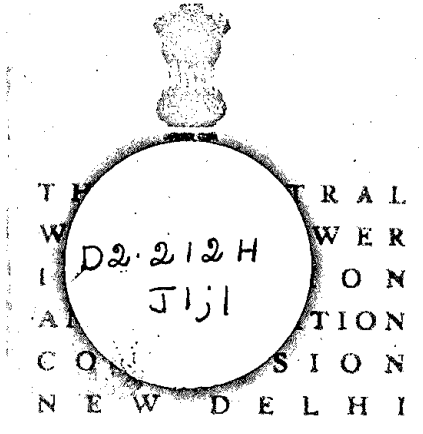
HIRAKUD DAM PROJECT



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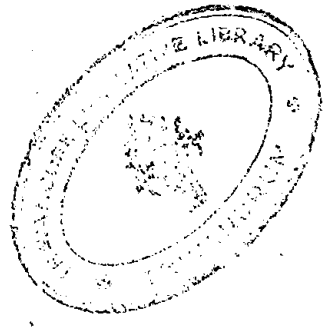
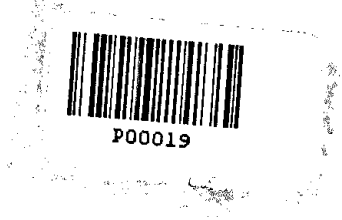
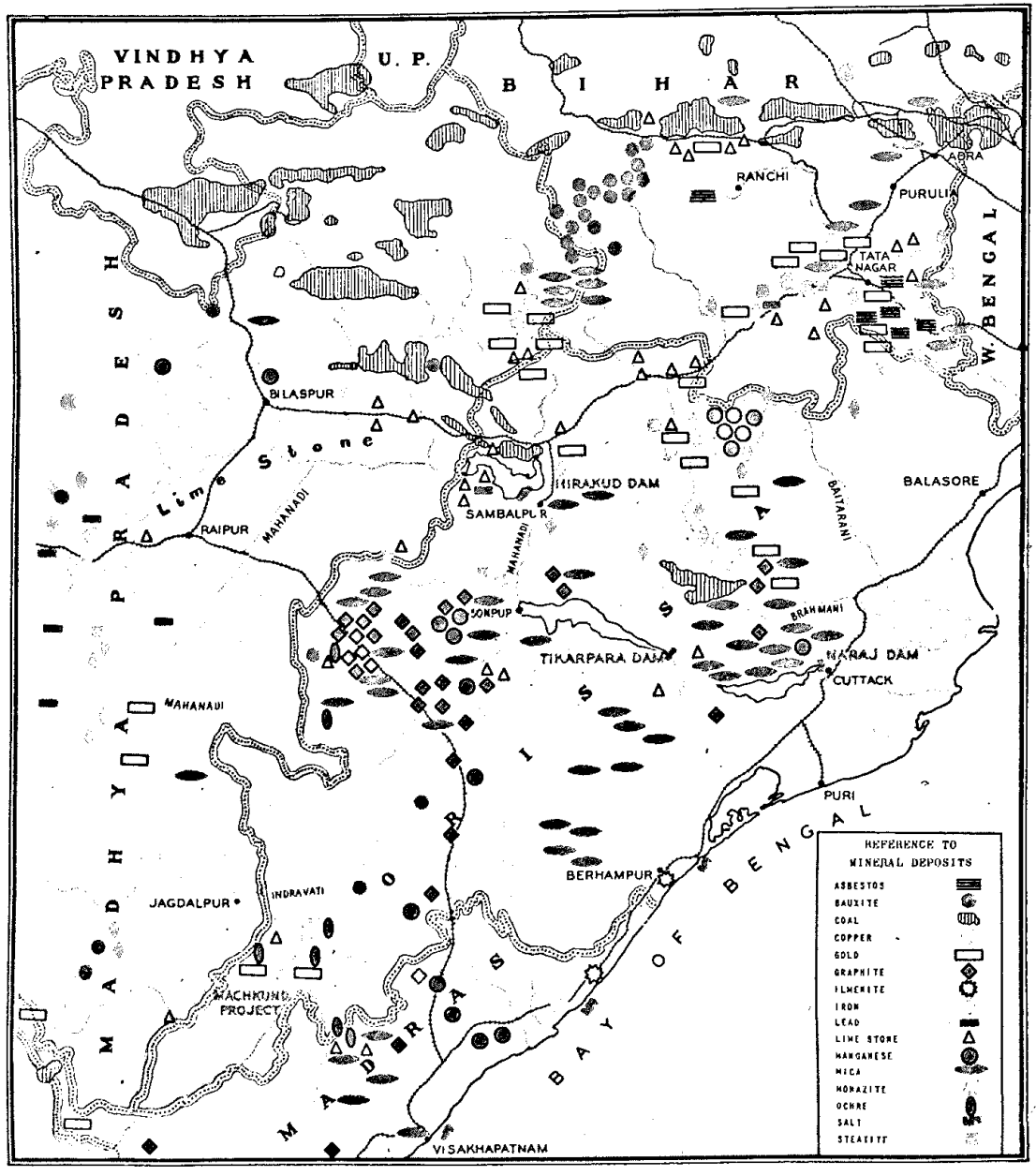




THE CENTRAL WATERPOWER, IRRIGATION AND NAVIGATION COMMISSION, NEW DELHI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SONPUR
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NARAJ DAM
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COPPER
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IRON
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THE MAHANADI VALLEY

Orissa, formerly a straggling, disjointed, little province covering 32,000 square miles grew into a compact State under the Indian Republic after 1947. With the integration of the neighbouring Princely States, Orissa is now a coherent, major State of 60,000 square miles and has a population of more than 14 millions.

Features of the Valley

There are large deposits of coal, iron, bauxite, manganese, graphite, chromite, mica and other useful minerals. But these are largely unexplored and mostly unexploited. This region also contains vast areas of agricultural lands and forests. The State is traversed by three major rivers and two minor ones. The Mahanadi, the biggest of them, carries annually 74 million acre feet of water, which is only slightly less than the volume carried by the Indus. It is far in excess of the water carried by the Tennessee River in the United States of America. The waters of this river, which could provide irrigation to raise more crops and cheap electric power to run the wheels of industry and thus raise the standard of living of the common man, are at present running to waste, causing untold damage and destruction by floods in their passage to the sea. Less than 5 per cent of this water is at present being put to beneficial use for purposes of irrigation.

Navigation on the river, fairly considerable in the past, has almost disappeared, mainly as a result of a mistaken railway policy practised till recently. The State is not well served with up-to-date means of communications. The railway lines skirt only the boundaries of the State; and for internal communication, it depends mainly on the roads. Even the latter do not provide through communication, due to lack of bridges on rivers and streams.

The man-power of the State, admittedly intelligent and industrious, is languishing for want of opportunity and full-time employment. And the State has at present no industries worth the name.

In spite of its tremendous wealth of land, water, minerals and man-power, Orissa continues to be a backward State suffering from chronic and low-income diseases. This is primarily due to the spectres of flood and drought which alternately haunt the territory.

Famines and Floods

The distribution of rainfall, and consequently the river-supplies through the year, suffer from maladjustment. There is too much water during the rains and too little during the rest of the year, with the result that Orissa has only one crop, and a precarious one at that.

Historical records show that severe droughts and famines occurred in the 14th, 15th and 16th centuries. In the unforgettable famine of 1770, people were reported to have died in thousands. Nearly a century later came the great Orissa Famine of 1865-66. The rainfall in 1866 was scanty and ceased prematurely. The food crops failed, and

nearly a million people died in the district of Cuttack alone. In the Puri District 40 per cent of the population perished. Then followed the flood of 1866. Crops and property were destroyed, and what the drought had spared, was engulfed by the wide-spread floods. Hundreds of square miles were submerged for four to five days with water up to a depth of ten feet.

Earlier Attempts at Solution

Many committees were appointed, numerous conferences held and reports submitted during the last 30 years to deal with the problems created by the floods in Orissa. Distinguished engineers like Sir Arthur Cotton and Shri M. Visveswaraya advised the Government on the subject. Nothing tangible was, however, accomplished. The few ameliorative measures adopted like construction of embankments and levees, only touched the fringe of the problem.

Problem Referred to CWINC

Finally in 1945, the problem was referred to the newly constituted Central Waterways, Irrigation and Navigation Commission (CWINC).

The Chairman of the Commission, Shri A. N. Khosla, visited Orissa in May 1945 and, as a result of local inspections, studies of previous reports and discussions with the local officers, came to the conclusion that the only effective cure for the many troubles of Orissa lay in the control, conservation and utilization of the enormous water wealth of the rivers of Orissa by means of storage dams.

In November 1945, at a conference held in Cuttack under the chairmanship of Dr. B. R. Ambedkar, Member for Labour in the Government of India, the representatives of Orissa States and the Central Provinces unanimously agreed that the potentialities of the Mahanadi for unified multi-purpose development, namely, flood control, irrigation, navigation and hydro-electric power, should be thoroughly and expeditiously investigated by the CWINC.

The investigations subsequently conducted by the CWINC confirmed that the only solution that would meet all the requirements lay in the construction of a series of dams. Concretely the over-all development of the valley could be achieved by the construction of three dams on the Mahanadi at the only three sites available, namely at Hirakud, Tikarpara and Naraj, each project being capable of independent development and yet neatly falling into place in the unified development of the river basin.

The Mahanadi, fully harnessed on these lines, would afford complete protection against the periodical floods, provide irrigation for over 20 million acres of land, generate 4 million kW. of power (twice the total developed by the 26 dams of the Tennessee Valley Authority), and provide a 380-mile navigable waterway with a minimum draught of 9 feet, stretching from the borders of Madhya Pradesh all the way to the Bay of Bengal. The volume of traffic on this waterway would in time warrant a sea port for Orissa at Chandbali or at Dhamra, capable of handling as much as six million tons a year (the annual traffic at the port of Calcutta in pre-war years was about ten million

tons). The extensive lakes formed by the dams would serve as seaplane bases and further afford facilities for fish culture, irrigation, etc.

The Commission, however, recommended that the Hirakud Dam Project be taken up first for construction, as it was uppermost on the river and was the simplest in respect of physical features, design and construction requirements, and would also yield quicker results and would be financially self-supporting.

HIRAKUD DAM PROJECT

PROJECT FEATURES

The Hirakud Dam Project will consist of a dam across the Mahanadi with gravity and lift canals for irrigation taking off from the reservoir on either side and hydro-electric installations. There will be two power houses, one at the base of the main dam and the other 14 miles downstream at the outfall of a small tributary. A subsidiary dam at this site will impound waters of the tail race of Power House No. I carried through a canal with a flatter gradient than the river itself, thus giving a head of about 75 feet which will be utilized for the generation of power at this site.

The main dam has been sited below the confluence of the Ib River and about nine miles upstream of Sambalpur. It will be 15,800 feet long with 17 miles of low earthen dykes on two sides.

The reservoir formed by the dam will have a water-spread of about 150,000 acres when full and have a shore line of 150 miles. Its gross storage capacity will be 5.98 million acre feet of which 2.24 million acre feet will form the dead storage to serve as a silt reserve and provide the minimum head for power generation. The remaining capacity of 3.74 million acre feet will provide a sufficient reserve for flood control, live storage for irrigation, power generation and improvement of navigation facilities.

A total length of about 3,700 feet of the main dam will be in concrete to serve as power dam and spillway, and the remainder will be of earth. The maximum height of the dam above the deepest part of the river will be 180 feet.

The power dam will accommodate six penstocks, of which four will be used for the four generating units of Power House No. I to be installed immediately and the remaining two will be for future expansion.

There will be two spillway sections on either side of Hirakud island. They will be of concrete gravity type and consist of 84 overfall bays with an equal number of deep-set sluices and will have an overall discharge capacity of over 1.3 million cusecs.

Power-cum-Navigation Canal

A power-*cum*-navigation canal will take off below Power House No. I to carry the water to the second reservoir 14 miles lower down which will be formed by a low earthen dam about four miles long. There will be an overflow weir with its crest at R.L. 515 just below the head of the power-*cum*-navigation canal to discharge the surplus water from the right spillway. The ultimate capacity of the power-*cum*-navigation canal will be 18,000 cusecs and supply in the canal will be controlled by gates when surplus water from the right spillway is passing over the weir. This spillway will come into operation only when the regulated discharge exceeds 700,000 cusecs, the surplus up to this limit being passed through the left spillway located in the left arm of the river.

A lock channel will be constructed alongside the head of the canal for purposes of navigation. Bridges on the canal will also be constructed with sufficient headway to allow for navigation. As the canal is not aligned on the watershed it will have only one bank on its left side, the right side being left open to take in the run-off from the catchment on the right. The run-off from the catchment will spillover three overfall weirs on the left bank.

Subsidiary Dam

The water brought down by the power canal will be impounded by a subsidiary dam about four miles long. This will also be an earthen dam except for a length of 726 feet near the tail to serve as spillway and power dam. The top of the subsidiary dam will be at R.L. 525 with the water level in the reservoir varying between R.L. 510 and 515.

The water from the turbines will be discharged direct into the Mahanadi River, the level of which will vary between 425 minimum during dry weather and 463 maximum during high floods.

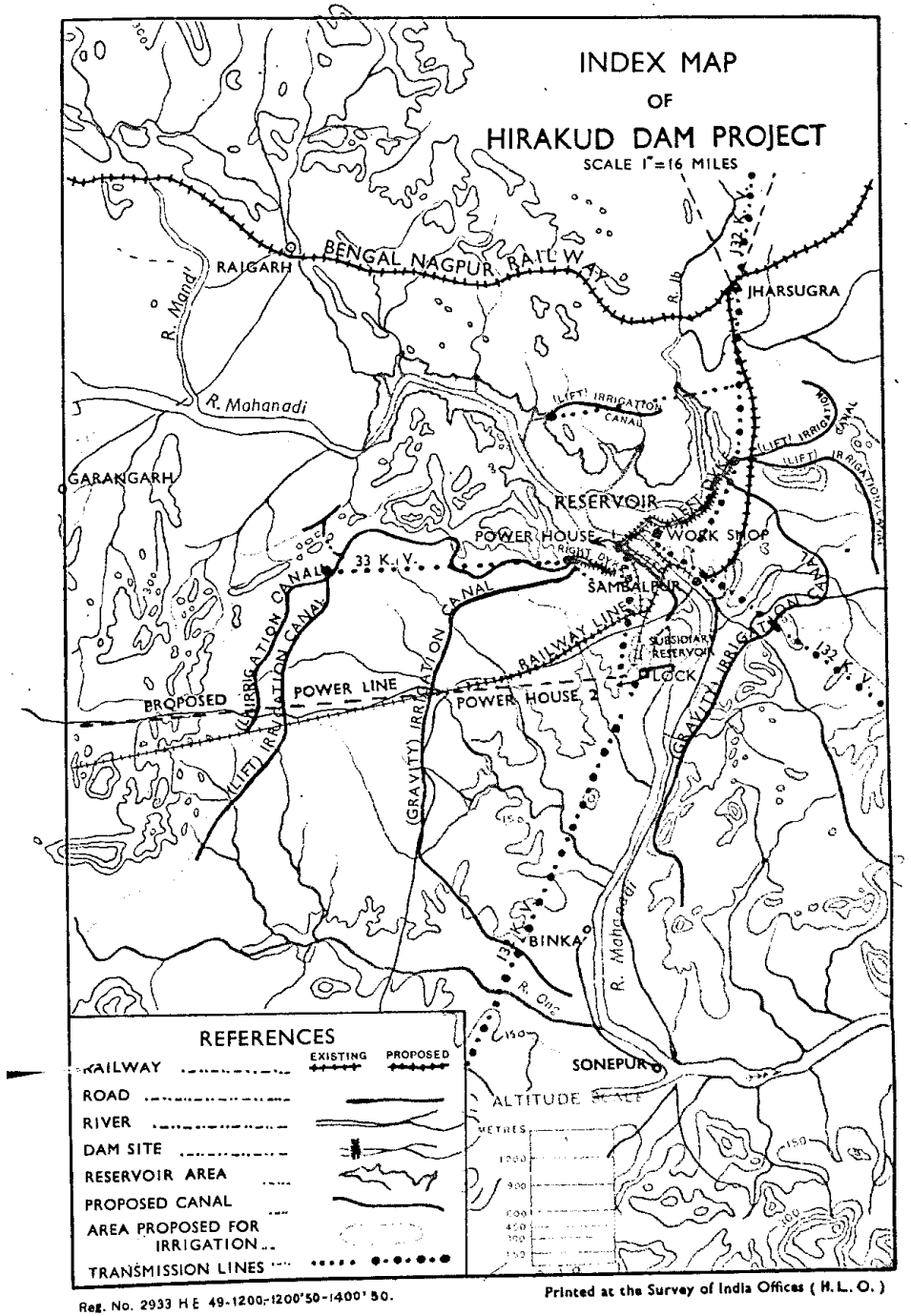
Power Houses

There will be two hydro-electric power generating stations, one at the main dam and the other at the subsidiary dam, at the tail of the 14 miles power-*cum*-navigation canal.

Power House No. I—This is designed for an ultimate installation of six main generating units and one small station service unit. Each main generating unit will consist of a vertical shaft 3-phase alternating current generator to produce 37,500 kW. at 11 kV. and 0.9 lagging power factor. The generator will be driven by a hydraulic turbine of the automatically-adjustable-blade-propeller type operating under a head of 78 to 113 feet. The capacity of each turbine will be 52,000 H.P. The power from the generators will be stepped up from 11 kV. to 132 kV. for purposes of transmission.

The initial installation will consist of two generating units and the station service unit, more units being added with the growth of the load.

Power House No. II—The Power House No. II is



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designed to house 4 main generating units and one station service unit. The generating units will be similar to those in Power House No. I, with the difference that they will be designed to generate 24,000 kV. each under a head of about 75 feet. As in Power House No. I, power will be stepped up to 132 kV. for transmission. Here too, two main generating units and the station service unit will be installed to begin with.

Transmission lines will radiate to various load centres from both the power houses and the two power houses will be interconnected by a double circuit 132 kV. line.

Irrigation Canals

Two flow canals, one on each side, and four lift canals, one on the right side and three on the left side of the main dam, will be constructed. The total length of the flow canals with their branches and distributaries will be about 550 miles. The lift canals with their branches and distributaries will be about 120 miles.

SCOPE OF THE PROJECT

Flood Control—The main reservoir provides a flood reserve of 3.74 million acre feet up to R.L. 625, which will in normal years limit the regulated flow to 700,000 cusecs, which is a very safe discharge. The maximum possible reservoir inflow of 1.5 million cusecs in an abnormal year will , however, be regulated down to 1.2 million cusecs over the dam with the water level in the reservoir rising to a maximum of 630.

Irrigation—The canals taking off from the reservoir formed by the main dam—two flow and four lift canals—will between themselves command an area of 1.3 million acres and irrigate an area of 1.1 million acres annually. Besides this direct irrigation, the regulated supplies from the dam (ranging between 10,000 and 14,500 cusecs during the dry months) will provide protective irrigation to the existing irrigated areas in the delta during the critical period when supplies are short and also extend irrigation to the areas in the delta, which are now periodically submerged during floods. The extent of this irrigation is yet under investigation.

Further, more than 20,000 acres of silt-laden, rich land will be available on the marginal shores of the reservoir for raising a *rabi* crop and spring rice when the level of the reservoir falls.

Water for irrigation will be available from 1953-54. When irrigation is fully developed, it is expected to yield additional food crops of the order of 340,000 tons, and cash crops like sugarcane and cotton of about 34,000 tons. These figures do not take into account the increase in irrigation in the delta area that will result as a result of increased supply during the dry season.

Navigation—With its discharge falling down to less than one thousand cusecs in the dry season the Mahanadi does not at present afford sufficient draught for navigation. The regime of the river with its jutting rocks and sand

banks also offers impediments to the free and safe passage of boats.

With the regulated discharge of 10,000 cusecs from the reservoir even during the dry season and blasting of jutting rocks in the river-bed, the river will be made navigable right up to Sambalpur and then on to Madhya Pradesh. Ship lifts that are being provided at the two dam sites will make it navigable up to Sambalpur for crafts up to 800 tons.

Provision is, however, being made for locks being constructed at a future date when navigation for much larger crafts will become possible.

Power—The Hirakud Dam Project has been designed for an ultimate effective capacity of 260,000 kW. maximum demand. This will serve to cater for the needs of the State of Orissa and parts of the States of Bihar and Madhya Pradesh.

The power will be generated in two power houses, as mentioned earlier, one at the main dam and the other at the subsidiary dam. The water utilized in the power house at the main dam will be carried in a power canal to the subsidiary dam to be utilized again in the second power house. This will enable full use to be made of the power potential offered by the rapid fall of the river-bed below the main dam. The installed capacity at the two power houses will be 225,000 kW. and 96,000 kW. respectively.

The availability of such a large amount of power in this area will give a great fillip to the rapid development of the mineral and forest wealth of this region. It will further contribute towards augmenting the food production by making nearly 48,000 kW. available for lift irrigation.

Transmission System—An extensive system of power transmission will be erected to convey the power to the various load centres spread over a large area. Ultimately this transmission system will link up with that of the Damodar Valley Corporation on one side and with the Machkund Hydro-Electric Project on the other. The need for proper co-ordination with these systems has been constantly kept in view. The Hirakud Transmission System will include about 800 circuit miles of 132 kV. transmission lines and about 300 circuit miles of 66 kV. transmission lines. Ultimately some of the 132 kV. lines will have to be converted for 200 kV. operation in order to transmit the required amount of power.

Other Benefits

Apart from the above benefits the project will provide for soil conservation, silt control, fish culture and recreation and a suitable sea-plane base.

Indirectly, the chronic malaria in the region will be wiped out by the elimination of stagnant pools of water, marshes and swamps which are now left behind by the floods. Anti-malarial measures will also be actively adopted in the valley.

The large block of cheap power supplied by the project will enable a systematic exploitation of the industrial potential, the mineral and forest wealth of the territory providing creative employment and all the consequent benefits to the large population in the area.

CONSTRUCTION

GENERAL

The Hon'ble Shri Jawaharlal Nehru, Prime Minister, laid the first batch of concrete of the Hirakud Dam Project on the 13th of April 1948. Shri A. N. Khosla, Chairman, CWINC, in his speech requesting the Hon'ble Prime Minister to lay the concrete, aptly stated that "In laying the foundation of the development of the entire Mahanadi Valley you will be laying the foundation of the rapid and progressive development of many other valleys in India for the conservation and utilization of their water resources".

Though work on all aspects of the project is under way, it has been divided, for purposes of efficient and speedy execution, into four sections enjoying the following order of priority :

The Hon'ble Shri Jawaharlal Nehru, Prime Minister, laying the first batch of concrete for the Hirakud Dam on 13th April 1948

(*i*) Construction of buildings, workshops, thermal power house, roads, railways and bridges.

Housing, and transport facilities for men and materials, workshop facilities and power supply for construction are essential preliminaries for any project of this magnitude and have necessarily to be given first priority.

(*ii*) Construction of Power House No. II along with power canal, subsidiary dam, transmission lines, etc.

(*iii*) Construction of the main dam, spillways, dykes and Power House No. I.

(*iv*) Construction of canals, distributaries, etc.

The construction of the Power House No. II along with the power canal, subsidiary dam, etc., has been given the highest priority, as it can be completed in advance of the main dam by merely diverting the river flow. In addition to making power available earlier, this will have a psychological effect on the people which cannot be underestimated.

The project was estimated to cost 47.8 crores* of rupees according to rates of materials and labour prevailing in 1946, but since then there has been a sharp rise both in wages and prices of materials. This increase will be largely counteracted by the economies effected by changes in design. On the whole the actual estimate is likely to be exceeded but the excess will, it is hoped, be fully compensated by increased benefits of which no account was taken in the project estimate.

* 1 crore equal to 10 millions.

Progress of Work

Investigations—Gauge, discharge, silt and meteorological observations are being regularly taken in the project area, and the data collected are being regularly analysed and correlated.

Topographical Surveys—The survey of the dam site and reservoir area have been completed by the Survey of India; and surveys of the irrigated area are nearing completion.

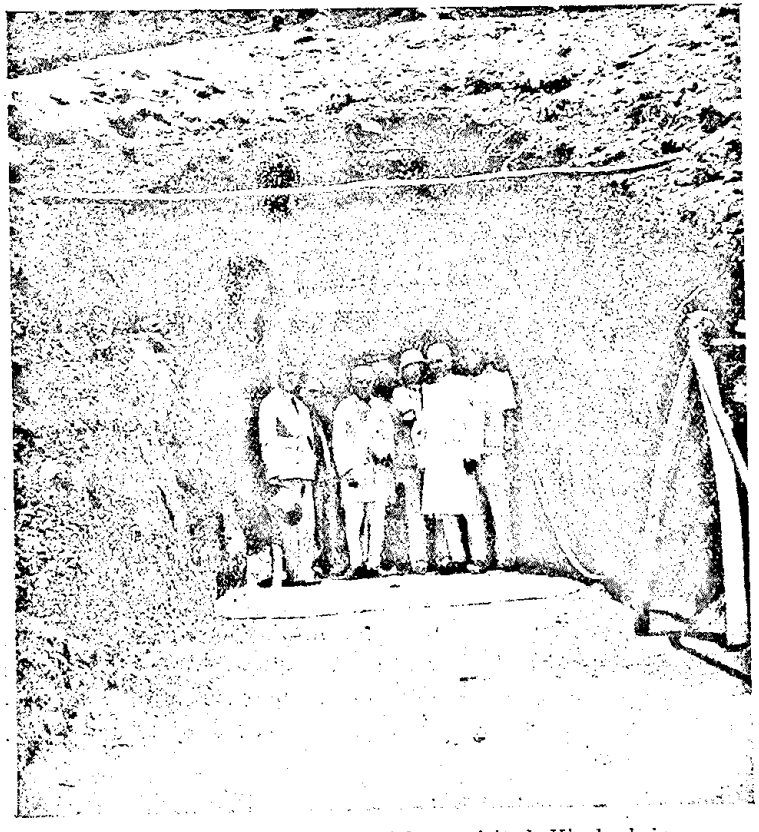
Foundation Explorations—Extensive drilling has been carried out in the main dam site, subsidiary dam site and along the power canal. Drift tunnels aggregating to 470 feet in length have been driven into the abutment rocks to explore their geological formation and to get necessary data for design.

Field Research Laboratory—A well equipped and an up-to-date research laboratory has been established at Hirakud. It has five sections engaged on investigations relating to :

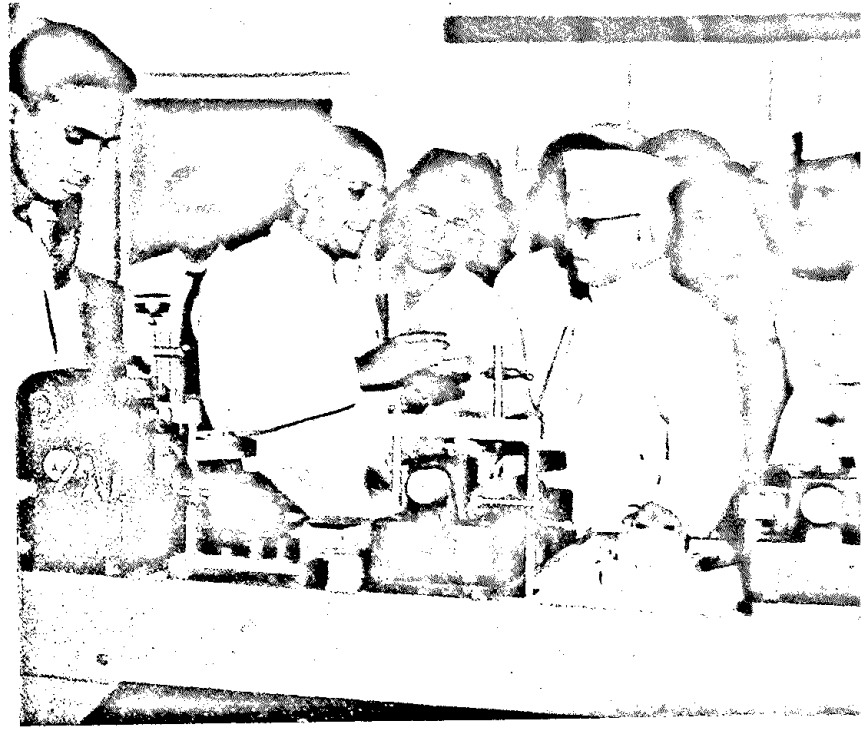
(*a*) Silt carried by the river waters;

(*b*) Engineering properties of soils for assessing their

suitability for purposes of earthen embankment construction;



The Prime Minister, Shri Nehru, visited Hirakud in April 1943 for the inauguration of the Project



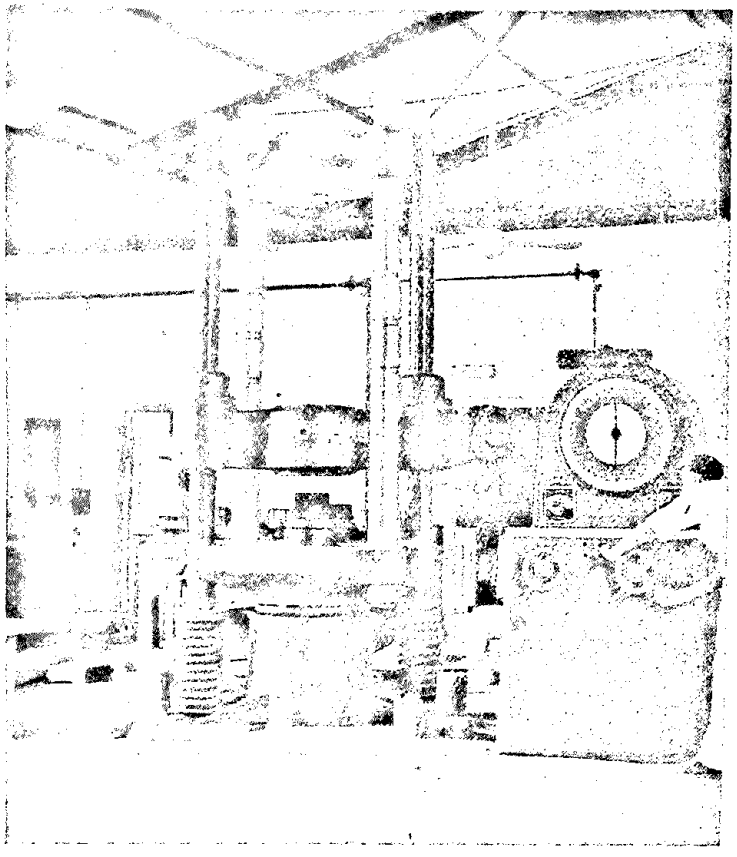
The Hon'ble Shri N. V. Gadgil in the Soil and Silt Laboratory at Hirakud

(c) Cement concrete and building materials;

(d) Soil surveys for assessing the irrigational and cropping possibilities of commanded land;

(e) Chemical and other miscellaneous problems.

A correct appraisal of the probable rate of silting is of vital importance to the construction of storage dams, so as not to impair the useful capacity and financial prospects of any project.



A 200-ton Testing Machine set up in the Hirakud Research Station

From the data of suspended silt load of the Mahanadi collected during the past three years silt storage requirements of the Hirakud Reservoir and the probable length of its useful life have been assessed.

The earthen portion of the Hirakud Dam and the dykes are to be of composite construction, the core being of impervious soil and the shell of semi-pervious soil. This requires systematic prospecting of borrow areas on a large scale in the proximity of the dam and the dykes, to determine suitability of the soils for use in construction.

In the cement concrete and building materials section, the suitability of coarse aggregates from a number of quarries in the Hirakud Project area are determined and suitable mixes designed. Similarly suitability of soils for brick moulding is determined before sites are selected for kilns. This is important as soils in the Hirakud area vary widely.

As a result of studies carried out for the development of hydraulic limes certain soil types have been found to yield eminent hydraulic limes. It has also been noticed that certain materials available locally manifest effective pozzolanic properties. Results of tests relating to moisture requirements, tensile and compressive strength of mortar and concrete, reactivity and heat development characteristics have shown that these pozzolanic materials are eminently suitable and have immense possibilities.

As the construction of Hirakud Dam will result in submergence of agricultural lands, soil survey of new lands is being carried out to determine their suitability for resettlement. So far soil survey of over 120,000 acres has been carried out.

Buildings

On this project, three colonies are being established —

two at the dam site on the left and right banks of the river, and the third at the lower power house site. In addition, there will be a few bungalows and quarters along the main canal for canal work.

On the left bank colony, all the 600 quarters required have been completed and occupied. A fully equipped hospital has also been opened.

On the right bank colony, most of the bungalows for junior officers, and more than half of the quarters for

HIRAKUD HOSPITAL
Medical Officer examining a labourer

senior and junior clerks have been completed and others are in progress. The construction of a hospital, high school and offices has been taken in hand.

Construction of bungalows and staff quarters at the lower power house site has been completed. Construction of the rest house has been started.

Along the right bank flow canal buildings have been completed at Bargarh, Rangalipali and Gurbhaga. Buildings at other sites along the canal are in progress.

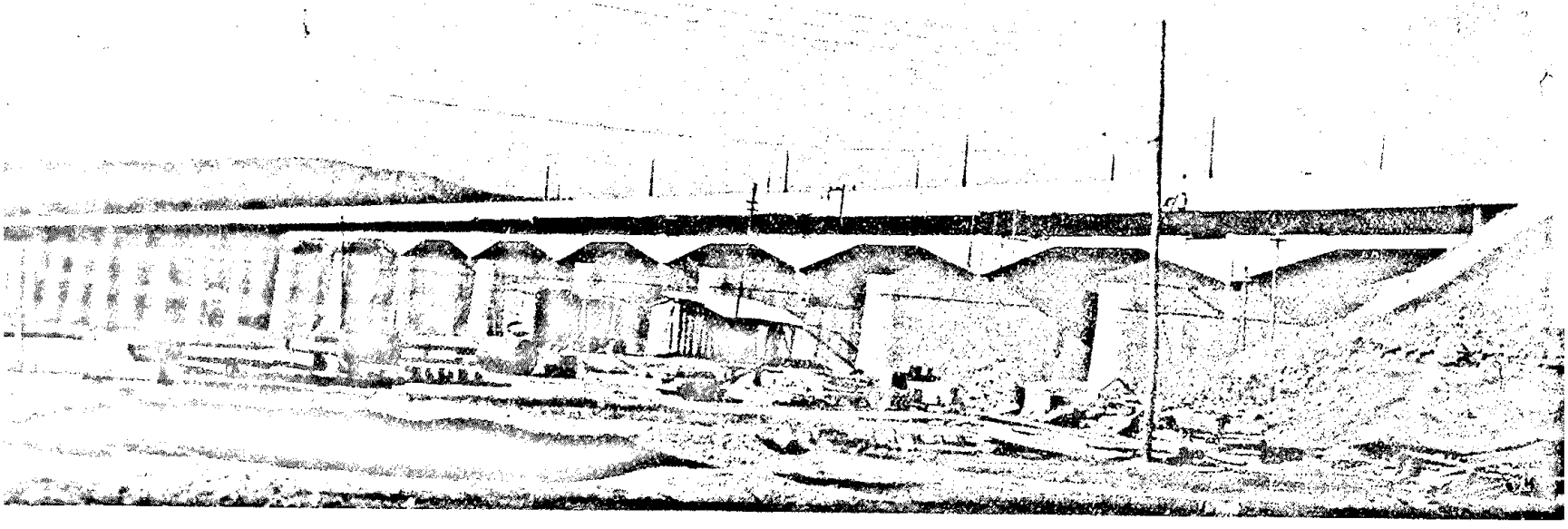
Roads and Railways

The National Highway No. 6 from Calcutta to Bombay passes through Sambalpur. In order to make use of the highway during construction of the project, ten miles of the highway on either side of the combined rail-road bridge across the Mahanadi have been constructed.

On the left bank, the railway line from Sambalpur Yard to the combined rail-road bridge across the Mahanadi and to the workshop has been completed and work on doubling the track is in progress. On the right bank, embankment has been completed and linking of the railway track is in hand.

Rail-road Bridge Across Mahanadi

Large construction operations and transport of heavy plant and machinery across the great Mahanadi river were involved in connection with the project, which was obviously impossible without a proper bridge across the



Mahanadi Rail-Road Bridge after completion

river. The construction of a bridge across the Mahanadi was, therefore, given the highest priority.

The Railway Board wanted a rail bridge across the Mahanadi in connection with their proposed Sambalpur–Titlagarh Railway line, and the Road Transport Department, whose National Highway No. 6 from Calcutta to Bombay passes through Sambalpur wanted a road bridge constructed across the Mahanadi. In order to expedite matters, both the Railway Board and the Governmnet of India Road Transport Department authorised the CWINC to carry out the construction of the bridge and its side-approaches. The foundation stone of this combined rail-road bridge was laid on 7th of November 1948 by the Hon'ble Shri N. V. Gadgil, Minister of Works, Mines and Power, Government of India. The bridge consists of 25 spans of 100 feet each. The highest pier is nearly 65 feet in height above the foundation rock. The roadway is 24 feet wide with 5-foot footpaths on either side. The road bridge is of concrete, of double cantilever girder-*cum*-suspended

span design. The railway bridge will be of plate or prestressed concrete girder design.

Construction of the road bridge was completed in August 1950. As the railway portion of the bridge will be constructed subsequently a broad gauge line has been laid for purposes of the project on the road portion itself. The bridge was declared open to public traffic by the Hon'ble Shri N. V. Gadgil on 27th October 1950.

Power for Construction

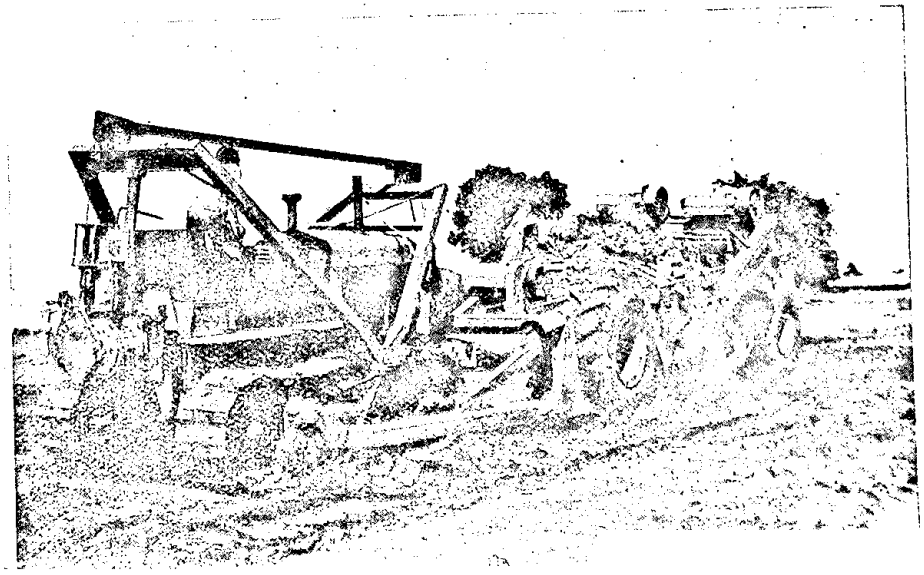
To provide power during the construction period, a power house with two units of 345 kW. and one unit of 475 kW. has been erected. The demand for power is increasing every day, and it is proposed to provide three more units of 500 kW. each.

Sambalpur town had no electricity till recently. A high tension line has now been constructed to supply power to the town from the Hirakud Power House. Power will be supplied to the distributors in bulk at two or three places along the line.

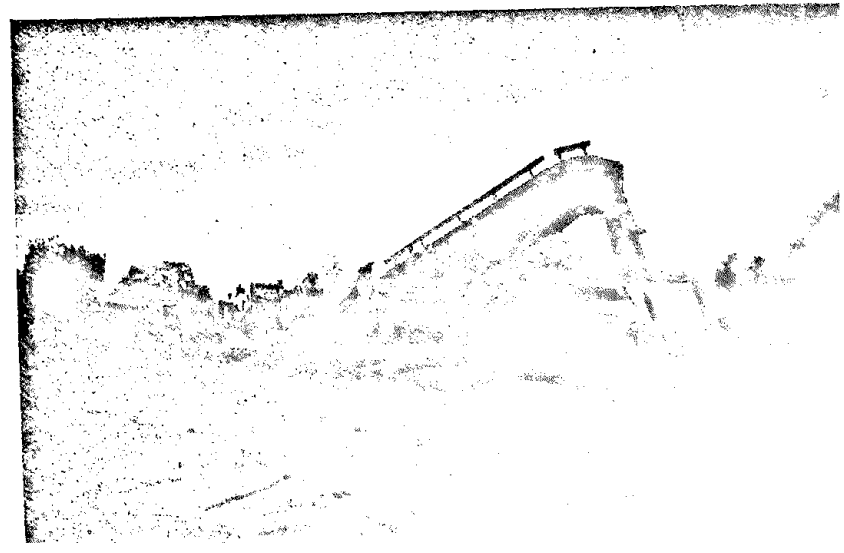
Construction Equipment—Earth-moving machinery costing about a crore of rupees has been obtained and put on duty.

Workshop—An up-to-date workshop capable of meeting most of the demands of the project has been constructed with machinery obtained from the Disposals. It is being further expanded to manufacture gates, transmission line towers and to accommodate a galvanising plant.

Scraper at work



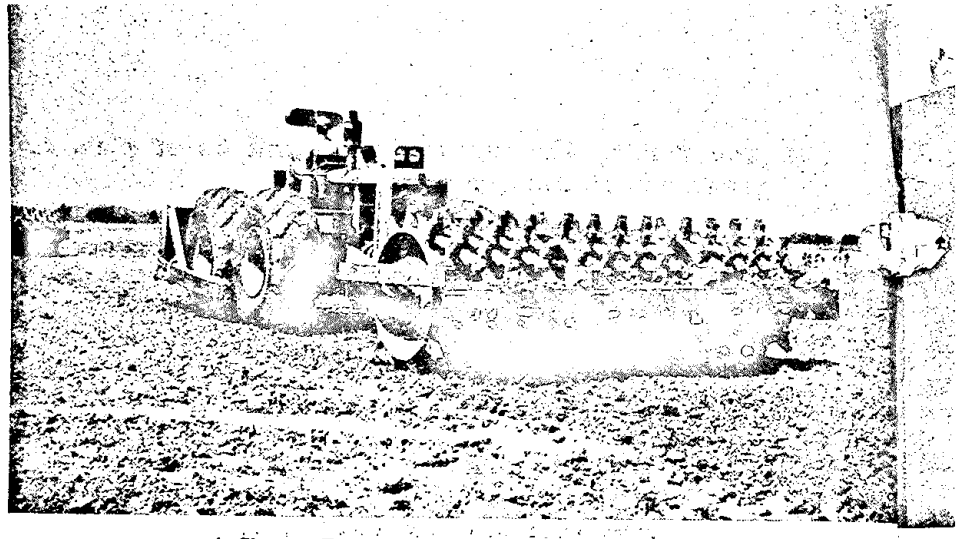
Bull Dozer dumping soil into wagon



This workshop has been of great service in overhauling and putting into commission the old plant and machinery obtained from the Disposals, thus enabling the construction to be pushed on much quicker than it would otherwise have been possible.

Cement Factory—The present supply of cement is from the Associated Cement Factory, Chaibasa, 180 miles from Sambalpur. About half a million tons of cement will be required for the project, and the demand from the public is also likely to go up on account of the industrial expansion in and around Sambalpur. It was, therefore, decided in consultation with the Government of Orissa to sponsor the construction of a new cement factory. A site near Rajgangpur, 100 miles from the dam site has been selected, and the Orissa Cement Company has already started erection of the plant. Hydro-electric power will be supplied to the factory in due course but in the meantime four 1,000 kW. steam generating sets are being installed by the project authorities for supply of power to the factory.

Workshops and quarters at Hirakud

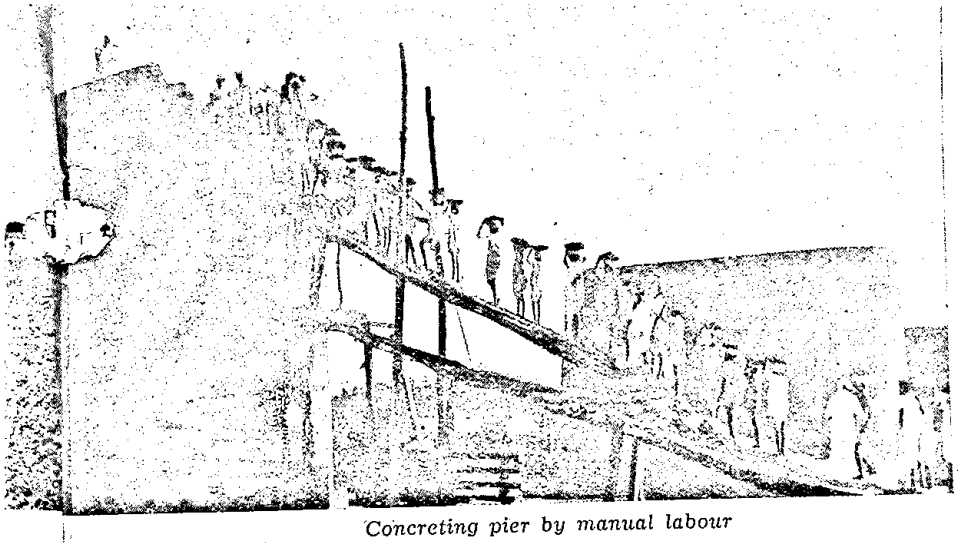


A Sheeps Foot Roller consolidating earth

Main Dam—The design of the dam was entrusted to the International Engineering Company, Denver. It has been completed, and the construction of the dam is underway.

Excavation of foundations of the main dam spillway portion has been done over a length of 2,000 feet, and three million cubic feet of disintegrated and hard rock removed from foundation.

Main Earth Dam—On the left bank portion, stripping of the base of the dam is in progress and over a million



Concreting pier by manual labour

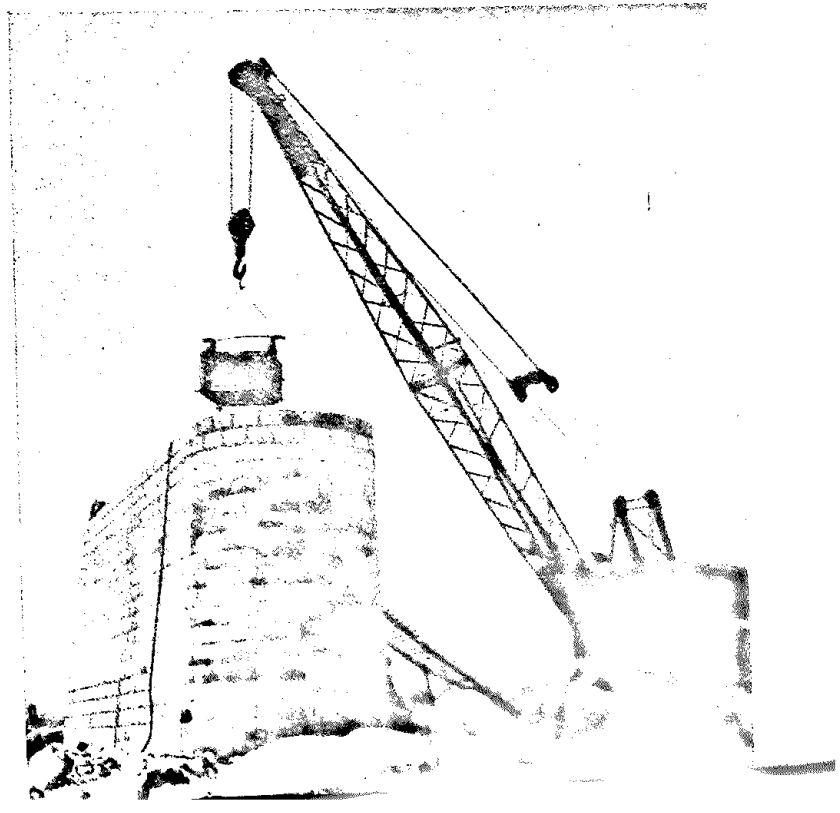
cubic feet have been completed. Work on the cut-off trench has been started over a length of 500 feet.

Dykes—Earthwork on the left dyke is in progress partly by manual labour and partly by machinery. The staff of a field laboratory at the site regularly checks the field densities and moisture contents of the rolled embankments. Over 14 million cubic feet of earthwork has been done so far, and two million cubic feet of rubble collected to pitch the dyke slopes.

Subsidiary Dam—Work on a two-mile length of the subsidiary dam and excavation of power dam foundations is in hand. Five million cubic feet of earthwork and a million cubic feet of excavation for the power dam in disintegrated, soft and hard rock have been completed.

Power Channel—About 16 million cubic feet of earthwork has been executed by manual labour, and for the rest draglines are to be employed as the soil is hard and mixed with shingle. Two walking draglines have already arrived and are being erected at site. These will shortly be put into operation. The abutments and pier of the rail-road bridge at R.D. 11,000 have been completed, and centring for the bow-string girder bridge is under construction.

Concreting pier by crane



Work on the other two bridges on the power channel at R.D. 29,000 and 47,000 is also in hand.

Main Canal and Branches—About 400 miles of canals and distributaries have been aligned and designed. Earthwork on the main canal has been taken up in the first fifty miles and excavation of two major distributaries is almost complete. About 83 million cubic feet of earthwork has been completed so far.

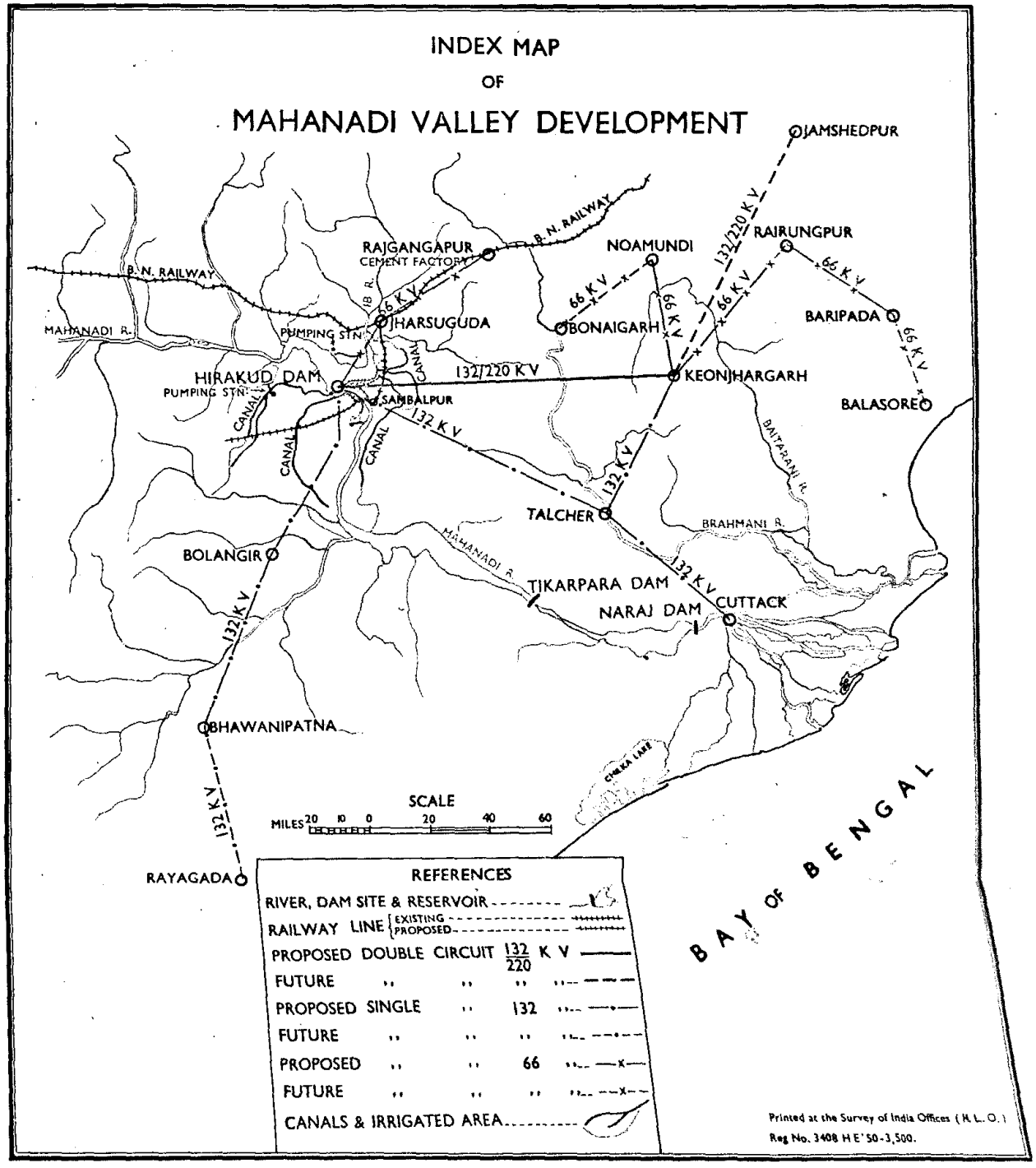
Designs of a number of bridges, regulators and cross drainage works have been completed, and their construction is being taken in hand.

Transmission Lines—The main circuits will be, one from Hirakud to Cuttack, another to Rajgangpur *via* Jharusuguda, and a third to Jamshedpur, and later on to Nagpur and to Duduma Power House, according to requirements. The survey of the lines to Cuttack and Rajgangpur is expected to be completed in about a year, when the erection of the transmission lines will be taken in hand. It is proposed to complete the line to Rajgangpur by the end of 1952 and to Cuttack by the end of 1953.

RESETTLEMENT

A construction of the nature and magnitude of the Hirakud Dam naturally creates its own human problems. The reservoir behind the dam will cover an area of 235 square miles, of which 70,000 acres is good culturable land now under cultivation. The authorities will be faced with the delicate problem of rehabilitating each land owner with new land to his liking.

Plans for rehabilitation are, therefore, well in advance of the date of demand. About 120,000 acres of culturable waste land has been located in the commanded area, of which nearly 80,000 acres have been selected for cultivation. Another 20,000 acres of silt-laden, rich land will be available when the reservoir level goes down every year. Spring rice and *rabi* crop will be raised in this marginal land. Thus, for the people who have lost farms in the reservoir, there will be enough to allot land for land, and more. To enable the resettled farmer to bring his land smoothly under cultivation, the trees and bushes will be mowed, and the hard crust ploughed up with machinery. Houses, roads, drainages and water supply will be built to approved plans. Cheap electricity for illumination, irrigation and cottage industries, and schools and hospitals for the inhabitants will all be provided. To promote modern methods of agriculture, selected seeds, manure and agricultural implements will be supplied to the farmers. Credit co-operatives will organise fair trade and business for the communities. In brief all aspects of life affecting the life of the resettled people will be anticipated, planned and provided for.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ORISSA AND THE HIRAKUD DAM

The entire Hirakud Dam Project naturally entails planning on a gigantic scale, investment of a large chunk of the national income and years of labour of men and machinery. But the capital need not be locked up, and Orissa will not have to await the completion of the project to reap its benefits.

The salutary influence of the construction programme began to be felt from its very inception. The excavation of crores of cubic feet of earth alone employs thousands of labourers from the neighbouring districts. A large contingent of skilled and semi-skilled workers like masons, smiths, carpenters and mechanics have found their place in the construction programme. Equally important is the wide scope of training provided by the project for technicians of all types and description. The operators of labour-saving machinery employed in the workers will provide the nucleus of personnel needed for mechanisation of agricultural methods, so essential for cultivating the vast tracts of virgin land in Orissa and outside.

The enhanced income of the large population of workers, coupled with the demands of the modern townships that have sprung up to house the engineering and administrative personnel of the project, has promptly raised the production and price of garden and dairy products, thereby adding to the income and standard of living of the local and surrounding population. The thermal station at Hirakud, set up for purposes of construction, will supply electricity for the first time to Sambalpur.

With the progress of construction of the dam, canals and power houses, the first block of 24,000 kW. of hydel energy will be available for supply in 1952-53, and water for irrigating the first 100,000 acres will flow to the fields in 1953-54. Developed in successive stages, the project will yield, ten years hence, 110,000 kW. of power and irrigate more than 800,000 acres of land with a maximum ultimate potential of 321,000 kW. of electricity and over one million acres of irrigated land.

Apart from the land fed directly by the Hirakud Canals, nearly one million acres of rich-silted soil in the Mahanadi Delta will be permanently released from the flood menace for perennial irrigation by the waters steadily released by the Hirakud Reservoir.

The large amount of power generated will feed the furnaces and rolling mills of Jamshedpur, which are now consuming thousands of tons of the limited resources of the precious coal in the country. Power will also contribute to the systematic exploitation of the untapped resources of forests and minerals of the State. This will naturally set-in a chain reaction of more employment, new industries, greater all-round production and a steady upsurge of the standard of life and culture of the inhabitants of the Orissa State.