctioned for 1862-63, Rs. 80,000 for both. At Seetapoor 5 barracks were completed, and a sixth in progress. These were sufficient for the prisoners in the jail. At Fyzabad great progress was made. All the barracks were roofed in, and enclosure walls built; only the inspection tower and female ward, and a few minor buildings remained to be done.

Nagpoor.

Central Provinces.—An allotment of Rs. 50,000 was reserved for the commencement of a Central Jail at Nagpoor; this is not mentioned in the Chief Engineer's report. It appears that a Ressalah Hospital was converted into a jail for 100 prisoners.

Bangalore.

Mysore.—Central Jail, Bangalore, intended to accommodate 1000 prisoners; estimate, two lakhs; allotted for 1862-63, Rs. 50,000. The building was commenced in October 1862, and fair progress was made. Rs. 40,000 were spent. Rs. 25,000 were reserved for a Divisional Jail and hospital at Shemoga, but the work was not commenced, owing to the difficulties of selecting a suitable site and the objections of Government to the plan for the work.

Shemoga.

PUBLIC IMPROVEMENT.

MUNICIPAL.

Markets.

MUNICIPAL.

Sealdah.

Bengal.—The construction of a market was commenced at Sealdah in May 1862; progress was not very satisfactory. It was expected to be finished by 1st January 1864.

MUNICIPAL.

British Burmah.—Permanent markets were completed at Bassein, Shoaygheen, and Tounghoo, and similar buildings were well advanced at Prome, Thayetmyo, and Mergui. The funds were drawn from the 1 per cent. of the Income Tax it is believed. These markets prove largely remunerative, and form a permanent source of Local Funds for further improvements.

Paving and Streets.

Punjab.—Considerable progress was made by means of Local Funds in metalling station roads at and about Delhi; in paving bazars and streets of towns in the Sirsa, Loodiana, Jullundur, and Shahpoor districts; on station roads and paving city streets at Umritsur; in improving and extending station roads at Dalhousie; in metalling roads in about Anarkullee; in metalling station roads at Goojerat, and on a raised road round the city of Mooltan, and in paving the city streets. The streets of Rohtuk were widened, levelled, and metalled.

Lucknow.

Oudh.—A grant of Rs. 25,000 was made from the Lucknow Municipal Funds towards the construction of Napier Road, one of the broad streets radiating from the stone bridge fort. Most of the earth-work, which is very heavy, and one culvert, were completed during the year.

Rangoon.

British Burmah.—A considerable amount of work was done in raising the low ground on the town blocks at Rangoon. A million and a half cubic feet of earth was carted by tramway, of which five lines were laid down, at ⅓rd of the cost of ordinary labour.

Water-Supply.

Sealdah.

Bengal.—A tank was commenced in May 1862 at Sealdah, 500 feet square and 30 feet deep, and completed within the year.

Punjab.—A large sum was spent in improving the water-supply at Hurreepoor, Abbottabad, and Rawul Pindee.

Sewage.

Umritsur. Mooltan.

Punjab.—Extensive measures were in progress for improving the external and internal drainage of Umritsur. The koop, a large hollow in Mooltan, was being filled up and the drainage of the city improved.

Bangalore.

Mysore.—Cantonment and Sudder Bazar drainage at Bangalore. Estimate, Rs. 1,36,101 (doubtful); spent up to 30th April, Rs. 85,857; sanctioned for 1862-63, Rs. 40,000. The work was completed. It was intended to cut off the sewage of the bazar and cantonments from the Ulsoor

MUNICIPAL.

tank, which was formerly contaminated by it, and this object has been gained. The tank now affords a quite pure supply of water. The sewage is now delivered into a nullah nearly two miles from the town, and is thence transported into a tank at a considerable distance.

MARINE.

MARINE.

Harbours and Navigation.

Coconada Harbour.

Madras.—Coconada Harbour Works, estimated to cost Rs. 2,86,836; spent up to 30th April 1862, Rs. 38,792. It was proposed to spend Rs. 16,250 during 1862-63, Rs. 23,863 was actually laid out in dredging and building lining walls, and in raising the lighthouse.

Apollo Pier.

Bombay.—The Apollo Pier at Bombay was widened from 75 feet to 150 feet. There was but little remaining to be done at the end of 1861-62. The whole work was brought to completion at a cost of Rs. 89,000, which was defrayed from the 1 per cent. of the Income Tax.

Apollo Bay Reclamation.

The reclamation of Apollo Bay was partially carried out at an outlay of Rs. 1,49,960, also from the 1 per cent. of the Income Tax. The estimated cost of the remainder of the project is Rs. 6,00,000. When completed it will serve to some extent to meet the constantly increasing demand for wharfage and storage accommodation.

Moody Bay Reclamation.

Another reclamation of much greater extent than that above referred to has been undertaken or rather resumed in the official year just closed, that at Moody Bay. It was proposed to appropriate 1½ lakhs for this work out of Imperial Funds, but under the orders of the Government of India it was transferred to the 1 per cent. fund of the Income Tax. In 1853 a comparatively small project, estimated at about 9 lakhs of Rupees, was sanctioned and commenced: it was, however, suspended after about 2 lakhs of Rupees had been spent upon it, and subsequently it has been determined to extend the project for reclaiming Moody Bay considerably. That now approved is estimated at 58 lakhs of Rupees, and authority to resume operations was given in December 1862. The expenditure in 1862-63 was limited to Rs 20,000, and was confined to the preparation of a depôt for materials, &c. The total area to be reclaimed amounts to 186 acres, and when completed will form one of the most useful as well as most remunerative public works on this side of India.

Kurrachee Harbour Improvements; estimate, Rs. 13,70,000; spent up to end of 1861-62, Rs. 5,16,533; sanctioned for expenditure during 1862-63, 3½ lakhs.

MARINE.

Kurrachee Harbour.

The Superintendent writes:—"The Keamari Groyne was completed to its full length of 7,548 feet from Keamari Island on the 7th March last, a length of 5,789 feet was made during the year, 99,470 tons of stone were conveyed by Railway from the Hand's Hill Quarries, and 37,298 tons by boat from the Manora and Naureenal Quarries

"The quarries have been worked chiefly by convict labour: an average number of 400 prisoners have been employed daily.

"Some work remains to be done in raising and strengthening the Groyne, which will occupy about three months longer.

"The permission granted in May 1862 for the running of locomotives by day along the Napier Mole in lieu of horse power formerly made use of, has greatly facilitated the execution of the Groyne both as to cost and time, and has been productive of no complaint on the part of the public who make use of the adjoining road.

Of the Napier Mole bridge three piles only remain to be screwed, and the superstructure is in a forward state, so that it is expected that the traffic may be turned over the bridge by September next, and the removal of the Mole opposite the bridge for a length of 1200 feet will be then proceeded with so as to afford a passage for the tidal waters.

"The Native Jetty north wall has been completed to its full length of 1,070 feet, a length of 504 feet having been built during the year; of this a length of 500 feet has been thrown open to the public (in February last), making together with the Quay wall constructed during the previous year altogether 1,050 feet of new wharfage, which has proved highly useful to the greatly increased trade.

"The deep wharfage of the west wall is in progress; 212 lineal feet of coffer-dam have been made, and a length of 100 feet of the wall built to coping level, and the footings of a second length of 100 feet in progress.

"Little or nothing has been done at the south wall beyond making a portion of the coffer-dam near the bridge; increased means of pumping have proved requisite for this work, and two centrifugal pumps have accordingly been indented for; on their arrival better progress may be expected with the south wall, a portion of which, in the mean time, is being proceeded with by the method of block-sinking.

"The excavation of the new channel from Keamari to the Jetty from the bridge eastward to the Chinna creek has

MARINE.

been carried on both by steam dredging and hand labour; 1,48,206 tons having been excavated during the year and made use of for filling in the low ground at Keamari adjoining the Naval and Commissariat yards to the extent of six acres, and in filling the ground allotted to the Keamari Cotton Press Company on the Napier Mole to the extent of $3\frac{3}{4}$ acres, a contract having been entered into by the Harbour Works to fill for the Company a plot containing 4 acres 22 rods 16 poles for a sum of Rs. 26,770.

"The works of the 'Chinna creek stoppage' were commenced in February, since which time a length of 3833 yards of Railway line has been formed on either side the creek for conveyance of stone from the quarries; 127 piles driven to form the temporary staging which is to be constructed over a portion of the creek; and 8488 tons of stone brought by boats from the Manora Quarries deposited in line of the embankment between the staging and the Keamari side, forming a bank of stone 1500 feet long, 33 feet wide, and averaging 4 feet deep.

"The above works may be expected to be completed by the end of April 1864, with the exception of probably a portion of the Jetty south wall, and certainly two-fifths of the new channel excavation.

Beitkool.

A sum of Rs. 30,000 was allowed for tentative operations with a view to the construction of a pier at Beitkool. This is not mentioned in the Progress Report.

Rangoon.

British Burmah.—Rs. 21,120 were sanctioned for providing a corrugated iron roof to the coal shed at Rangoon which was completed.

Akyab.

Extensive works were in progress at Akyab; 800 feet of a sea retaining wall of rubble masonry was successfully built; it had stood well, and shown no signs of failure; a new pier intended ultimately to be 430 feet long, and to have at its extremity 15 feet of water at low tide, was run out 50 feet. The bazar pier also was carried out 132 feet into the harbour.

Alguada Reef Lighthouse.

Alguada Reef Lighthouse.—Estimate Rs. 8,63,576. This lighthouse is now under construction by Captain A. Fraser, R. E. The first stone was laid on the 14th February 1861. It was designed to consist of a granite tower 120 feet high, surmounted by a revolving light. The diameter at base 42 feet, and at top 16 feet; according to the last report, dated 3rd February 1864, the tower was brought up to a height of 70 feet.

INDUSTRIAL.

Mines.

INDUSTRIAL.

Punjab.—The State quarries at Lohala Khud, yielded 272,996 slates during the year.

Manufactures.

Ravee Saw Mills.

Punjab.—Rs. 20,000 were sanctioned for saw-mills on the Chenab River, estimated at Rs. 88,963. No mention is made of this in the Report. The saw-mills on the Ravee at Madhopoor continued to work well, but owing to the low state of the river only a small quantity of timber was brought down, and the machinery was idle for many days. It worked during part of 213 days, sawing in that time 294,450 square feet of timber at a mean cost of 3 annas 10 pie per 100 square feet. Some additions were made to the workshops at Madhopoor. The quadrangle on the east side of the canal was occupied, and the machinery was in process of being set up.

AGRICULTURAL.

Irrigation Canals.

AGRICULTURAL.

Madras.—The following account of the operations of the year under this sub-head is taken from the Madras Administration Report.

Raising Godavery anicut.

Raising the Godavery anicut; Estimate Rs. 2,82,540 for which Rs. 80,000 was sanctioned for the year, and on which Rs. 70,083 was spent. The Rally branch has been raised throughout, and the Muddoor branch commenced; the rough stone aprons of both these branches of the anicut are being widened 20 yards to resist the increased overfall and scour consequent on raising the dam. 420 shutter posts have been fixed in their places.

Canal from Kistna anicut to the Masulipatam basin.

Rs. 31,930 was expended on the canal from the Kistna anicut to the Masulipatam basin, estimated at Rs. 2,59,826, of which Rs. 2,58,130 were spent by 30th April 1863. The last lock (connecting the canal with the tidal basin) was completed and opened for navigation on the 29th March 1863. The value of the canal, of which this lock is the key, is very great. By it the port of Masulipatam has the best possible means of communication with the Kistna and (by the next noticed work) with the Godavery and its net work of canals. Its construction was a work of considerable difficulty. Since it was opened the lock has been worked night and day as rapidly as possible to meet the requirements of the large traffic.

AGRICULTURAL.

Elore high level canal.

Ellore high level canal connecting the Kistna and Godavery and their dependent Delta canals. The expenditure during the year on this very important link was Rs. 79,138. It was very nearly ready for traffic at the close of the official year, and will soon be opened for navigation.

Kistna Irrigation.

Next in importance and superior in local beneficial effect and remunerative return to the State is the widening the Kistna Main Ducts, which was commenced this year, and the construction and extension of branch channels for irrigation in that Delta. Rs. 1,52,185 were spent on these works, of which Rs. 53,220 were laid out on the enlargement of the main ducts from the anicut, 7⅛ lacs cubic yards of earth being removed for that money. The new irrigation channels in the eastern Delta were brought into full operation during the year with good effect—their total cost has been Rs. 61,326, of which Rs. 8,096 were spent in the year 1862-63. Rs. 21,097 were expended on the enlargement and prolongation of the western Delta river bank channel, the progress on which is reported to be very satisfactory, and Rs. 16,436 on the Cummamoor or western Delta outside channel. Numerous minor works for distribution and regulation of water in the Delta were pushed on during the year to the extent of Rs. 53,336, making the total Rs. 1,52,185 above stated.

Cost of the Kistna works.

It may not be out of place here to observe that the Kistna works up to date have cost about 21 lakhs; that the net return in extra revenue in consequence of the incomplete state of the works is only about 13 per cent. per annum; that to complete the irrigation of all the arable land commanded by the anicut, and for which the Kistna can in ordinary seasons supply sufficient water, about 16 lakhs more, judiciously laid out, will suffice; and that the net Government profit by increased revenue will be upwards of 40 per cent. on the total cost of the completed works.

Expenditure on the Godavery and Kistna Delta works.

The total expenditure during the year on the Godavery Delta works was Rs. 2,21,180, and on the Kistna works Rs. 2,18,132.

Palaar Channels.

Palaar Anicut project in North Arcot.—The outlay on these works during the year was Rs. 1,36,071, making the total expenditure Rs. 7,92, 908. The three main channels on the north side as well as the Doosy main on the south, and its three branches, have been widened and improved, and the main channel supplying the Madras District has been completed. Besides these main works seven minor branches have been well advanced towards completion, and

several of the tanks (106 in number) fed by the channels have been put in good order.

AGRICULTURAL.

Poiney Channels.

Poiney project in the North Arcot District.—Rs 25,246 have been expended on the channels from the Poiney Anicut. One of the principal channels is being widened, and another, which was commenced in December, has been opened (with a width of 6 yards, to be ultimately increased to 10) for a distance of 11 miles up to the Amoor tank.

Pennair Channels.

Rs. 55,983 were laid out on the extension of the channels for the Pennair (Nellore) Anicut and on their masonry works. The Kistnapatam channel was nearly finished at the close of the year, sufficiently so to be used for passing water down to tanks.

Mitrow Canal.

Bombay.—The only important Irrigation Work in progress was the Mitrow Canal in Sindh. This is a channel designed to utilize fully the water introduced into the Eastern Narra River through the Roree Supply channel. It leads off from a loop branch of the Narra near the village of Mitrow, and will carry water down towards the Runn of Kutch. The Executive Engineer writes thus:—"This important work has been pushed on as fast as the supply of water would permit. It was opened last year for irrigation for a length of 38 miles of main line, and about 14 of branches, viz., the Dosab and Hingornah Wahs. The head was nearly of the full size designed for it, the depth of water admitted being 7½ feet, but which, owing to the large quantity of water expended on the rice cultivation near the head, was speedily reduced to the depth originally intended, viz., 6 feet; so well had the section of the canal been proportioned by Captain LeMesurier to the size of Kurriahs, that this depth was maintained to the tail. Except during the rains, the water level never varied an inch, an immense advantage which this canal has over the existing canals in Sindh. The crops, until destroyed by the rain and locusts, were very fine, but these two plagues made great ravages amongst them, so much so, that all were more or less injured, and some 8,000 acres utterly destroyed.

"During this working season the canal has been extended to the 53rd mile, or 15 miles, so that next year there will be 53 miles of main canal, and about 20 of branches open for cultivation. The heaviest masonry work on the canal, the weir across the Mukkee Reservoir, commenced on the 1st March, will be finished before the water is admitted, at a cost of about Rs. 45,000. A great want has hitherto been felt of bridges over this canal; so this year their construction has been pushed on as fast as

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possible: eleven bridges of timber and masonry are in progress, and I hope to have ten of them finished by the time the water is admitted, or soon after. The expenditure on the canal for the year has been about Rs. 1,01,000. The canal this year will have been extended as far as the supply of water will permit."

Ganges Canal.

North-Western Provinces.—The sum of Rs. 6,86,865 was sanctioned for carrying out new works on the Ganges Canal.

A lakh and a half was reserved for permanent head works, but work was directed to be confined to the preparation of materials, until a matured plan should have been submitted to the Government of India and approved. Somewhat more than the usual amount of work was done in constructing the temporary boulder weirs at the canal head. Heavy repairs were necessary in the Northern Division, especially in connexion with the Dhunouri works. Measures had to be taken to protect the foundations of the Munglour, Azufnugger, and Mymoodpoor Falls, and the Dimat, Togulpoor, and Belrah bridges. The gauge at the Roorkee bridge shows that the average depth of water in the canal for the year during the time it was open, was 5·52 feet. The canal was closed from 16th October to 26th November 1862; from 7th to 22nd December, when it was re-opened for one day; it was then closed till the 10th January; it was also closed for 4 days in April. No new rajbuhas were undertaken during the year in this Division; the total length of existing rajbuhas in the Northern Division is 228 miles.

The Meerut Division extends from Jowli (51st mile) to the Dubthullah bridge (161st mile), on the main canal. The work in this division was confined to the construction and improvement of rajbuhas. On the right of the canal there were 26 miles of distributing channel completed during the year, and the total length completed on 30th April 1863, was 339 miles. The corresponding numbers on the left bank were 26 miles, and 367 miles. The work done during the year on rajbuhas is reported to have comprised 244,790 cubic feet of pucka masonry, and 402 millions of cubic feet of earth-work. The latter number is evidently a mistake.

The Allygurh division is made up of the last 20 miles of the main canal, and the first 50 miles of the Cawnpoor and Etawah terminal branches. In this division also work was chiefly confined to rajbuhas, and consisted for the most part in remodelling defective systems of distribution. The amount of earth-work done was about 19½ millions cubic feet, and of masonry, 84,000 cubic feet.

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The Cawnpoor Division comprises the remainder of the Cawnpoor terminal branch, a length of 120 miles. A boat dock at Cawnpoor was commenced and nearly completed in the year. Besides this, work was confined to the rajbuhas; 114 miles were under construction, of which 54 were completed.

Ganges Canal.

The Etawah Division consists of the remainder of the Etawah terminal branch. Forty-five miles of new rajbuhas were completed, including some heavy work; the Gangsee and Bansuk channels are more branch canals, than mere irrigation channels; the quantity of earth-work done in the former was 16,870,000 cubic feet.

The whole amount assigned for rajbuhas in the foregoing divisions was Rs. 3,73,919; the expenditure previous to 1862-63 had been Rs. 21,70,000.

In the Budget of 1861-62 a grant of 1 lakh was made for the Futtehgurh branch, and an additional assignment of 2 lakhs was made from the Famine Fund. One lakh was allotted for 1862-63. The portion in progress consisted of two sections of 40 miles each, with an escape at the end of each section. The present assignment was to be directed towards the completion of this length of 80 miles, and its attendant rajbuhas. Several masonry works that had been well advanced in previous years were brought to completion, but the principal work was in rajbuhas. Water was admitted to the 40th mile, but irrigation extended to the 80th mile on the right bank, the system of rajbuhas on that side being complete. On 30th April 1862, 125 miles of rajbuhas had been completed; 60 miles were constructed during the year 1862-63. The amount of earth-work executed was 28,338,000 cubic feet, besides 2½ millions in bridge approaches.

An assignment of Rs. 50,000 was made for the Boolundshuhur Branch in the Budget of 1861-62. This work also received a grant of 2 lakhs from the Famine Relief Fund, and at the end of 1861, 43¼ miles of main channel, and about 117 miles of rajbuhas were more or less completed. Rs. 50,000 were reserved for 1862-63. Considerable progress was made on the Kot escape works. The number of miles of rajbuhas completed on 30th April 1862 was 112; 33 miles more were completed during 1862-63, involving excavation to the extent of 12½ millions of cubic feet, and 77,000 cubic feet of masonry.

Eastern Jumna Canal.

On the Eastern Jumna canal, a new regulating bridge at the head of the canal was built.

An assignment of Rs. 18,850, the unexpended balance of an estimate amounting to Rs. 99,651, was made for the

AGRICULTURAL.

Doon Canals.

completion of the Jakhun Canal, a small water-course intended for irrigation in the eastern part of Dehra Doon. The works were very nearly brought to completion. The quantity of work executed was 3 lakhs of cubic feet of earth-work, and 1,20,000 cubic feet of masonry.

Rohilkund Canals.

Two canals from the East Bygool River were commenced as famine works, estimated respectively at Rs. 24,595 and Rs. 11,412. A balance of Rs. 6,007 was given to complete them. The work appears to have been nearly brought to a close. Rs. 15,000 were assigned for the Kylas Canal, estimated originally at Rs. 82,476; the progress has been slow, owing to the late rains of 1862, and also to the dispersion of the work-people by heavy rain in January 1863.

Agra Irrigation works.

No report had been submitted on the Agra Irrigation Works, to which Rs. 27,277 were assigned, when the Superintendent General of Irrigation prepared his general report.

Baree Doab Canal.

Punjab.—Rs. 15,000 were assigned for completing the regulators on the Baree Doab Canal, and Rs. 2,50,000 for continuing the excavation of rajbuhas. It is presumed the first named work is finished, though nothing is said of it in the report. The quantity of work done in the rajbuhas during the year was as follows:—

In the first division 64 miles were opened out during the year, making a total of 74¼; about 2 miles more of excavation, and a few masonry works remained to complete.

In the second division 147 miles of rajbuha had been completed up to the end of 1862-63; 82 more were in progress.

The third division is a branch not now under construction.

In the fourth division six lines of rajbuha out of eleven had been completed, having an aggregate length of 96 miles, of which about half has been excavated during the year. On the other five lines having an aggregate length of 90 miles, 64 miles of excavation have been completed during the year.

A water-course was being made from the canal to Lahore.

At the annual closing, the bed of the main branch, upper, was found to have been much injured; extensive piling was resorted to to prevent further damage to the banks. About four miles of the second division too, were a good deal cut up. Piles were driven across the cuttings and wattled with branches and grass ropes, and in some instances concrete walls have been built across, which have acted well.

AGRICULTURAL.

A good deal of damage was done to the head works by the severe floods in the beginning of July 1862.

The Vahn Escape Channel was injured. At the tail on the Ravee, the river in July 1862 suddenly changed its course and cut off about 4,000 feet of the Escape Channel, carrying away a temporary masonry outlet. The fall consequently cut back in the canal bed. This has been checked by staking.

Sutlej Inundation Canals.

Extension of the Sohag and Kutora Canals; estimate Rs. 2,48,870; assigned Rs. 25,000. A new head was excavated for the Sohag Canal, the river having taken a course away from the old head. Rs. 18,600 were expended on the extension of the Kutora Canal.

Indus Inundation Canals.

Dhoondee Canal; estimated cost Rs. 88,849. The sum of Rs. 44,425 was sanctioned for the year to meet the same amount subscribed by the Zemindars. It was opened to its entire length, with a reduced width at present.

Manka Canal.

Rupees 50,641 were spent on the extension of the Manka Canal, making the total expenditure Rs. 58,574, of which the Government has paid Rs. 19,180, and the rest, Rs. 39,394, has been paid by the Lugham Chief, in hopes that Government will ultimately bear half the cost. Another canal, called the Mussoo Wah, is being dug at the expense of Mussoo Khan, a wealthy Zemindar. It will be 27 miles long, of which 17 have been dug at a cost of Rs. 42,800. About 12 miles of an old canal, the Gaya Mull, have been re-opened at the expense of another Zemindar, the Muzan Chief.

Mussoo Wah.

Putiala Canal.

The survey for this projected canal in the territories of the Maharajah of Putiala was completed at a cost of Rs. 38,460; the expense, except the military allowances of the officers, is borne by the Maharajah.

Western Jumna Canal.

The only work of importance in progress on the Western Jumna Canal was the new line of canal from Indree to Boodha Khera. The estimated cost is Rs. 1,68,063, and Rs. 50,000 were proposed for expenditure during the year. The channel was excavated down to water, and work could then only be carried on when the canal was dry, and this was only the case for 14 days, owing to the demand of water for cotton cultivation. The expenditure did not exceed Rs. 18,621.

Muddoor Anicut.

Mysore.—It was proposed to spend Rs. 25,500 in completing the re-construction of the Muddoor Dam across the Shumsha river, and that amount was passed in the Budget orders. The estimate is now increased from Rs. 50,500 to Rs. 63,209, and the outlay during the year was Rs. 43,247.

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The work comprises the construction of a masonry dam across the Shumsha river, in lieu of an old native work at the same place, and will feed an irrigation channel with eight tanks under it. The anticipated revenue on outlay amounts to 16 per cent. Arrangements had been made for completing the work before the close of the year, but a most unprecedented fall of rain in March crippled the operations so much, that spite of every effort the work cannot be completed till next season. The river came down in heavy flood several times, washing away portions of the green brick-work, while the rain spoilt a large quantity of raw brick. The Supervisor in charge of the work fell ill; cholera broke out and dispersed the work-people; in fact every thing, at the most critical time for the work, combined to prevent its completion. Though flood after flood afterwards poured over the dam, no injury of any consequence had occurred.

The Muddoor Dam furnishes an example of a solid work being constructed across a considerable stream, with only a casing of masonry—the core or heart of the work being simply rubble stone grouted with a mixture of 5 parts sand and 1 part lime,—and although left in an unfinished state, with at times floods pouring over the work, withstanding the action of the river successfully.

Dykes.

Hidgelee Sea Embankment.

Bengal.—The most important work in progress was the Hidgelee Sea Dyke. Estimate Rs. 4,70,490, of which 1½ lakh had been spent up to the end of 1861-62; 1¾ lakh was passed for expenditure in 1862-63. The work progressed rapidly after December 1862. The daily out-turn of work in February was 400,000 cubic feet of earth-work, in March 5 lakhs, and in April 4¾ lakhs, notwithstanding the occurrence of the Churruck Poojah, which caused almost a cessation of work for nearly a week. The whole quantity of work done was 43 million cubic feet. The length of work in progress was 17¼ miles, of which 11¼ was fresh work.

The great flood of 1862 caused considerable damage to the embankments in the Mahanuddee, Pooree, and Balasore divisions. The aggregate length of the breaches was 14½ miles, involving the execution of 30¼ millions of cubic feet of earth-work in repairing them, at a cost of Rs. 52,300.

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Metalled Roads.

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Madras.—Although no less a sum than 4 lakhs was spent during the year on metalled roads, besides expenditure

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from Local Funds, no important large works were in active progress, the work is described as all "ordinary road work distributed in little patches on many different lines of road all over the Presidency."

The lines on which most work has been done are the Great Northern Trunk Road, the road from Madras to Mysore Frontier at Oossor, and the Southern Trunk Road through Trichinopoly and Madura to Tinnevelly. The latter has been very much improved within the last two or three years.

Bellary and Cuddapah Road.

A good deal of work was done during the year on the Bellary and Cuddapah road, on which the daily average traffic is reported to be upwards of 500 bandies (principally cotton), and the operations on the Nandikanama and Munteral Kanama Ghats were pushed on as vigorously as possible. Sickness, due to the unhealthy locality, and the demand for labor on the Irrigation Canal Company's works, make it difficult to keep coolies on these works.

Trichinopoly.

Two new lines of road have been commenced in the Trichinopoly District, one running direct through the well-watered Torriore Taluq and by the pass between the Collay Mullay and Pachamullay hills to the Attoor valley of the Salem District, the other through the cotton tract of the Arealoor and Woodiarpolliem Taluqs to the trunk road No. 7, which, crossing the Coleroon by the bridge at the lower Anicut, gives access to the coast either direct to Tranquebar viâ Myaveram, or viâ Combaconum Nedamungalum and rail to Negapatam.

Forty miles of new road to connect Canara with the Malabar canals, viâ Vitta and Hossdroog, have been traced and opened out: eleven miles of road have been opened, and 51 small bridges built between Calicut and Paulghat; and operations on the Carcoor, Peria, Cootiaddy and Perambaddy ghats have been carried on during the year. These ghauts are intended to give the Coffee Planters of Wynaad and Coorg access to the coast.

Bunkapoor to Hurrihur.

Bombay.—The new road from Bunkapoor to Hurrihur, portion of the trunk line from Poona, viâ Hurrihur to Madras, was commenced on an estimate amounting to Rs. 2,36,349. The appropriation for the year was Rs. 20,000. The work is said to have progressed satisfactorily.

The road from Annigherry to Sungutteekope viâ Hoobleе, estimated at Rs. 2,53,060 which would naturally form one of the principal roads for conveying cotton from the Dharwar districts to the coast, is now open for traffic; the Executive Engineer reports that it is at present only used

COMMUNICATIONS. for the local timber trade, and, until the establishment of a cotton port at Sedashewghur and the completion of the approaches thereto, its full advantages will not be felt.

Bellary and Sedashewghur. The appropriation for the year was Rs. 40,000, in continuation of a previous expenditure of Rs. 79,668. The continuation of this road in an easterly direction to Godduck has been sanctioned, and Rs. 10,000 were allotted to it in the Budget Estimate, but owing to a scarcity of labour, little has been done in the past season. These form part of the trunk line from Bellary to Sedashewghur.

Tinai Ghaut. The work on the Tinai Ghat road leading from Dharwar to Goa was much retarded by scarcity of labour, but the portion undertaken by the British Government was reported to be further advanced than that in charge of the Goanese authorities. Fever was very prevalent in all the Ghat districts in the south of the Presidency in the last working season, and the Tinai Ghat road, along with others, suffered from the consequent scarcity of labour; the Superintending Engineer, Southern Circle, was instructed to push on this work to completion as soon as the state of the labour market and the sanitary condition of the district would permit. The estimate for this Ghat road is Rs. 60,000 and the appropriation in 1862-63 was Rs. 5,000.

Belgaum to the West Coast. New line of road from Belgaum to Vingorla; estimate Rs. 5,60,110; appropriated in Budget Estimate, Rs. 30,000, in continuation of a previous expenditure of Rs. 25,630, but additional funds were supplied and the expenditure during 1862-63 amounted to Rs. 2,12,265. The work was pushed on as vigorously as possible. The length of the line is 77¾ miles, viz., the Belgaum approach, 43 miles; Parpoolee Ghat 10¾ miles; Vingorla approach, 24 miles. In the Belgaum approach the road work up to formation level was completed, with the exception of about 5½ miles which were in progress; three bridges were built, and the foundations of two others put in; 62 culverts or drains under 10 feet of waterway. The work on the Ghat is thus described by the Executive Engineer—

"On the Parpoolee Ghat a large quantity of earth, moorum, &c., has been excavated, and rock blasted, and several dry stone retaining walls of various heights constructed. About 8¾ miles of the Ghat road may be said to be opened out; 34 culverts or drains under 10 feet of waterway, varying in size, have been constructed, and a bridge of 2 arches of 15 feet span at Danolee near the foot of the Ghat, has been erected. An arch of 40 feet has been thrown across a deep gap, where the line runs along

the scarp, near the summit of the Ghat, for a length of COMMUNICATIONS. 596 feet; the object of this was to avoid a portion of retaining wall which would have been about 60 feet high at the deepest point. Besides possessing this advantage, the arch breaks the great continuous length of retaining wall that otherwise must have been erected, and thereby adds stability to the portions on either side of it. The roadway in the vicinity of the flying arch averages between 40 and 50 feet in height, and, the work being solid and rather handsome than otherwise, the effect of the whole is good. The retaining walls on either side, owing to the great scarcity and difficulty of procuring good working stone near at hand, are not yet completed: they are however progressing fairly."

On the Vingorla approach 17 miles were completed, and the remaining 7 miles in progress. One bridge was built, and another was up to springing.

Rs. 15,593 were expended in improving two of the steepest and worst portions of the road between Belgaum and Kolapoor, one at Sutgutee, 15 miles from Belgaum, and the other at Neepanee, half way between Belgaum and Kolapoor.

Poona, Sattara, and Kolapoor. *The new Poona, Sattara, and Kolapoor Road.*—North of Sattara the line is entirely new, and, when complete, will lessen the distance between Poona and Sattara by nearly 10 miles; the length of the portion of this trunk road passing through the Sattara Collectorate is 97 miles, and includes the Kamatkee Ghat, which the Executive Engineer reported would be open for traffic last season. There are two large bridges on this road. One over the river Quoina at Kurrar, consisting of 780-feet arches and 240-feet land arches; the materials for this bridge were being collected, and the other over the river Neera at Sheerwul, consisting of 1140-feet arches; the masonry of the latter was complete to a height of 42 feet above the river bed or to the springing level of the arches. This bridge it was reported would be finished in December 1863. There were several other smaller bridges on this line, north and south of Sattara, in various stages of progress. The total expenditure on this road and its bridges in 1862-63, in the Sattara Collectorate, was Rs. 2,70,025. The section within the Poona Collectorate terminates at Sheerwul, 30 miles from Poona. A mountain ridge at Katruz near Poona takes up 3½ miles of this road and has to be overcome. By the introduction of a tunnel, 300 yards in length, a saving of 2,000 yards on the line first laid out has been secured, and a gradient of 1 in 21 been maintained. The cost of this section is esti-

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mated at Rs. 2,99,806 including bridges. Expenditure in 1862-63 Rs. 102,782. The work progressed satisfactorily.

Hyderabad to Chiploon, Trunk line.

The portion of the road from Hyderabad to the coast which lies to the west of Kurrar, where it meets the Great North and South Trunk line described in the preceding paragraph. From Kurrar to the Koombarlee Ghat the road is bridged throughout, and from the foot of the Koombarlee Ghat, below the ghats, all the bridges were brought up to the springing level of the arches. The traffic on this road, since the Koombarlee Ghat was opened in 1859 is very great, and when it is opened to Gowulkote on the Chiploon Creek, where boats of considerable tonnage can go, it may be expected to increase still more.

	Estimate.	Spent in previous years.	Spent in 1862-63.
	Rs.	Rs.	Rs.
The Ghat road	6,52,916	4,78,789	
Below the Ghats to Gowulkote with wharf and jetty there	86,018	20,000	1,17,057

Mhar to Wurrunda Ghat.

Road from Mhar on the Savitree River to the Wurrunda Ghat. This when completed will give direct communication between Mhar, which is situated on a navigable creek, and the new Poona and Sattara road, as there is already a road from the top of the Wurrunda Ghat eastward. The expenditure on this road in 1862-63 was Rs. 26,461, of which Rs. 19,061, were expended in bridging; the principal bridge being one over the Savitree river near Mhar, consisting of seven arches of 40 feet span; the masonry of this work was raised about 8 feet.

Barsee.

The road from Barsee, in the heart of the cotton fields of the Deccan, to the Barsee road railway station, a distance of 21¼ miles was in progress. The level nature of the country through which this road passes, and the quantity of traffic likely to pass over it, render it particularly adapted for ultimate conversion into a tram or light railway; the Executive Engineer was therefore instructed to flatten all the gradients to 1 in 100, and to construct all the masonry works of sufficient strength for locomotives and trains. Rs. 33,747 were expended in 1862-63 on embankments and earth-works, and Rs. 6,273 in bridging this road. The principal bridge will be one over the River Seena, consisting of 1140-feet arches. This, however, was not commenced.

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An important cross road from Neera bridge (on the old Poona and Sattara road) to Seroor (on the Poona and Ahmednuggur road) has been under construction. The road crosses the Great Indian Peninsula Railway at the station of Khairgaum, and will form a useful railway feeder. The length of the whole road is 56 miles, of which 37 lie in the Poona Collectorate. The expenditure on this section was Rs. 49,727.

Baramuttee to Kanowteh.

Another railway feeder from Baramuttee to Kanowteh, a distance of 21 miles crossing the Great Indian Peninsula Railway at Decksal, has been completed in the year under report. This is one of several roads approved by Government some years since as railway feeders to the Great Indian Peninsula Railway in the Deccan, but until lately funds have not been forthcoming for constructing them. Expenditure in 1862-63, Rs. 39,683.

Poona and Sholapoor Road.

Rupees 16,010 have been expended in 1862-63 in preparing metal for the section of the Poona and Sholapoor road within the Poona Collectorate. This section of road runs parallel to, and nearly within sight of, the Great Indian Peninsula Railway, but notwithstanding, the traffic has been great and was considered sufficient to warrant metalling the road.

Poona and Nassick Road.

A short road was under construction in 1862-63, from Deolalee railway station to the town of Nassick, 5 miles in length; this forms a part of the Poona and Nassick road, but since the opening of the railway, it has been found necessary to metal this section; this has been done at an entire cost of Rs. 13,139, and the approach from the Great Indian Peninsula Railway to Nassick is now reported to be in excellent order.

Dhurumter and Kurjut.

Rs. 20,000 were expended in 1862-63 in constructing the most difficult portion of a new road between Dhurumter (on the Nagotna river) towards Kurjut railway station at the foot of the Bhore Ghat Incline. The necessity for this road has been frequently urged upon Government, and the increased traffic, especially in salt, likely to be thrown upon it, after the opening of the Bhore Ghat Incline, rendered it unadvisable to delay its commencement any longer.

Nassick and Ahmednuggur Road.

Rs. 20,000 were sanctioned and Rs. 20,206 expended in 1862-63 in improving the section of the Nassick and Ahmednuggur road which lies between Nandoor and Kolhar, a length of 30 miles; 25 miles were completed, and the remainder was progressing satisfactorily.

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Yeola.

On the road from the large commercial town of Yeola to the railway station at Munmar, a distance of 14½ miles, Rs. 24,434 were expended. A very useful railway feeder.

Rs. 19,553 were expended in metalling the road from Ahmednuggur to Imampoor Ghat. The work was rendered necessary by the heavy cotton traffic that passes over the road.

Owing to the distress prevailing in the Ahmednuggur Collectorate, principally caused by the deficiency in the previous year's rainfall and consequent rise in prices of grain, &c., the following works were undertaken as famine relief works; they are useful in themselves, but were selected on the recommendation of the local authorities with a view of affording relief to the agricultural classes of those districts most affected by the scarcity of grain.

1. Spreading moorum between Wuddala and the Imampoor Ghat on the Ahmednuggur and Aurungabad road.
2. Spreading moorum between Lingion and Baboolsur on the Ahmednuggur and Malligaum road.
3. Spreading moorum between Ahmednuggur and Patus, one of the Great Indian Peninsula Railway Stations.
4. Clearing a road from Ahmednuggur to the boundary of the Ceded Districts.

The aggregate expenditure on the four works above named amounted to Rs. 45,000 in 1862-63, and, as the high prices of grain were still prevailing, it was decided to proceed with these relief works in 1863-64.

Agra and Bombay Road.

In the Mhow Division, Rs. 1,33,347 were spent. The division comprises 127 miles of road, viz., from Bhoreghur, on the boundary of the Bombay Presidency, to Dewas. The moorumming was completed throughout. In the Dewas and Beora Division, 82 miles in length, Rs. 1,59,777 were expended, of which Rs. 1,18,036 was due to earth-work and moorumming, and the rest to masonry works.

Indore and Simrole.

The construction of a road between Indore and Simrole, at the head of the ghat on the road leading to Boorhanpoor, was sanctioned during the year, and Rs. 21,827 were spent on it. A road from Boorhanpoor to Mhow, viâ the Simrole Ghat has been completed, and another from Boorhanpoor to Nargaom on the Nagpoor extension of the Great Indian Peninsula Railway was put in hand during the year.

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Nargaom and Boorhanpoor.

The distance between Nargaom and Boorhanpoor is 36 miles. A section of 18 miles was let out to a contractor, and rapid progress was made with the aid of the local authorities in Nimar. The expenditure was Rs. 64,882. It was reported open for monsoon postal traffic on 23rd June 1863.

Gogo and Ahmedabad.

Rs. 1,03,298 were spent in constructing the portion of the Gogo and Ahmedabad Road that lies between Vertej and Wulla, south of Dundooka. The works were proceeding satisfactorily.

Malligaum and Munmar Railway Station.

The road from Malligaum to the Railway Station of Munmar progressed, but not so rapidly as could be wished, owing to the scarcity of labour. The principal masonry works were in progress, and though incomplete, the line was used for postal traffic. The expenditure was Rs. 33,708.

Sedashewghur.

Two roads to connect Sedashewghur with the interior were in progress, one by the Kygah Ghat, and the other by the Arbyle Ghat. It is reported regarding the former that, although every endeavour was made to open it out, the attempt proved a failure, owing to the scarcity of labour to be mainly attributed to an epidemic fever raging in the district. The Ghat road was opened out to a width of 12 feet throughout and supplied with temporary bridges. The expenditure was Rs. 17,126. When sickness caused the suspension of these works, attention was chiefly devoted to the approach viâ the Arbyle Ghat. The line was opened out, and moorumed throughout the greater part. It would be ready to receive the metalling after the monsoon. The outlay was Rs. 95,848.

Beitkool.

The wharf road from Beitkool to Konay progressed satisfactorily; a good road was completed the whole way, and wharfage near Pier Point for a length of 230 feet. Pattamars and small steamers can with ease lie along side and discharge goods at the wharf wall. The greater portion of this work consists on the reclamation of land from Beitkool Cove and Allyguddy beach so as to form a continuous beach road, 100 feet wide, from Beitkool to Konay. The Konay creek which crosses the road was to be bridged by an iron lattice-girder bridge, in two spans of 40 feet. In the mean time a temporary timber bridge has been constructed. The expenditure was Rs. 58,522.

Bengal.—At Calcutta the deviation of the Garden Reach Road from Hastings' Bridge, for a distance of half a mile, was completed at last. The work cost Rs. 41,125. It was commenced in 1860-61, and was finished in December 1862.

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Midnapoor and Bancoora Road.

Considerable expenditure (upwards of Rs. 50,000 apparently) was incurred on the Midnapoor and Bancoorah Road. It is difficult to gather what progress was made. The road is an Imperial metalled road, and the present expenditure was designed to put it into good order, an end that is said to have been attained to.

Paunchcoora and Koilaghat Road.

The metalling of the road between Paunchcoorah and Koilaghat was completed, and the remodelling of the Paunchoooorah and Tumlook Road was put in hand, (estimate Rs. 22,011), and an estimate for metalling (Rs. 62,574) was sanctioned. The road is being made 24 feet wide, and will be raised throughout 2 feet above the highest flood level. Of the earth-work about 8,500,000 cubic feet out of a total of 11,500,000 were completed. Material for metalling was being prepared. The work was expected to be finished by the end of October 1864.

Doobrajpoor Branch Road.

The new district road from the Grand Trunk Road to the Adjee, and on to Doobrajpoor, 24 miles, was vigorously prosecuted. The first portion from the Grand Trunk Road to Toposy river, had the earth-works, metalling, and masonry culverts completed; also, the iron bridges over the Bungabund Khal and the Toposy river, moreover the masonry works for the Kangra Khal and Toomnee river were completed; indeed the iron-work of these two might have been put up, had not there been so much delay in transmission from Calcutta. It was expected that by 1st August 1863, the whole line, 13 miles 2 furlongs and 192 feet, would have its earth-works, metalling, masonry culverts, and four iron bridges (two of which over the Toposy and Toomnee rivers are extensive) completed.

Patna and Gya Road.

The new road between Meetapoor Railway Station towards Gya was pushed on with vigour, until a question arose as to the construction of a tramway between Gya and Patna; progress was then stayed, and only a narrow embankment was being raised between Jehannabad and the Poon Poon river; many of the viaducts were finished between the Poon Poon and Meetapoor, but all progress in metalling the road was stopped.

Bhagulpoor and Burhee.

Rs. 21,516 was appropriated for completing the metalling and improvement of the Road from Bhagulpoor to Burhee; estimate Rs. 1,01,516; previous expenditure Rs. 80,000. The road 22½ miles long was finished, except the four large bridges.

The Chowparun and Chuttra Road, 30 miles long, was finished as far as its earth-work and drain bridges, and metal was collected to be laid during the following rains.

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The realignment of the Grand Trunk Road through the Dunwah Pass was very nearly completed, and the metal would be, it was expected, laid and consolidated during the rains of 1863.

Soane causeway.

The stone causeway across the sandy bed of the Soane, except where the dry weather stream runs, was completed.

Nulhattee and Jeeagunge.

The metalling of the Jeeagunge and Nulhattee Road was completed, and the road generally put in good order previously to its being made over to the Branch Railway Company. Three iron girder bridges were in progress.

Jeeagunge.

Rs. 24,512 were sanctioned to complete the metalling of the Jeeagunge and Bhogwangolah Road, 8 miles. The project was completely revised to accord with the recorded flood levels of 1861, in which year, owing to the failure of the Bhaugirutee embankments, the country was very heavily inundated. The line has been very carefully laid out with easy curves and gradients, and prolonged to the river bank through the Jeeagunge Bazar. The work executed up to the close of the year amounted to about five millions of cubic feet of earth-work, and the completion of the masonry portion of a girder bridge of nine spans of 11 feet clear opening each. Four millions of bricks were also manufactured for this road.

Amerparah and Pheelkhana Roads, 6½ miles, for which Rs. 20,000 was passed, out of an estimate of Rs. 26,035. This is an extension of the last towards Berhampoor, cutting off a considerable detour through the Moorshedabad Bazar. The line follows generally the course of an old country road, the raising, realigning, metalling, and bridging of which constituted the work to be done. About two-thirds of the earth-work, comprising two and three quarter millions of cubic feet were completed, and about seven lakhs of bricks burnt for metalling. There were only a few small culverts required in the way of bridging. When completed, the whole of this line, 15 miles long, from Bhogwangolah to Pheelkhana, will be adapted for rails.

Ganges and Darjeeling Road, 136 miles.

The metalling of the first 30 miles of the Ganges and Darjeeling Road, viz., from Caragolah to Purneea (estimate Rs. 2,03,328) was in progress. Rs. 100,000 were assigned for the work, in continuation of previous expenditure, amounting to Rs. 75,000. The first 12 miles were completed; also three other isolated patches of 1 mile each; brick-flat soling of 7 other miles was laid. Seven timber bridges were in hand, either new, or under repair after being damaged by the floods.

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Darjeeling Cart Road.

Considerable progress was made on the Darjeeling car road. Between Kursiong and the Saddle, 15 miles, the road was practically open, and most of the traffic was already diverted to it. The remainder of the road, about 25 miles, had been laid out at a mean gradient of 1 in 30, and the report, as understood, states that 20 miles were completed. The greatest natural obstacle occurs about 3 miles below Kursiong, where a cutting has to be made in the face of a solid mass of rock, about 500 feet in height, and of the same breadth. A satisfactory impression had been made on it. The whole road was expected to be available for traffic by December 1864.

Bhagulpoor and Bowsee.

A sum of Rs. 20,000 was assigned to the Bhagulpoor and Bowsee Road; estimate Rs. 2,03,265; spent in previous years, Rs. 1,83,265. The extension of this road from Mirzatilloo to the Railway Station, one and a quarter mile in length, and 50 feet in width, was completed and metalled to a width of 16 feet. In the Bowsee section, the whole of the first layer of metalling was laid during the rains of 1862. The material for second layer had been carted to the berm, and stacked preparatory to being spread in the next season. Eleven new masonry bridges with timber platforms were in progress in this section. The portion between Hasdiha and Bowsee, 14 miles, was also in progress. This section was carefully realigned, and the entire project for its construction reconsidered with reference to the floodings of the hill streams traversed by it. About five millions of cubic feet of earth-work were executed in this section, and the heaviest portion of the work was regarded as completed.

Assam.

A thorough examination and practical survey was completed of the Great Trunk Line of road, which is to link Assam to the rest of India, from Dibrooghur to Dobree on the Rungpoor side of the Berhampooter, 360 miles. In the Budget Estimates, the following arrangement was made for meeting the cost of raising and metalling portions in the neighbourhood of the large stations:—

	Estimate.	Passed for
	Rs.	1862-63.
From Gowhatty towards Nowgong, 4 miles ...	21,353	10,000
„ „ „ Gowalparra „ ...	27,976	10,000
„ Dibrooghur „ Seebsaugor „ ...	23,687	10,000
„ Seebsaugor „ Dibrooghur „ ...	38,540	15,000

About one-half of the earth-work was done.

Sylhet and Cachar Road.

Twenty-four miles of earth-work were done on the Sylhet and Cachar Road; total length of road, 82½ miles.

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Agra and Bombay Road.

North Western Provinces.—The portion of the Agra and Bombay Road under the Government of the North Western Provinces, extends as far south as Beora, 267½ miles. The whole estimate amounts to Rs. 11,72,355; previous expenditure, Rs. 2,50,000; allotment for the year, Rs. 2,50,000. The progress has been satisfactory. It was anticipated that the whole length of road would be metalled by 30th November 1863. The quantity of work done during the year was 19¼ million cubic feet of earth-work; 11 bridges over 20 feet waterway completed, and several in progress; 12 miles of road metalled, besides drains and drain bridges.

Roorkee and Dehra Road.

Fair progress was made on the Roorkee and Dehra road; at the end of the year, 28 miles of roadway had been opened for traffic; 30 pucka bridges had been completed; 15 more were in progress; 4 miles had been metalled; 4 miles of the road in the Mohun Pass had been opened to a width of 20 feet, and rendered fit for light traffic. The dearness of provisions, the absence of neighbouring villages, and the discomfort and unhealthiness of the Pass in the rainy season, all tend to retard progress on this portion of the work.

Sohagee Pass.

The whole of the earth-work necessary on the Sohagee Pass Road between Allahabad and Rewah was completed; also the masonry works with some slight exceptions. Two-thirds of the required metal had been collected, ready for consolidation in the rains of 1863.

Rohilkund Roads.

Two lakhs were assigned to these roads. The account of the work done is not very intelligible. "In the old 1st Division, a length of about 36 miles, the earth-work has been very nearly completed; the metal has been collected in all the miles but six, and has been spread in seven miles, and three out of nine culverts required have been built; one 2nd class Chokie also has been erected. In the old 2nd Division, a length of 43½ miles, the 11 miles out of Futtehgurh up to Allahgunge have not been touched, but the ground has been surveyed and the line partially marked out preparatory to the submission of Plans and Estimates. It is this portion of the road which is subject to the inundation of the Ganges and Ramgunga Rivers. In the remaining portion the earth-work has been about three-fourths completed; very little kunkur, only about 10,000 cubic feet, has been collected."

Cawnpoor and Malthone Road.

The allotment for the Cawnpoor and Malthone Road was Rs. 1,25,000; from Cawnpoor to Kalpee the road was already metalled, but bridges were wanting over the Pandoo, the Orrind, and the Seyngur. The first only

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appears to have been put in hand, under the Cawnpoor Local Committee. It was but little advanced. The foundation wells were partly sunk. From Kalpee to end of Jaloun District, 32½ miles of metalling were estimated for, but progress was only made on 13 miles, owing, it is said, to the late date on which sanction was given. Between the Jaloun District to Jhansi, metalling was in progress in 19 miles; the arches of a new bridge near the Jail at Jhansi were being turned. From Jhansi to Lullutpoor is 57 miles; it was already bridged, except at the Betwa River, through which a causeway has been made.

Etawah and Futtehgurh Road.

Rupees 38,145 were spent on the Etawah and Futtehgurh Road out of the Income Tax Fund, within the Agra Division.

Ghurmooktesur and Ghazeeabad Road.

The road from Ghurmooktesur, on the Ganges, to Ghazeeabad on the Grand Trunk Road, near Delhi, the main artery of traffic from Rohilkund, was advancing rapidly to completion.

Nusseerabad Pass, Ajmere.

A sum of Rs. 16,668 was granted out of the one per cent. fund for the completion of the Nusseerabad Pass. The road through the Pass for the distance of nearly three miles has been completed. It was made of uniform width and metalled throughout, and considerably raised in some portions. One large bridge and a great number of culverts of various sizes for the drainage of the Pass were newly constructed, and others enlarged and repaired; large masses of rock were removed from the road, and side cuttings carried throughout the whole length. The work was fully completed.

Lahore and Ferozepoor Road.

Punjab.—Metalling the road from Ferozepoor to Lahore; estimate Rs. 2,10,316; previously expended, Rs. 1,34,000; allotted for 1862-63, Rs. 45,000. Distance between Ferozepoor and Lahore is 50 miles, and the length of road from the right bank of the Sutlej to Lahore, 41 miles. The metalling of 38 miles was completed. The crossing of the bed of the Sutlej is about 5 miles in length. To reduce this an embanked roadway was thrown out from the left bank in the line of the trunk road, about 2 miles in length, with spurs at intervals on the up-stream side to check the current in the flood season, and encourage the deposition of silt. The work after standing one season, promises to be successful.

In all, 101½ miles of metalling was done in the 8th Division of the Grand Trunk Road, i. e., from Umballa to Lahore, by Jullundur and Ferozepoor, comprising 306½ miles of road.

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Umballa and Kalka Road.

The road from Umballa to Kalka received its first coat of stone metalling, and the second was in progress. The allotment for this work was Rs. 50,000.

Lahore and Peshawur Road.

The large sum of Rs. 6,67,905 was allotted to the Lahore and Peshawur Road. The estimates sanctioned in 1861, for the works necessary to complete the road, amounted to Rs. 33,37,110, of which about 8 lakhs would be spent up to 30th April 1862. The metalling was carried on vigourously during the year. From the Ravee to the Jhelum, there remained at the close of the year about 2 miles to complete the first coat of metal. Sixty-six miles of metalling were done in 1862-63. Between the Jhelum and Rawul Pindee, a distance of 68 miles, 58 miles of metalling have been completed. Between Rawul Pindee and Peshawur, 32 miles, Cis-sutlej, and 35 miles Trans-sutlej had been metalled. The metal has for the present been laid down 12 feet in width, instead of 16, to accelerate the completion of a metalled line of communication throughout the whole length. Several large bridges were in various stages of progress. That over the Bhimber Nullah in the 70th mile was extended to 460 feet in length. The foundations of the bridge over the Deera Nullah, 112th mile, 10 spans of 40 feet, were about three-fourths constructed. The Bukrala bridge, 120th mile, 12 spans of 40 feet (to have a timber superstructure on masonry abutments and timber piers) had the abutments half finished, and the piles of 5 piers driven. The Bishendour bridge, 130th mile, 3 spans of 60 feet (timber superstructure on masonry piers) was completed. The bridge over the Sohan River, 163rd mile, near Rawul Pindee, 15 masonry arches of 63 feet span, the foundations of one abutment and three piers were up to flooring level, and the curtain walls on both sides were well advanced. The bridge over the Kurro, 201th mile, 10 spans of 40 feet, timber superstructure on timber piers, with masonry abutments, was opened for traffic, as also were bridge No. 26, 250th mile, 12 masonry piers on well foundations, and the Bara bridge, 258th mile, timber superstructure, bow and tie form, with masonry abutments and piers on well foundations, centre span, 74 feet, and two side spans 53 feet each. The bridge over the Vah Nullah, 192nd mile, an oblique strut and strain timber bridge, 9 spans of 25 feet, on timber piers with masonry abutments, was all but completed, as also was the Gondah Nullah bridge, 216th mile, a skew masonry bridge, 5 spans of 40 feet. New approaches to the Indus Ferry and bridge-of-boats at Attock were in progress and almost finished, including the bridge on

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the gorge at the west approach, a single brick arch of 70 feet.

Attok Tunnel.

The work on the experimental drift under the Indus was stopped by order of the Government of India in November last, leaving 285 feet to complete. A wire rope for the purpose of a flying bridge was thrown across the Indus at Attok; the width of the stream in the cold weather, at the point selected, is 775 feet. The wire is suspended from two masts 81 feet high, on masonry pillars 20 feet high.

Rupees 21,197 were spent from Local Funds in widening, improving, and partially metalling 15¼ miles of the high road from Hoshiarpoor to the borders of Kangra.

Fyzabad and Allahabad Road.

Oudh.—Road from Fyzabad to Allahabad, of which 72 miles lie within the Oudh territory; estimate Rs. 2,81,861; spent up to end of 1861-62, Rs. 2,81,861; sanctioned for the year 1862-63, Rs. 75,439; the road was expected to be finished, within the year except the large bridges. The Chief Engineer reports that a considerable amount of earth-work was done in the neighbourhood of the Goomtee River; 54½ miles received two coats of kunkur within the year. The well-sinking for the Tonse Bridge was commenced, and materials collected for the other large bridges. Thirteen drains of 10 feet water-way or under, one of 20 feet, and one of 30 feet, were constructed. Of the minor bridges, five small ones only, and one of 40 feet, remained to complete, and they were all in active progress.

Lucknow to Fyzabad, with branch to Byram Ghat.

The distance from Lucknow to Fyzabad is 78 miles, and that of the Byram Ghat branch, 23 miles. A lakh and a half was sanctioned in addition to Rs. 1,80,000 already spent. No estimate. Ninety minor bridges, and 60 irrigation culverts were built during the year, and others were in progress; 40 miles of metalling were done, leaving only 33 miles to complete, for which nearly sufficient metal was collected. In addition to the above a loop line through Nawabgunge was embanked, bridged, and metalled.

Fyzabad and Gonda Road.

Fyzabad and Gonda Road, 28 miles in length. No estimate. Rupees 44,000 were sanctioned in addition to Rs. 40,000 already spent. An experimental causeway 10 feet wide was thrown across the three miles of flooded land on the River Gogra, between its left bank and Nawabgunge. It was finished before the rise of the river, and was but slightly injured by the floods. All the earth-work and turfing was completed between Nawabgunge and Gonda, and all the bridges. Two coats of kunkur were consolidated over six miles, and a single layer over five more; the kunkur

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for the remainder of the road was dug, and most of it collected on the road side.

Roy Bareilly and Delamow.

The distance from Roy Bareilly to Delamow is 17 miles. Rupees 44,561 were passed for this road, being the unexpended balance of an estimate amounting to Rs. 94,561. The remainder of the earth-work was completed, 50,000 cubic feet. One layer of road metal was consolidated throughout, and all the kunkur required for the second layer collected. Twenty-one bridges were built, three of them being over 10 feet water-way. The whole of the above roads, aggregating 218 miles, were expected to be finished in 1863-64, with the exception of a few large bridges.

Lucknow and Seetapoor Road.

For the road from Lucknow to Seetapoor, 50½ miles, Rs. 50,000 were passed in continuation of expenditure amounting to about Rs. 15,000. No estimate had then been submitted. The earth-work was completed for 39 miles, and a considerable quantity done between the Gond River and the 45th mile. Metal for 17 miles was collected, and three small bridges were built. The south approach to the iron bridge at Lucknow was improved by giving easier gradients and metalling.

Northern Road (Great Deccan Road.)

Central Provinces.—The northern road, formerly called the Great Deccan Road, running southward from Mirzapoor is divided into three Divisions—

	Allotment for 1862-63.
1st Division, from North Western Provinces frontier to Jubbulpoor, 198 miles ...	Rs. 1,00,000
2nd Division, from Jubbulpoor to Korai miles	2,20,000
3rd Division, from Korai to Nagpoor, 58 „	2,00,000

Rs. 40,000 also were allotted to the 2nd Division from the 1 per cent. Income Tax Fund.

The 1st Division has been for some years a good road metalled throughout, but comprising many unbridged nullahs, rivers, and water-courses. Many of these are crossed by means of paved causeways or metalled dips; the minor water-courses are passable at all seasons, but at the larger nullahs and rivers traffic is frequently staid till the subsidence of a flood. The lakh of Rupees was given for bridges. The Chief Engineer has taken great pains to describe the progress made during the year, and the exact state of the road at its close. Stripped of details, the account shows that the bridges of 5 nullahs were completed during the year; the Cohari, Chunda, Chaka, Umrah, and Rewah. Seven more were in progress, viz., over the

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Girwah	in the 57th mile,	3	spans	15	feet	Foundations commenced.
Burhurrah	„	„	1	„	20	„ Arches being turned.
Kutnay	„ 58th	„				„ Materials being collected.
Hurdoo	„ 74th	„	3	„	20	„ Foundation excavated and masonry commenced.
Belwah	„ 86th	„	3	„	20	„ Foundations excavated.
Goosroo	„ 93rd	„	3	„	45	„ Arches completed.
Umrah	„ 96th	„	3	„	15	„
Tonse	„ 101st	„	5	„	50	„ Foundations excavated and masonry commenced.

Forty-eight rivers or nullahs remain to be bridged, and there are 96 metalled dips for the passage of small-water courses, which it is said should be replaced by culverts when funds are available. It is estimated that not less than 6 lakhs will be required for all these works.

On the 2nd Division, as far south as Seonee, (85 miles) the roadway was completed or nearly so, with the exception of about 14 miles; several bridges were in progress; that over the Wein Gunga will have 12 arches of 50 feet span, with high piers (the highest being 40 feet high). It was anticipated that all the arches would have been turned before the rains of 1863, but heavy rain in March and April did so much injury to the stock of bricks in preparation for turning the arches, that only eight could be turned. It was expected to be completed by the end of 1863. South of Seonee, work was being pushed on as far as the 10th mile, and a survey was being made of the remaining portion as far as Korai, at the foot of the ghat. Of the 3rd Division, the first 10 miles from Nagpoor to Kamptee has long been finished as a bridged and metalled road. From the 10th to the 28th miles a little metalling required to be done; three small bridges were not commenced, and the large bridge over the Kanhan at Kamptee was in progress. On the remainder about 6 or 7 miles of earth-work were done.

Eastern Road.

The Eastern road is that from Nagpoor to Raipoor, Rs. 40,000, were passed, in addition to Rs. 1,00,000 from the 1 per cent Income Tax Fund. The work has not progressed so satisfactorily as it should have done. From Nagpoor to Bhundara, 36 miles, the earth-work was completed, and the metalling was almost finished, but it was so badly done, that a great part had to be taken up again. It may be said to have been, about $\frac{1}{4}$ finished at the end of the year. From Bhundara for $22\frac{1}{2}$ miles, one-half of the earth-work was completed and metal collected for $12\frac{1}{2}$ miles. From Raipoor, westward, 10 miles, the earth-work was completed, $\frac{1}{8}$ of the bridging done, and the metal at the road side.

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Southern Road.

The Southern Road runs from Nagpoor to Chanda. Rs. 10,000, together with Rs. 1,10,000 from the 1 per cent. fund were allotted. From Nagpoor to Bhoree, 18 miles, the road was completed, except two bridges, which were approaching completion; 8 miles of metalling, too, required consolidation. From Bhoree where the road through Nachengaon branches off to Hingunghat, 28 miles, including a branch to the latter place of 15 miles, the earthwork was completed, and 12 miles of metal collected and partly spread. Five large streams remained unbridged. The earthwork of the remainder of the road from Jam, the place where the Nachengaon road branches off to Chanda, 56 miles, was all but finished, and metal for 10 miles collected: 16 bridges of various sizes remained to be built.

North Western Road.

The North Western Road comprises the line from Nagpoor to Chindwarra, 75 miles, and a branch of 7 miles connecting Kamptee with it. The first 20 miles from Nagpoor were completed, except $\frac{1}{4}$th of the masonry and the consolidation of the metal. On the rest of the road nothing appears to have been done. The branch from Kamptee was raised and half bridged. The metal was being collected.

Prome and Poungday.

British Burmah.—Rs. 50,000 were appropriated from the Income Tax Fund to the Prome and Poungday road, estimated at Rs. 89,105; 18 miles of roadway were metalled and 47 culverts constructed. Near Rangoon the roads in the Poozoondoung quarter, the chief rice mart, were much improved; Rs. 25,932, the whole amount of the estimate, were allotted to the work. A large timber bridge of $82\frac{1}{2}$ feet span was constructed, the first large bridge yet built in British Burmah. The Chief Engineer reports that it consists of two trussed girders supporting a roadway between them on their bottom chords, and resting on brick abutments. It was built by contract, and cost Rs. 16,000. No local contractors could be found capable of working it out from the drawings, but a model of it was made on a scale of an inch to a foot, and, with the model before them, the Chinamen readily came forward to contract for it, and they did the work very well. It was intended to spend Rs. 50,000 on the Rangoon and Manbee road; work was delayed owing to the necessity for revising the estimates; 11 miles were partially cleared, and the work was actively progressing.

Toka and Aurungabad.

Hyderabad.—The portion of the Nagpoor Dâk line between Toka and Aurungabad, 26 miles, begun in 1861, was completed in January 1863. Estimate Rs. 1,12,800; already spent Rs. 50,000; sanctioned Rs. 30,000. The

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work was satisfactorily done by contract. The line is still intersected three by large unbridged rivers, which are at times unpassable in the monsoons. The road between Aurungabad and the Railway Station at Nandgaon viâ Dowlutabâd, 52 miles, is an important line through a highly productive though not over-populous tract of country in which it will be the only made road. But little work had been done previous to 1862-63. In that year the masonry works, 54 bridges and culverts, and all the earth-work of the first section, were finished; 15 miles in all have received the metal. The cost of the whole line was roughly estimated at Rs. 2,05,000, of which Rs. 20,000 were assigned for the year.

Aurungabad and Nandgaon Railway Station.

Mysore.—The only metalled roads of importance that were in progress during the year were the Bangalore and Munzerabad, (estimate Rs. 1,13,370), and the Mysore and Shreemoga (estimate Rs. 97,608) roads. Great difficulty was experienced in getting labour, and not more than 11 or 12 miles were raised and metalled.

Unmetalled Roads.

Bengal.—The road from Calcutta to Jessore was completed with some trifling exceptions, which do not interfere with the traffic. It is a very fine road: a line of rails might be laid down on it nearly the whole way without any alteration. The additional bridges which the floods of 1861-62 showed to be necessary were all completed. This road is metalled from Baraset to Duttopooker, Rs. 60,000 were appropriated to it for the year for formation and bridges. Of the Dacca and Chittagong road, the portion from Naraingunge to Byde Bazar on the Megna was almost completed as a well bridged unmetalled road. For the portion between Chittagong and the Fenny River, 41 bridges were sanctioned, of which two only were finished, and 12 raised a foot above the foundations. Nearly the entire season was taken up in preparing bricks, soorkee, and lime.

Calcutta and Jessore Road.

Dacca and Chittagong Road.

Rs. 50,000 were allotted to the Mozufferpoor and Hajeepoor road, 35 miles, from the 1 per cent. fund of the Income Tax. It was being raised and repaired, and bricks were being prepared for the bridges on the realignment.

Mozufferpoor and Hajeepoor Road.

The same sum was allotted to the Mozufferpoor and Dulsing Serai road, but not spent.

The Cuttack Trunk Road from Rajghat to the Mahanuddee River, 133 miles. Rs. 54,000 were allotted for this road, but a heavy expenditure was incurred in repairing the numerous breaches made in it by the heavy floods of 1862.

Cuttack Trunk Road.

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Some portions of the road work were let out to contractors, but they failed to work satisfactorily. The whole amount of earth-work done during the year was 22½ million cubic feet. Good progress was made in the masonry works; 25 appear to have been commenced, of which 16 were described as well advanced.

The Sumbulpoor Road extends for 120 miles west of Cuttack; the usual annual repairs were executed upon it. In addition, and for new works, about 8,00,000 lakhs of earth-work, 41,800 cubic feet of rubble stone in causeways, and 6½ miles of jungle cutting have been put out of hand; 10,00,000 lakhs of bricks have been burned for masonry causeways. This road passes for almost its whole length through independent, but tributary and very petty Rajah's Estates; some miles lie in the Government Estate of Ungool.

Sumbulpoor Road.

The fair-weather road from Calcutta to Taldunda was completed as such, and 10 timber topped bridges begun in 1861-62 were completed.

Calcutta and Taldunda.

The line of road from Cuttack to Sonepoor is 152 miles. From Cuttack to Burmool, 75 miles, it was made passable for cart traffic, but two or three deep and large nullahs, holding deep water in the dry season, still diverted the traffic to loop-roads. Two useful bridges were built, and 66 stone causeways were constructed over shallow and mud-bedded nullahs and water-courses.

Cuttack and Sonepoor.

The Sub-Division from Burmool to Harbungah, 22 miles, contains that portion of the cotton road which is the key to the whole line. The Burmool gorge works were consequently pushed on during the year as far as funds allowed and as far as the labour market permitted. In the Burmool gorge, which is 15 miles in length, the operation of the year progressed in a very satisfactory manner, considering the very unhealthy nature of the locality, and difficulties about labourers. Four miles of road were widened to 18 feet, and 5 more to 15 feet, the excavation being gravel and loose rock; 1½ mile of new road made 18 feet wide, and 1 mile, 12 feet; 10 miles of road in gravel and loose rock commenced in the previous year were well advanced towards completion; 7 miles of jungle cut to a width of one hundred feet. The crossings of six large and deep mountain streams, beds in some cases 60 feet below level of road, have had approaches fit for heavy cart traffic, constructed; 22 causeways over minor mountain streams were built from 10 to 120 feet in length and from one-half to 14 in height.

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The pure rock cutting at the Sonakaniah cliff extends for about 1,000 lineal feet. The depth varies from 20 to 35 feet; this is side cutting. It has been a troublesome piece of work to construct the line round this cliff. The rock is gneiss, parts of it so hard that it could not be bored with the jumpers at hand and by the ignorant jungle and village coolies. It was found cheaper and simpler, situated as the works were, to quarry these hard masses of rock by first making them red hot, and then splitting them by pouring cold water over the heated stone. The road round the cliff for the distance of 1,000 feet is now with the exception of 150 feet, 18 feet wide. For this length of 150 feet the width is 15 feet.

The difficulty in obtaining labour and the expense of carrying out the work is much increased by the opposition of the petty Rajahs through whose property the road passes. At Boad its Rajah sanctions or permits his people to give to the Department that passive resistance it is so hard to meet and overcome. Not one coolie from Boad attended on the works during the past season, though the wages for such men was Rs. 4-8 per month, sufficient to entice the free workmen from Cuttack and Sumbulpoor, places over 100 miles distant.

Sutlej Valley Road.

Punjab.—The work on the Sutlej valley road from Simla towards the Chinese Frontier, for which Rs. 25,000 were allotted, was actively carried on. It is an improvement and widening of the present track with slight alterations, and not a new alignment fitted for wheeled traffic. As far as Nag Kundha, the line of the Hindoostan and Thibet Road, opened out some years ago, is followed. From that point the line now being improved descends to the valley of the Sutlej, passing through Rampoor, the capital of Busahir; 61 miles in continuous line from Nag Kundha were opened out to the standard at present prescribed, and an isolated $6\frac{1}{2}$ miles further in advance. Preparations were being made for a bridge across the Sutlej at Wangtoo.

Road to Ladak Frontier.

Similar improvements of the road from Sultanpoor in Kooloo through Lahoul to the Ladak Frontier are in progress. The work was stopped by snow on the 22nd October, and could not be resumed till April. Five miles were opened out, and one timber bridge, 50 feet span, was built, materials were collected, and commencement made of the bridge across the Chandra River at Koksur.

Rawul Pindee and Murree Road.

The widening and improvement of the Rawul Pindee and Murree Road, estimated at Rs. 42,263, had been carried out to within 13 mile's of Murree at the end of 1861-62.

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Rs. 10,000 were assigned for 1862-63, and 6 miles more were almost completed. The width is 22 feet, including the inside drain.

Murree and Kohala.

Improvements were made on the road from Murree to Kohala, 21 miles, on the high road from Murree to Sreenuggur in Cashmere.

The Central Road of the Hazara valley from Abbottabad to Gurhee was widened, and revetments and bridges provided at a cost of Rs. 12,500.

Gondah and Byram Ghat Road.

Oudh.—A road from Gondah to Byram Ghat, 29 miles, was being constructed from Local Funds as a first class bridged, unmetalled road. The earth-work was nearly completed, seven small drains were built, and eleven more commenced. A pile bridge over the Tehrie, of 180 feet waterway, was completed, and the well foundations for the Kurai Nullah Bridge were commenced; three other bridges of 30, 36, and 50 feet waterway were in progress.

Lucknow and Roy Bareilly Road.

The Lucknow and Roy Bareilly Road, 45 miles, was transferred from Imperial to Local Funds. Seventeen bridges and culverts were finished during the year, and nine others were in progress.

Lucknow and Sultanpoor Road.

On the Sultanpoor Road, 82 miles, some twentysfive small bridges were finished, and an old unsafe native bridge over the Loonce was partly pulled down and rebuilt with eighteen arches, of which fifteen were entirely new.

Mysore.—The Chief Engineer reports as follows:—

Estimate Rs. 41,830.

"The terminal portion of the new Cuddapah Road, $15\frac{1}{2}$ miles, was completed with bridges and drains, and, with the exception of a few small works on the Madras, side, the line is now open for through traffic, i. e., from Bangalore to Cuddapah.

Aggregate of estimates Rs. 47,732.

"Five important Railway feeders east of Bangalore have progressed very rapidly under contract; most of them are now nearly finished, and all will be out of hand by the 1st of November.

Estimate Rs. 27,278.

"The road leading from Kankhanhully to Bangalore, 30 miles, also made fair progress; it has been cleared throughout, and was formed and bridged for two-thirds of its length.

*Estimate Rs. 10,144
†Estimate Rs. 23,295.

"The Yellahunka-Dodaballapoor road *, $13\frac{1}{2}$ miles, Dodaballapoor-Davenhully and thence to Jungumcotta †, 20 miles, have been pushed on very satisfactorily, and will be completed within a few months.

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"Rupees 26,000 were expended on the Mysore-Maninoddy Road. Very little now remains to be done besides the culverts, which were subject to unavoidable delay. Two miles remain to be put in hand, and 8 miles to be gravelled, so that, including the 10 miles completed the previous year, 49 miles have now been opened.

Estimate Rs. 23,936. "The Muddoor-Sevasamoodrum Road, 26 miles, has not progressed satisfactorily, owing to various causes, chiefly misconduct on the part of the contractor; 7 miles have however ,been commenced, and 5 miles completed. The work will be easily finished without bridges next season.

*Estimate Rs. 1,13,370. "In North Astagram work was chiefly confined to metalling and raising to 2nd class the portions of the Bangalore-Munzerabad * and Mysore Shemogah Roads † within the Division. Only 11 or 12 miles were completed during the year, owing chiefly to great difficulties connected with labour. Better progress is, however, promised in the current year.

†Estimate Rs. 97,608.

Estimate Rs. 34,682. "In the same Division the work of opening out the Boond Ghat for cart traffic was also delayed partly from the late date of sanction (November), and partly in consequence of the difficulties connected with labour. One and ahalf miles of ghat were opened out to 6 yards, clear width. As several companies of Khalihauts (Mysore Labour Corps) are to be despatched to the work soon, more satisfactory progress will it is hoped be shown."

* Estimate Rs. 16,800 "Twelve and a half miles of the Bankipoor-Doomee* road were completed, making 19½ miles open. It should soon be finished with the exception of bridging. Scarcity of labour has affected this work also.

* Estimate Rs. 15,410. "Eleven miles of the* Theerthully-Annatapoor, Road† were completed."

* Estimate Rs. 13,800. The *Seerah-Mudgherry road, 24 miles, and the, Chit-
† Estimate Rs. 16,800. tledroog-Doomee Road, † 30 miles, have been nearly completed with the exception of bridging; the latter line is a continuation of the Bankipoor-Doomee road, and when finished will prove of considerable importance: the bridges, however, will require two and a half years to construct.

* Estimate Rs. 17,181. Of the new northern road from Mudgherry * to
† Estimate Rs. 19,333. Powgud, 11 miles were opened in the year; as also 24 miles of that connecting Mudgherry † and Dodaballapoor to the south-west.

BRIDGES.

Chuttoor and Cuddapah Road. *Madras.*—Rupees 10,000 were assigned towards bridging the road between Goolcherroo and Kulloor, portion of

Trunk Road No. 11 from Chuttoor to Cuddapah; esti- COMMUNICATIONS.
mate Rs. 94,882; already spent Rs. 38,272. Rs. 6,527 was sanctioned to complete a bridge over the Kundera river in the Kurnool District, estimated at Rs. 27,263. The arch- Kurnool.
work was completed, and the wings, superstructure, and approaches were in progress. Bridging was also in progress on the road from Cuddalore to the Salem Frontier. A bridge over the Codamoorty river, Trichinopoly, estimated at Trichinopoly
Rs. 17,650, was completed for Rs. 17,216 in April 1863; so also was that over the Iyaur, estimated at Rs. 17,220; the actual cost was within a few rupees of the estimate. A bridge over the Ponany at Kulputty, near Palghat, Malabar, Malabar.
was completed at a total cost of Rs. 27,089. In Ganjam a Ganjam.
bridge of 7 arches of 36 feet was commenced and nearly completed over the Makendra river; estimate Rs. 17,280; spent during the year Rs. 15,639; also one of 8 arches of 30 feet over the Godahala Nullah at Ingilly was commenced on an estimate amounting to Rs. 19,290. A bridge (esti- Madura.
mate Rs. 19,300) over the Shunmooganuddy river appeared in the Budget of 1856-57, but owing to financial restrictions work was not commenced. In 1862-63 Rs. 4,578 were spent, and a large quantity of materials collected.

Belgaum and Kolapoor Road. *Bombay.*—At the beginning of the year a bridge of 7 arches of 45 feet over the river Gutpurba at Soolguttee, on the Belgaum and Kolapoor road was sanctioned. The stream where it crosses the Road is very rapid even in the dry season, but during the rains it becomes a dangerous torrent, delaying the traffic sometimes for days together. The estimate amounts to Rs. 47,881, and the expenditure in 1862-63 was Rs. 31,262.

Two other bridges, each consisting of 7 45-feet arches, one over the Hurrunkasee and the other on the Yedgunga river, both crossing the main high road between Belgaum and Kolapoor, were under construction, and Rs. 3,300 were expended in 1862-63 in laying the foundations of the piers and abutments.

Hyderabad and Sholapoor Road. Two bridges on the Sholapoor and Hyderabad Road over the Boramunee and Hurnee streams were completed; they are both of 9 arches of 15 and 30 feet span respectively. These bridges complete the communication between Hyderabad and Sholapoor. They were opened for traffic in December 1862. Their cost was Rs. 47,495, of which Rs. 41,310 was spent in 1862-63.

Poona and Sholapoor Road. Authority was given in the year under report to proceed with an unfinished bridge on the Poona and Sholapoor Road over the Mella Nullah, formed by the back-water of the

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Bheema river. It was originally commenced as one of five 50-feet arches. But in 1861, when the piers and abutments had been built to their full height, the flood line rose 9 feet over their tops. The piers were too light to be raised to that height. It was intended to introduce piers between those built, and raise them all sufficiently to give the waterway required.

Palej and Jumbooseer Road.

A large timber bridge across the river Dhadur on the road from Palej to Jumbooseer, estimated at Rs. 31,563, was commenced and nearly finished during the year; the expenditure being Rs. 22,615. This road is one of those to which the name railway feeder is now generally given. It communicates with the Bombay, Baroda, and Central India Railway.

Tolly's Nullah.

Bengal.—A contract for erecting an iron screw-pile bridge over Tolly's Nullah at Alipoor was taken up by Messrs. Brassey, Wythes and Co. and the work was nearly finished. Estimate Rs. 49,220.

Burrakur Bridge.

The Burrakur Bridge on the Grand Trunk Road is to consist of seven masonry arches of 75 feet and 9 spans of iron girders, estimate Rs. 5,37,176; spent up to end of 1861-62 2½ lakhs; sanctioned for the year 1¼ lakh. At the close of the year 1861-62 the eastern abutment and piers 1, 2, 3, 12, 13, 14, and 15, and the western wing walls were up to the level of the spring of the arches, and the supports for the centering of arches 1 and 2 had been commenced. At the close of 1862-63 the centering had been completed, and in the former 8 courses and in the latter 24 courses of the arch voussoirs set. The scaffolding for the erection of the iron girders of the third span had been constructed. All the iron-work had been delivered. The foundations of pier No. 4, 21 brick wells of 7 feet diameter were sunk 25 to 30 feet below the surface of the bed of the river at the beginning of the year, and at its close they were down to 32 to 37 feet. They are in a bed of sandy clay which it is very hard to penetrate. The foundations of pier No. 5 are two blocks 25′6″ × 19′; these were sunk 42 and 43 feet below the bed of the river, having sunk only between 2 and 3 feet during the year. The foundations of piers 6, 7, and 8 were being sunk, but not much progress was made; they are exposed to the full force of the torrent, and suffered severe damage in the rains. The north block of No. 8 was twisted through a considerable angle, and sunk at the up-stream end about 4 feet; but it apparently remained unbroken, and the south block was a good deal displaced and broken; operations were suspended until after the rains

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of 1862. A coffer dam of brick-work blocks for No. 9, the foundations of which are to rest on rock, was in progress. Piers 10 and 11 were within 2 and 3 feet of the level of the bed plate of the girders.

Patna Branch Road.

On the Patna Branch Road seven brick masonry viaducts, containing 28 arches of 16 feet span each, were finished, and two viaducts of 18 arches of similar span were built up to springing; 199,932 cubic feet of masonry were executed during 1862-63.

Leelajun Bridge.

Rs. 1,10,000 were allotted to the Leelajun Bridge on the Grand Trunk Road, but little appears to have been done. Endeavours were made to repair it during the year according to a design proposed by the Officiating Chief Engineer, but it was found impracticable. The debris of the old bridge preventing the sinking of any description of foundation to support one of the iron standards.

Morhur Bridge.

A lakh and a half was assigned to the Morhur Bridge at Shergottoy and the Booryah Bridge, but work was confined entirely to the former. It consists of 14 spans of 74 feet. On 1st May 1862 piers Nos. 4 to 12 were completed to the springing of the arch, and during 1862-63 six arches were nearly built. The block sinking for the foundations of the remaining piers and the two abutments appears to have been going on all through the year, but the report is not very clear.

Hindun Bridge.

North Western Provinces.—The re-construction of the Hindun Bridge at Ghazeeoodeennugger near Delhi, estimated at Rs. 56,000, and the diversion of the river estimated at Rs. 48,755, must be regarded as one project. Rs. 33,705 were assigned for it in continuation of a previous expenditure of Rs. 57,000. The bridge was formerly a suspension one, which broke down in 1858. It was proposed to replace it by adapting the piers and abutments to a masonry bridge of 5 spans of 81 feet. The abutments, piers, &c., of this bridge have been carried up to the level of springing; two-thirds of the earth-work in the approaches have been executed. A contract was entered into for the supply during this year of bricks sufficient to turn the masonry arches, but on running one of the bays dry in February to permit of centering pillars being brought up, certain indications of the insufficiency of the masonry flooring to sustain the centering presented themselves; and about the same period the attention of Government having been drawn by the Secretary of State in Council to doubts which were formerly entertained as to the ability of the piers to sustain masonry arches, it was decided that further pro-

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gress should be suspended, pending consideration of plans for an iron lattice or girder bridge, as being lighter on the piers and not so liable to disarrangement from any settlement as masonry arches.

As connected with this bridge, the steps taken during the year to alter the channel of the river Hindun are thus described by the Executive Engineer:—"The excavation of this channel, undertaken as a relief work in the famine of 1861-62 was nearly completed during that season, but the floods of that year having come down with unusual velocity, washed most of the spoil-banks again into the channel, extensively silting it up, (the soil being of a very light sand). During this year it was not considered advisable to incur a further expenditure in the excavation of the channel. About Rs. 3,000 of the assignment have been expended in putting down five spurs on the convex curve of the channel to assist in diverting the current into a more direct course. About Rs. 5,000 more have been sanctioned to maintain the boat-bridge over this river, complete through the rains, and about Rs. 5,000 have lapsed." It may here be stated that the necessity for the alteration of the channel of the river Hindun near Ghazeeoodeennugger became apparent in 1859. The stream, if left in its natural course, would have run obliquely to this bridge and to the bridge proposed to be constructed by the East Indian Railway Company.

Aril Nuddee, Rohilkund.

A large bridge was in progress over the Aril Nuddee on the high road from Budaon to Shahjehanpoor. Fifteen of the piers and abutment wells were sunk, and the rest, 23 in number, were in different stages of sinking.

Markunda Bridge.

Punjab.—Of the Markunda Bridge near Umballa the abutment on the south side and the seven adjacent piers had been raised to the spring of the arches; the foundations of the north abutment and the five piers next to it were brought up to flooring level.

Guggur Bridge.

The work on the Guggur Bridge was confined to well sinking for the foundations and curtain walls. Those of the eastern abutment and the 1st and 2nd piers were sunk to their full depth, and those of the curtain walls as far as the 3rd pier; others were in progress. The expenditure was Rs. 24,900.

Kanhan Bridge.

Central Provinces.—Rupees 80,000 were assigned to the Kanhan bridge at Kamptee; estimate Rs. 3,04,715; spent in previous years Rs. 30,000. The north abutment and piers Nos. 10 and 11 were complete up to springing line; the coffer dam of No. 9 pier about half finished; wells

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for No. 8 three-fourths sunk. Down-stream side curtain blocks are 42 in number, of these 5 were 12 feet to 14 feet deep, 18 more were 10 feet deep, 7 were 7 feet deep, 5 were 5 feet deep, and 4 were 3 feet deep, and three more were wanting to fill in a gap in midstream.

Navigable Canals.

Murdapatah Canal.

Madras.—Rupees 11,584 were spent in constructing locks and calingulahs in the Murdapatah Canal; 2½ million cubic feet of earth-work were done, wells for calingulahs sunk, and materials collected.

East Coast Canal.

The portion of the East Coast Canal between Sadras and the Palar river was cut at a total cost of Rs. 20,191, of which Rs. 13,516 were spent during the year. This completes communication between the Palar and the Adyar.

Oolooburiah Canal.

Bengal.—The Oolooburiah navigable canal between Oolooburiah and Moisrakha, connecting the Hooghly and Damoodah rivers, was completed during the year, upwards of 47,37,429 cubic feet of earth-work having been executed, and it was transferred in December 1862 by orders of Government to East India Irrigation and Canal Company.

Calcutta and Eastern Canal.

The new cut which was being made in lieu of Bosekkally khall was far advanced. The progress made this year was very much better than that made in the previous year. About one and a half miles of the cut were finished; it was expected to be completed in the ensuing season.

The stop-gates which were being erected last year at Dum-Dum bridge to turn all the water admitted through Chitpoor lock down the old canal in hopes of keeping it free from deposit were finished. They were closed during four spring tides, and a good deal of scouring took place. It has not been clearly established that the deep deposit now in the canal will be scoured out by the operation, but it is quite established that, if the canal be cleared out again, it can be kept clear by a judicious use of the stop-gates.

The improvement of Tolly's Nullah was commenced in October 1862, the work was let by contract; the Contractor failed. It was then promptly taken up by the Executive Engineer, but Government thought better to defer the work: it was stopt early in December. The Nullah was reported to be in a very bad state.

River Improvements.

Indus.

Bombay.—The rock cutting at Sukkur (estimate Rs. 2,05,984) to improve the navigation of the Indus by cutting away the right bank and thus widening the channel between Bukkur and Sukkur was commenced. Most of

COMMUNICATIONS. the work done during the year was within the high water mark of the river, and consisted of the partial removal of the large spurs of rock in the bed of the river. Half the work was let out to a Parsee contractor, the rest was carried out by the Executive Engineer on a system of petty contracts. It was expected that the work would be finished in three years, and considerably within the estimate.

Godavery. *Madras.*—The Upper Godavery river improvement. The net outlay on these works during the year 1862-63 amounted to Rs. 5,66,973, the most important of the works in progress being the roads at the three barriers on the Upper Godavery, for the early completion of which every effort was made.

At the first barrier the tramroad was well advanced; three and a half miles of it were worked during the year: and, but for the occurrence of an accident at the suspension bridge being constructed over the Toorbuka river, the line would have been opened to Setimpett, a distance of 14 miles.

The tramroad at the second barrier had a fair prospect of being completed by the time the river should rise in July. The earth-work and bridging were finished, and all the sleepers and several miles of rail were laid.

The original intention of constructing a tramway at the third barrier was abandoned in favour of a common road, as it seemed evident that in the present state of the river this would be the terminus of river transit for nine-tenths of the traffic. Out of 32 miles of earth-work, 15 were finished, and more would have been done if funds had been forthcoming.

The whole expenditure on these roads during the year was Rs. 2,64,844.

Besides the above there was an outlay of Rs. 2,66,854 at the Sinteral (or first) barrier, anicut and channel; 197,100 cubic feet of masonry were built, and $7\frac{1}{4}$ millions cubic feet of earth-work excavated.

Rocks were removed from the bed of the river between Budrachellum and Dovlaishwaram, and considerable progress made with the construction of groynes.

Preliminary operations were commenced at the Enchampillay (or second) barrier, anicut and canal.

There was much difficulty in keeping together the workmen. Sickness was not so bad as in the previous year, but at the anicut it prevailed to some extent from 1st March to the 20th April, during which time the heat of the weather was most oppressive. Provision was being made to house the men properly, to clear the jungle. Prices of labour

and materials rose considerably, especially the latter, owing COMMUNICATIONS. to the taxes levied on all articles of forest produce.

There were seven steamers employed in all, two on each of the three lower reaches, and one on the upper reach. Navigation began at the latter end of June, and terminated in the middle of October on the upper reach, late in November on the two middle reaches, and continued open still later on the lowest. The portages at the three barriers were effected by means of country carts and the existing roads, neither of the tramways being fit for traffic.

The Godavery works were transferred from Madras to the Central Provinces on 1st May 1863.

Nuddea Rivers. *Bengal.*—Of the Nuddea rivers, the Matabangah and Jellinghy closed very early, and attention was confined to the Bhagiruttee which was kept well open. The tolls on the year amounted to Rs. 3,02,128, and the expenditure on works and establishments to Rs. 1,99,043, leaving a net profit of Rs. 1,03,085.

Hooghly River. A sum of Rs. 20,000 was given for the purpose of carrying out experiments for the purpose of testing the possibility of improving certain shoals in the Hooghly. Apparatus was prepared in the form of toothed rollers which were towed along by a steamer. The experiment was conducted during very adverse weather, but sufficient was done to show that at least a temporary deepening could be effected.

Indus River. *Punjab.*—The Indus, north of Mukkud, the present terminus of steam navigation, runs for a great distance between high rocks so steep that the boatmen tracking up could not in many places obtain a footing. A rough towing-path was constructed where it was necessary. At other parts the rugged tops of the rocks were removed. Some rocky impediments in the stream were blown away. The amount of rock blasted in all these operations was estimated at 300,000 cubic feet.

Pyne Kyun Creek. *British Burmah.*—The work of widening and deepening the Pyne Kyun Creek, connecting the Pegu and Sitang rivers, was commenced, and Rs. 22,923 were spent out of an estimate amounting to Rs. 30,000. The channel was shortened by $1\frac{1}{4}$ mile, and a good commencement made, enabling the creek by its own action further to improve itself. Plans and estimates were prepared for continuing the improvements, by which the length of the passage will be reduced from 35 miles to 19, and the channel kept open throughout the year.

RAILWAY.

RAILWAYS.

The following was the state of the lines on 31st July 1863:—

Madras Railway.

Of the Madras Railway, the portion between Madras and Beypoor, 405 miles, was opened throughout. Of the North West line, the line from Arconum to Tripetty, 41 miles, was opened, and from Tripetty to Bellary, 219 miles, was in progress; from Bellary to Moodgul the line was not commenced. The South West branch from Jalarapett Junction to Bangalore, 85 miles, was in progress, and expected to be opened by June 1864.

Great Southern of India Railway.

The Great Southern of India Railway, from Negapatam to Trichinopoly, 78½ miles, was opened.

Great Indian Peninsula Railway.

Of the Great Indian Peninsula Railway, the North East Extension was open for traffic to Bhosawul, 276 miles, where the Jubbulpoor and Nagpoor lines branch off, except the Thull Ghat Incline. From Bhosawul to Jubbulpoor, 338 miles, the line was in progress. From Bhosawul to Nagpoor, 243¼ miles, a length of 31 miles as far as Mulkapoor was opened, and the rest in progress. Of the South East Extension, 379½ miles, which branches off at Cullian Junction, the portion between Cullian and Sholapoor, 256 miles, was opened; the rest had not been commenced.

Bombay, Baroda, and Central India Railway.

The Bombay, Baroda, and Central India Railway, from Bombay to Ahmedabad, comprises 310 miles, of which 185 miles, from Ahmedabad to Bulsar, were opened for traffic, and the rest under construction.

East Indian Railway.

Of the East Indian Railway, the main line upwards from the Calcutta Terminus at Howrah to Mogul Serai, (the point of bifurcation of the Benares short branch,) 534 miles, was opened for traffic; from Mogul Serai to Allahabad, 92 miles, was in progress; from Allahabad to Allygurh, 311 miles, the line was open, and from Allygurh towards Delhi the line was under construction. All the branches were open throughout, except the Barrakur Extension of the Raneegunge branch beyond Searsole, viz.:—

Burdwan to Raneegunge	46 miles.
Barrakur Extension to Searsole	3 „
Singaron Branch	7¼ „
Teenpahar to Rajmahal	7¼ „
Jumalpoor to Monghyr	5 „
Patna Branch	1½ „
Mogul Serai to Benares	6¼ „
Allahabad Fort Branch	2¾ „
Cawnpoor River Branch	3 „
Agra Branch	13¼ „

RAILWAY.

The extension from Allahabad to Jubbulpoor, 225 miles, was in progress.

Eastern Bengal, Calcutta, and South-Eastern Railway.

The Eastern Bengal Railway was opened throughout to Kooshtee, 110 miles; as also was the line from Calcutta to Mutlah, 29 miles.

Punjab Railway.

Of the Punjab Railway the portion between Lahore and Umritsur, 32 miles, was opened; from Lahore to Mooltan, 205 miles, was in progress; and the portion, 13 miles, from Mooltan to the River Terminus on the Chenab, was open. The line from Umritsur to Delhi was not commenced.

Sind Railway.

The line from Kurrachee to Kotree, 105 miles, was open, and a branch to Ghizree, 9 miles, was in progress.

ABSTRACT.

	Madras.	Bombay and Central Provinces.	Bengal.	N. W. P. and Central Provinces.	Punjab.	Total.
Miles open	521½	844½	749½	330	45	2,493¼
Miles in progress ...	304	693¼	91	399	205	1,620¼
Miles uncommenced	67	123	..	..	280	470
Total ..	895½	1,660¾	768¼	729	530	4,583½

ANNUAL PROGRESS REPORT of Public Works in India for the year 1862-63, *by* A. B. SAMPSON, ESQ., *Asst. Secy. to Govt. of India, P. W. Dept.*

Dated 13*th April*, 1861.

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