E. C. No. 26

ESTIMATES COMMITTEE

THIRTY-SECOND REPORT

1955-56

MINISTRY OF RAILWAYS

IMPORTANT PROJECTS

LOK SABHA SECRETARIAT
NEW DELHI
May, 1956.

CORRIGENDA

THIRTY-SECOND REPORT OF THE ESTIMATES COMMITTEE ON THE MINISTRY OF RAILWAYS

Page 5, Para 27; line 6; read '41%' for '4%'
Page 22, Para 86, line 2; read 'Rs.7,35,15' for 'Rs.7,35:15'
Page 30, Para 118; insert '(i)' before sub-heading
Page 40, last line, last column; read '13,83,621' for '1,38,362'
Page 41, last but one line; read 'three' for 'free'
Page 45, line 6; insert 'not essential' after 'but'
Page 45, sub-heading 3(b); line 10; read 'Railways' for 'Railway'
Page 45, sub-heading 4, line 1; insert ',' after 'Shop'
Page 45, sub-heading 4, line 7; read 'Forge' for 'Froge'
Page 47, 1st sub-heading, read 'Costing' for 'casting'
Page 47, sub-heading "Direct Labour", line 1; delete ',' after 'Time'
Page 63, Put S.No. and Ref. to Para No. as '14' and '56' after '13' and '55' in columns 1 and 2 respectively.
Page 63, Serial No. 14, last but one line; read 'Railways' for 'Railway'
Page 64, Serial No. 16, line 2; read 'foundry' for 'foundary'
Page 67, Serial No. 32, line 4; insert 'trained' 'between 'suitable' and 'candidates'
Page 68, Serial No. 36; put the second sentence in '()'

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APPENDICES

MEMBERS OF THE ESTIMATES COMMITTEE, 1955-56

1. Shri Balvantray Gopaljee Mehta—*Chairman.*
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3. Shri Amarnath Vidyalankar
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SECRETARIAT

Shri S. L. Shakdher—*Joint Secretary*
Shri H. N. Trivedi—*Deputy Secretary*
Shri R. P. Kaushik—*Under Secretary*

*Elected Member with effect from the 7th December, 1955 *vice* Shri R. Venkataraman resigned.

INTRODUCTION

I, the Chairman, Estimates Committee having been authorised by the Committee to submit the Report on their behalf present this Report on the Ministry of Railways on the subject 'Important Projects', which includes (i) Chittaranjan Locomotive Works (ii) Integral Coach Factory and (iii) Ganga Bridge Project.

2. The Committee wish to express their thanks to the Chairman and Members of the Railway Board and other Officers of the Ministry of Railways for placing before them the material and information that they wanted in connection with the examination of the estimates. They also wish to thank the representatives of the Federation of Indian Chambers of Commerce and Industry, New Delhi, the All India Manufacturers Organisation, Bombay, the All India Federation of Transport Users Associations, Bombay, the National Federation of Indian Railwaymen, New Delhi and Sarvashri H. N. Kunzru, M.P., Shanti Prasad Jain, L. P. Misra, K. C. Bakhle, I. S. Puri, V. P. Bhandarkar and B. B. Varma for giving their evidence and making valuable suggestions to the Committee.

NEW DELHI;
The 3rd May, 1956.

BALVANTRAY G. MEHTA,
Chairman,
Estimates Committee.

I. CHITTARANJAN LOCOMOTIVE WORKS

A. Introductory

"Rolling Stock", is obviously the most essential requirement of a railway system. Though the railway system was introduced in India over hundred years ago, no systematic and large scale efforts were made to establish indigenous industry for meeting in full these basic requirements of Railways. The Indian Railways have, therefore, all along been dependent on imports for meeting their requirements of coaches, wagons locomotives and their components. Appendix I gives a statement containing the value of locomotives, carriages, wagons and their components that were imported during the vears 1938-39 to 1954-55. It will be seen from the statement that during these 17 years the country had to spend Rs. 138 crores for meeting the basic requirements of Indian Railways.

2. A small beginning was no doubt made in the direction of locomotive manufacture in the East Indian Railway Workshop at Jamalpur in 1885 and in the Bombay, Baroda and Central India Railway Workshop at Ajmer in 1896. The manufacture of locomotives in these workshops was, however, of a sporadic nature and it only formed a side activity of these two workshops, which were primarily repair workshops.

3. In spite of the success achieved in the direction of manufacture of locomotives, locomotive manufacture on a large scale was not adopted as a part of Railway policy. Even, when a private enterprise, the Peninsular Locomotive Company, which came into existence soon after World War I, undertook to build locomotives in India at their factory in Singhbhum, those in control of railway policy were reluctant to give any encouragement and the whole plan had to be abandoned.

4. In this connection, the following extract from the book "Indian Railways—Hundred Years" would be of interest.

> "It was not unnatural, therefore, that Indian public opinion should have continuously demanded that arrangements be made for the manufacture of locomotives required for India's needs in the country. The agitation became particularly strong after the First World War, when import of new locomotives became difficult and existing locomotives had either completely broken down through wear and tear involved during the war or were in a dismal state of disrepair. In the Legislative Assembly during the twenties of the present century, there was a furore of agitation by Indian leaders of all shades of opinion. No effective steps were, however, taken by the Railway authorities to enlarge the scope of locomotive manufacture at Jamalpur and Ajmer. Various practical difficulties were pointed out and reasons plausible and otherwise were advanced in favour of

continuing the existing practice of importing locomotives from Britain. The conclusion could not be easily escaped that in this matter, as in many others, those in charge of the Railways at the time, were more interested in the welfare and prosperity of British industries, and preferred to extend the patronage of Indian Railways to British locomotive factories, rather than taking steps towards developing this industry in India.

"As time passed, this agitation became stronger. Finally in July, 1939 a committee was appointed consisting of a Mechanical Engineer and Finance Officer, Mr. J. Humpherey and Mr. K. C. Srinivasan respectively to examine in detail the scheme of starting the manufacture of locomotives in some of the existing workshops in India and to report on the initial cost and financial implications of such a venture. The Committee, however, recommended that the manufacture of locomotives, despite the war and even because of it, should be taken up at once. No steps were taken to implement the recommendations of the Committee. During the war, the shortage of locomotives became more and more apparent. This only served to emphasise the urgency and the imperative necessity for India to become independent and self-sufficient in respect of locomotives and other equipment necessary for railway operation.

"It was not till 1945 that any serious consideration was given to the recommendations of the Srinivasan Committee. A provisional site at Chandmari in the then undivided Bengal was selected. Not much progress could be made at this site, because of political changes leading to the partition of India. In 1947, the present site, where the Chittaranjan is located, was finally chosen".

B. Location of the Project

(a) *Selection of site*:

5. Chittaranjan is ideally located for an industrial undertaking of this nature. It is situated within 10 miles of West Bengal's rich coal belt and only 6 miles from the Maithan Dam of the Damodar Valley Corporation from where Hydro-Electric energy will be obtained. The Maithon reservoir will also provide a source of perennial water supply for the township and the workshop. The hilly nature of the country facilitates easy drainage, so important for the establishment of a clean, healthy township and the excellent climatic conditions are expected to ensure a high level of labour attendance and efficiency. Workshop and the colony are spread over an area of over 7 square miles.

(b) *Township* :

6. Chittaranjan has 5,070 residential quarters, 71 miles of road, 120 miles of piping for water supply and 100 miles of water borne sewage. Every single house has a minimum of two rooms, verandah and courtyard, electricity, continuous supply of filtered water, its own sanitary privy and bath. Each house in Chittaranjan has been provided with the basic facilities of a modern home. The township

has been planned in separate colonies of composite self-sufficient units, each of which has its shopping centre, maternity clinic, school, playground, dispensary, park, social amenity and recreation centres. There are at present in Chittaranjan 5 dispensaries, 4 maternity and health centres, 7 basic schools, 4 community halls and 6 parks. The main hospital has 50 beds and is centrally situated to provide medical facilities for all residents of the township. Two high schools, one for boys and the other for girls, provide secondary education to the young inhabitants.

Water supply:

7. The principal source of water supply at present is the Ajai River, a slender hill stream, which passes around the township. As the river gets dried up during the three dry months of April, May and June, an artificial lake with a capacity of 360,000,000 gallons has been built by constructing a 1,600 ft. long and 40 ft. high dam across one of the main out-fall streams to tide over the summer months. At present, a sub-merged dam across the Ajai leads water through a sealed channel into an intake well and thence to the filter beds in the centre of the township with a capacity of 2 million gallons per day.

Power Supply:

8. Electricity was first generated by a number of small portable plants. Subsequently, when the three 600 K.W. thermal standby sets were ready, energy was obtained from these, and in December, 1950, when the D.V.C. temporary packet sets at Kamardhubi were brought in, power was obtained from there at 11 K.V. 3 phase, 50 cycles A.C. Since January, 1952, power is being supplied from Sindri at 33 K.V. over D.V.C. Grid.

9. The Committee understand that of the three 600 K.W. thermal standby sets, one has been released to the N.E. Railway, Gorakhpur, and until the D.V.C. supply is guaranteed, it is not proposed to release the balance.

(c) *Workshops*:

10. The construction of the workshops proceeded concurrently with the building of the township. After six months of intensive survey work and planning, the final layout was ready by the middle of 1948 and construction work started almost immediately.

11. The workshops have been so designed as to facilitate the movement of raw material, from the initial processing stages to the final finishing, in one direction through the various shops, until it is delivered to the Erecting Shop ready for the assembly of the locomotive. Machinery and plant at Chittaranjan are of the latest design and represent the best British makes. Each machine has its self-contained motor-drive.

12. The factory, which is the main hub of the township has 10 different shops including a main Assembly Shop. These shops have been laid east-west, in three groups, South, Centre and North. The South group consists of the Pattern Shop and the Iron and Brass Foundries. The centre group includes the Smithy and Forge, the Heavy Machine Unit and the Light Machine Unit. The North group consists of three bays running parallel east-west.

13. The Boiler Shop is located in the Northern bay, the Erecting Shop and Tender Shop in the centre bay and accommodation for

miscellaneous fittings work and Finished Parts Stores has also been provided in the South bay. The completed locomotives come out of the east end of the Erecting Shop.

14. The Erecting Shop is equipped with specially designed machinery for handling locomotive frames. To facilitate erection of locomotives and tenders, stores for finished parts have been provided right along the entire length of the Shop so that finished components from Manufacturing Shops can be stocked at the appropriate stages of erection.

15. Finally, a Paint Shop and a Weighing Machine Shed have been provided to paint and weigh the finished locomotives, after they leave the Erecting Shop.

16. The locomotive design section of the Central Standards Office of the Ministry of Railways, which is responsible for designing all components of a locomotive, is also located here.

(d) *Amenities for staff*:

17. Out of the total estimated cost of Rs. 14·93 crores for the entire Project, a little over Rs. 7 crores has been provided for building up the township, with its housing, roads and welfare institutions. While lower grade staff quarters have been considerably improved, higher types have been stepped down to austerity standards and the gap between the two considerably narrowed down.

18. The problem of children's education has received special attention. Besides the two High Schools, one for boys and one for girls, there are seven basic schools. Basic education is free.

19. As regards entertainment and recreation, two big Institutes and four Community Halls have been provided in different parts of the township. Each Institute has its own library, reading room, indoor and outdoor games facilities and a spacious auditorium for meetings, dramatic performances and cultural functions.

20. Simultaneously with the progress in the completion of the Project, great care and thought have been devoted towards the development of cultural and social life at Chittaranjan. Area Committees have been formed with elected representatives from staff to look after the needs of the different colonies of the township. A Cultural Association, a Technical Association and a Mahila Samity are also functioning. Each of these committees and associations meet regularly to discuss matters of civic administration and cultural problems and constantly endeavour to bring a scientific and cultural outlook on life. The canteens are being run by canteen committee with equal number of elected and nominated members on no profit no loss basis. There are three canteens, one attached to the Workshop and Works Office, which supply food at cheap rates. A Co-operative Stores and a Co-operative Credit Society are also being run for the benefit of the staff. A Staff Benefit Fund, administered by a Committee of employees has been opened, which provides for such worthwhile items like institution of scholarships in colleges for the children of employees, payment of medical expenses in deserving cases of severe illness, etc. A Central Sports Organisation besides holding annual athletic meet, also encourage the staff to participate in healthy outdoor games.

21. The amenities provided at Chittaranjan help to raise the status of the workmen, and to give them a sense of dignity. There are no slums typical of industrial towns. Workmen have not been segregated. They live side by side with clerks, teachers and others in the same type of quarters under the restraining and educative influence of cultural and corporate life.

22. The Committee are favourably impressed with the facilities afforded to the workers at Chittaranjan. In order to raise the standard of living of the people, the government have accepted the policy of rapid industrialisation. Care will, however, have to be taken to see that in our enthusiasm to build up large scale industry rapidly, the factor of labour exploitation, usually associated with rapid large-scale industrialisation does not creep in. The old patterns of unhygienic and insanitary conditions of living for the workers and the slum areas must not be repeated. The Committee, therefore, recommend that the living conditions and amenities provided at Chittaranjan should be accepted as the basic minimum for workers in all the Government enterprises in future.

(e) *Organisational set-up*:

23. The Project is in charge of a Senior Administrative Officer of the rank of General Manager, assisted by a Chief Mechanical Engineer, 5 Officers of the Junior Administrative rank and a number of senior scale and junior scale Officers. The organisation chart of the Chittaranjan Locomotive Works is given in Appendix II.

C. Production of Locomotives

(a) *Actual Production*:

24. The production in the shops was inaugurated on the 26th January, '50, and the hundredth locomotive was ready in December, 1953.

25. The number of locomotives turned out during the First Five Year Plan, against the targets set, is given below:

Year	Ist Five Year Plan Targets	Annual out-turn of locomotives
1951-52	20	17
1952-53	32	33
1953-54	52	64
1954-55	72	98
1955-56 . . .	92	129
	268	341

26. Thus against the target of 268 locomotives to be turned out during the First Five Year Plan period, 341 have been turned out. Since July, '55, Chittaranjan has been turning out 11 locomotives per month against the original target of 10 per month (120 locomotives per year), thus exceeding the target. The Railway Ministry have subsequently intimated that the C.L.W. is turning out 12 Locomotives per month now.

(b) *Requirements of Locomotives during the Second Plan:*

27. The revised targets of traffic movement, construction of new lines etc. now anticipated in the Second Five Year Plan are as under:—

(i) Increase in passenger traffic by 6180 million passenger miles (*i.e.* by 15%)

(ii) Increase in goods traffic by 47 million tons (*i.e.* by 4%)

(iii) Construction of new lines—850 miles (*i.e.* 2·5% increase in route mileage).

For these targets, the requirements of B.G. locomotives have been estimated as under:—

	Passenger	Goods	Shunting	Total
(*i*) For additional traffic . . .	138	834	76	1,048
(*ii*) For rehabilitation . .	318	553	191	1,062
TOTAL .	456	1,387	267	2,110

28. The plan envisages electrification of 800 miles; if this materialises, the requirements of B.G. steam locomotives will come down as under:—

	Passenger	Goods	Shunting	Total
(*i*) For additional traffic . . .	..	457	76	533
(*ii*) For rehabilitation . . .	318	553	191	1,062
TOTAL .	318	1,010	267	1,595

The number of electric locos, as may be required, will be included in the schemes for electrification as and when they are finalised. If it is eventually decided to restore the original target of 3,000 miles of new construction, provision will have to be made for extra locomotives for this purpose.

(c) *Future Production:*

29. The Locomotive Works will not be able to meet all the requirements of B.G. locomotives in the first few years of the Plan. Dieselisation is, however, expected to provide for a portion of the requirement. The Committee were informed that the question of introducing dieselisation on certain sections was under active consideration of the Railway Board. A revised target of 300 locomotives per year to meet the increased requirements against the Second Five Year Plan has been set. The details of the scheme are being worked out. The Committee understand that a tentative target date, 1958, has been fixed for achieving the enhanced target. In view of the shortage of locomotives and the necessity of reducing the imports from abroad, the Committee would suggest that the Railway Board should seriously consider the feasibility of bringing forward the

tentative date by at least one year. When the out-turn from Chittaranjan increases to the target of 300 locomotives per year, it is expected that Chittaranjan Locomotive Works would be able to meet most of the annual requirements of standard passenger and goods B.G. steam locomotives.

(d) *Passenger Locomotives*:

30. The Committee understand that it is proposed to manufacture passenger locomotives also at Chittaranjan in addition to goods engines and that an order for 10 WT proto-type tank locomotives for passenger shuttle service has already been placed on Chittaranjan Locomotive Works.

31. The Committee understand that for B.G. main line passenger and goods services, the WP and WG types are considered as standard steam locomotives at present. WG engines are already being manufactured at the Chittaranjan Locomotive Works. The manufacture of WP locomotives is no more difficult than that of WG. In fact a large number of important components, including the boilers are common. The Committee were informed that the manufacture of WP locomotives at Chittaranjan will be considered in due course, when requirements of W.G. locomotives have been met in a large measure. The Committee feel that it would be advisable to make a small beginning in the manufacture of WP locomotives also simultaneously and suggest that a suitable target for manufacturing W.P. locomotives may be set up at an early date.

(e) *Cost of Production*:

32. The number of locomotives and boilers that were manufactured at the works until 31st March, 1955 are as follows:—

	1951-52	1952-53	1953-54	1954-55
Locos (exclusive of boilers)	17	33	64	98
Boilers only	..	11	30	70

33. The average actual cost of a locomotive together with the break-up is as follows:—

(Figures in thousands of Rs.)

	1951-52	1952-53	1953-54	1954-55
Direct labour .	19	25	22	16
Direct stores .	375	302	346	382
Factory overheads :				
Labour . . .	121	145	70	40
Stores . . .	51	107	76	48
Administrative overheads :				
Labour	79	84	25	13
Stores	81	57	5	1

Township overheads :				
Labour .	1	28	14	7
Stores	2	35	22	13
Stores overheads :				
Labour	4	3	18	11
Stores	4	8	7	1
TOTAL.	747	794	605	532

N.B. The above figures are exclusive of interest charges on the capital-at-charge.

It is noticed that the cost of production per locomotive under various heads has fluctuated widely and the same under the heads "Direct stores" and "Stores overheads Labour" has increased in 1954-55 when compared to 1952-53. The reasons for this fluctuation and particularly, the increase under two heads should be analysed and remedial action taken, as necessary.

34. The Committee understand that the actual cost of the locomotives at present being turned out is not yet available, but that the estimated cost of W.G. locomotive during 1955-56 is about Rs. 510 thousands exclusive of interest charges on the capital-at-charge.

35. On the basis of the debits so far received and the orders placed, the present estimated landed cost of a W.G. locomotive imported from various countries is given in Appendix III, which shows the numbers and types of locos ordered abroad during the period 1951-52 to 1954-55 together with their cost.

36. Considering the fact that the Locomotive Works has been in existence for only a few years, the Committee note with satisfaction that the cost of the indigenous locomotives does not compare unfavourably with that of the imported ones. The Committee, however, hope that with greater experience in the techniques of production and more rigorous control, the cost would be reduced further. With the increased target of annual production of 300, efforts should be made to reduce the cost of production (exclusive of interest charges on capital-at-charge) to bring it to the level of the estimated landed cost of U.K. and Japanese W.G. locomotives under T.C.M. If this is achieved, it would result in an approximate annual saving of Rs. 1,41,00,000 on the basis of the average actual cost of a Chittaranjan locomotive during 1954-55.

(f) *Self-sufficiency in the use of components*:

37. It has not been possible for the Railway Board to give the exact proportion of the imported and indigenous raw materials utilised in the manufacture of each locomotive on account of the large number of items involved. However, on the basis of a special analysis of some major assemblies, the Committee understand that the

value of imported stores per loco against the figure of 'Direct Stores' shown in para 33 above has been approximately as under:

Year	Amount in lakhs of rupees	Percentage
1951-52	2·46	66%
1952-53	2·00	66%
1953-54	1·45	42%
1954-55	1·44	37%

The Committee consider this percentage to be on the high side and suggest that special efforts should be made to reduce it substantially.

38. In the manufacture of locomotives, most of the components are manufactured by processing of raw metal and basic materials: there are a few proprietary articles and other fittings, some essential and others desirable, like vacuum and pressure gauges, electric lighting equipment, roller bearings, asbestos mattresses etc. which are obtained from outside sources. In Chittaranjan all processing shops have been fully developed and given the basic materials, 100 per cent. of the components for production of a locomotive can be manufactured. At present, a certain quantity of some of the components, which are produced in Chittaranjan Locomotive Works, are also obtained from outside sources to maintain optimum production from Chittaranjan Locomotive Works. The Committee suggest that the question of setting up subsidiary industries in the private sector for the manufacture of such of the parts as are not manufactured in the Chittaranjan Locomotive Works should be given prompt attention.

39. The Committee understand that at present the assistance received from indigenous sources is not appreciable; it is limited to supply of cotters, split pins, rivets, bolts and nuts, minor fabrications and light steel castings. A note furnished by the Railway Ministry on the extent of production in the Chittaranjan Locomotive Works is given in Appendix IV.

40. The 14 essential components and 45 desirable components (referred to in Appendix IV), which are at present imported from abroad are listed below:

(i) *Essential imported components:*

Description	No. of components
1. Vacuum and pressure gauges . .	2
2. Electric lighting equipment . .	5
3. Steel castings:	
(*i*) Crossheads . .	2
(*ii*) Wheel centres .	3
(*iii*) Front drag casting	1
4. Thermic Syphon . .	1
TOTAL . . .	14

(ii) *Imported items—Desirable components not essential:*

Description	No. of components
1. Lubricator complete	1
2. Mattress asbestos	15
3. Thrust ball bearing	1
4. Roller bearing eccentric rod	3
5. Axlebox keep (Ajax)	2
6. Manganese liners	14
7. Roller bearing front truck (Timken or SKF)	1
8. Roller bearing hind truck (Timken or SKF)	1
9. Roller bearing tender (Timken or SKF)	1
10. Fabric liners	3
11. Rolled wheel centre	3
	45

The Committee understand that the six items of steel castings referred to above will be produced in the proposed steel foundry. In regard to the thermic syphon, it would be possible to set up a suitable section at Chittaranjan itself, if necessary, but that the vacuum and pressure gauges and electric lighting equipment, being very specialised items cannot be produced in the manufacturing unit.

41. The Committee recommend that the Railway Ministry should make special efforts to set up indigenous industry for the supply of components that are at present being imported from abroad. Private industrialists or artisans should be given special encouragement for this purpose. The Committee hope that by the end of the Second Five Year Plan, Chittaranjan will be able to manufacture hundred per cent. Swadeshi locomotives.

D. Special features of Chittaranjan Locomotive Works

(a) *Production Control:*

42. Chittaranjan has been provided with a most modern type of Production Control Office. As soon as the order for manufacture of a particular type of locomotive and the drawings are received, a locomotive manufacture programme is prepared and the dates on which the assemblies, components, semi-finished parts and raw material have to be on shop floor is worked out to conform to the production schedule. The locomotive is then part listed and those components, which can be manufactured, are separated from those that have to be procured from outside sources. Components, which would be manufactured in the Works are then planned out in detail. Process sheets, as they are called, show in detail the material, specification, the sequence of machining and other operations, the jigs, fixtures and tools to be used, the speeds and feeds of machines for each operation and the number per day to be produced. Thus these sheets, which are machine printed, give complete information for each component as to when a component is to be made, how it is to be made, on what machine it is to be made and how long it would take to complete it. The system eliminates any guess-work on the part of production shop staff.

(b) *Inspection*:

43. There is an elaborate system of component inspection, which is independent of the production organisation. At each stage of manufacture the components are checked by Inspectors and passed only if they conform to specifications. Finally, the assemblies are inspected by a Chief Inspector and only when they are passed, they are allowed to be fitted on to the locomotive. This system of rigid inspection, independent of production staff at Chittaranjan guarantees the quality of the components.

(c) *System of costing*:

44. The Committee are glad to note that a scientific system of costing has been introduced at Chittaranjan Locomotive Works. A copy of the detailed note furnished by the Railway Ministry explaining the system of costing at Chittaranjan is given in Appendix V. In this connection, the Committee reiterate their recommendation made in para 131 of their Twenty-first Report that the Officers from the Indian Railways should be sent to Chittaranjan Locomotive Works for a short period to take intensive training in this subject and that a cost accounting unit should be set up in each major workshop of the Indian Railways. The system should be copied by other State enterprises also, with such modifications as are absolutely necessary.

(d) *Incentive bonus scheme*:

45. The incentive bonus scheme was started at Chittaranjan Locomotive Works on the 16th December, 1954. It now covers practically all the shops.

46. Before introducing this system in Chittaranjan all operations were time-studied under the guidance of foreign experts and some Indian rate-fixers trained in the U.K. The 'time allowed' for the various operations was fixed after taking into account the element of fatigue and personal allowances etc.

47. For the purpose of evaluating the 'time saved' by workers, the mean of the prescribed scales of pay applicable to unskilled, semi-skilled, skilled and highly skilled workmen and chargemen has been taken as the standard basic wage.

48. The ceiling limit on profit has been fixed at 50 per cent. of the standard basic wages earned in respect of each piece-work job.

49. Supervisors of the level of chargemen and essential indirect workers participate in piece-work profits subject to their earnings being restricted to 80 per cent. of the average percentage of profit earned by direct workers supervised by them.

50. The basic wages of all workers are guaranteed irrespective of their piece-work results, but losses during any particular month are adjusted against the profits of the same month, over the different jobs done by a worker in the month.

51. Hourly rates of pay for calculating piece-work results are based on 208 man-hours per month throughout the year.

52. The average total time saved by the workers during August, September and October, 1955 amounted to about 33,000 hours per month and the average profits earned were about Rs. 15,000/-.

53. The Committee, in this connection, refer to their recommendation made in para 129 of their Twenty-first Report that each Railway should evolve the system of piece-work rating and bonuses in its major workshops. The Committee suggest that advantage should be taken of the experience gained at Chittaranjan Locomotive Works in this direction. The Officers, who are deputed for the study of costing system at Chittaranjan Locomotive Works, may also be asked to study the incentive bonus scheme in operation there. The system should be introduced in other State enterprises also, with such modifications as are absolutely necessary.

(e) *Training Scheme*:

54. Chittaranjan Locomotive Works has a spacious technical school, which caters to the entire requirements of the Factory in regard to skilled and supervisory technical staff. The special features of the technical school are as under:—

(1) There are three double-storeyed hostels each accommodating 120 apprentices. Facilities of sports and N.C.C. training have also been provided.

(2) A basic training workshop is attached to the Training School. It is fully equipped with machines and equipment and the apprentices are given basic training in the following trades:—

Fitting, machining, welding, sheet-metal work, blacksmithy, pattern making and moulding.

After completing basic training course, each apprentice is given practical training in the main workshop under actual working conditions.

(3) Evening classes are arranged for the following categories of staff:

Technical Supervisors in the workshops, clerks and workmen.

(4) Specialised courses have been arranged on modern welding techniques under the guidance of Welding Engineer under the Colombo Plan attached to the Technical School.

(5) Practical training facilities for members and students from Engineering institutions are available. About 20 engineering graduates and diploma-holders are given practical training under the Government of India stipendiary schemes.

(6) Short-term training is arranged for about 20 engineering students during the vacations.

(7) While the apprentice mechanics are recruited through the Railway Service Commission, Calcutta, trade apprentices are recruited locally through competitive examination, in which psycho-technical tests are included. These tests are designed to determine temperament, intelligence, ability to solve practical problems mechanical aptitude, concentration of attention on work, resistance to fatigue and stamina. These tests are given by a team of 14 psycho-technical experts from Calcutta University.

55. The Committee appreciate the training scheme introduced at Chittaranjan. In this connection, the Committee refer to para 69 of their Twenty-fourth Report, in which they have recommended that basic training centres should be organised on each Railway. The experience gained in the Technical School at Chittaranjan would be considerably useful for this purpose.

E. Miscellaneous

(a) *Cost of American Locomotives*:

56. The Committee understand that the cost of an imported WG locomotive from the U.S.A. obtained under the TCM Programme is Rs. 10·61 lakhs, *i.e.*, nearly double of that imported from other countries. The Committee were given to understand that one of the reasons for this was that the cost of production of steam locomotives in the U.S.A. was higher than in any other country. Under the TCM Programme, the Railways were offered 100 locomotives. The Railway Ministry pay to the general revenues the price at the usual world market rates. Orders were placed for only 50 engines from America and for 25 from Japan and the rest 25 from the United Kingdom. The Committee appreciate that under the TCM Aid Programme, the Railways might not have any voice regarding the cost of the locomotives, but the Committee suggest that the price at which the U.S. locomotives were being given to other countries (a) under similar aid programmes to those countries, and (b) through normal trade channels, may be ascertained and compared with the rates at which the locomotives were supplied to India in the corresponding periods.

(b) *Mechanisation of the costing system:*

57. The Committee understand that the cost of operating Hollerith accounting equipment hired from Messrs. Hollerith (India) Ltd., and the allied machines purchased by the Administration is about Rs. 4,167/- per month as detailed below:

	Rs.
Hired equipment :	
Monthly rent	2,000
Monthly maintenance	41
Monthly depreciation	191
Monthly interest	67
Operators :	
10 Operators (including P.F bonus, special cont. to P.F. and leave salary)	1,519
1 supervisor (including P. F. bonus, special cont. to P. F. and leave salary)	349
TOTAL	4,167

58. The manual handling of this work would involve about 60 men, the cost of which would be—

	Rs.
60 clerks (including P. F. bonus, special contribution to P.F. and leave salary)	10,688
4 supervisors (including P. F. bonus, special contribution to P. F. and leave salary)	1,099
TOTAL	11,787

59. It is, however, understood that in the above calculations, the additional facilities that will have to be provided, namely, housing, medical etc. have not been taken into account. If these facilities are also taken into account, then the saving consequent on mechanisation will be still greater.

60. The Committee understand that the suppliers of Hollerith accounting equipment, as a rule, refuse to sell their machines. The hire charges, however, include repairs and maintenance. The Committee also understand that the Hollerith machines are not manufactured in India. The committee see no justification for the continued hire of these machines and suggest that they should be purchased outright. In case, the firm is not in a position to sell the machines to Government, the Committee suggest that the Railway Ministry should invite global tenders, so that other manufacturers will be forthcoming for the sale of similar accounting equipment manufactured by them. The Committee feel that the Government should not be at the mercy of any monopolistic firm.

(c) *Steel foundry at Chittaranjan:*

61. The Committee understand that an approach has been made to the Technical Co-operation Mission of America for assistance with a 7,000 tons per year Steel Foundry Project capable of expansion to 10,000 tons capacity later. A preliminary project report prepared by Mr. Blakiston, a British expert, for a 4,000 tons project is being used as the basis for a further project report to be prepared in America. The total cost of the project as estimated would be of the order of 5 to 6 million dollars. Of this amount, it is estimated that 2½ to 3 million dollars representing approximately half the amount, would be required in dollars for the purchase of equipment, machinery and plant etc. The Committee were further informed that the TCM would assist with 2½ to 3 milion dollars for this purpose.

62. The WG locomotive now under manufacture at Chittaranjan requires about 32 tons of steel castings of various sizes. Arrangements have been made to redesign some components, particularly the locomotive cylinders in cast iron to avoid import, thus resulting in a net requirement of about 25 tons of steel castings per locomotive. Of this, about 5 tons per locomotive are obtained from indigenous sources and 20 tons imported on account of lack of indigenous capacity. Setting up of the steel foundry at Chittaranjan will assist in reducing the import of steel castings. The Committee hope that the proposal will be finalised without undue delay.

(d) *Uniform level of out-turn:*

63. Though continuous effort has been made to accelerate production at Chittaranjan, it has not been possible to develop each of the shops to a uniform level of out-turn with the result that the batches of components turned out from each shop vary and do not match up to the output of the best shop. In order to keep locomotive production at the maximum during the developmental period, the overall production of Chittaranjan Locomotive Works has been related to the performance of the best shop. To achieve this objective, the output of other shops has been balanced by procuring from indigenous sources as well as from abroad the components in short production. While such a course of action might be unavoidable in the initial stages, the Committee feel that early steps should be taken to balance production in different shops by providing extra equipment and introducing double shift wherever necessary. Dependence on imported components should be eliminated as early as possible.

(e) *Manufacture of electrical locomotives*:

64. The Committee understand that the Railway Board is considering the question of manufacturing electrical locomotives in India. The manufacture of electrical motors and locomotives is tied up with the electrical industry itself. The Committee were informed that the underframes and chassis of electrical locomotives should be manufactured by the Chittaranjan Locomotive works without any difficulty. So far as the manufacture of electrical components is concerned, the matter is being dealt with by the Ministry of Production. The Committee suggest that the matter should be pursued vigorously so that the manufacture of electric locomotives may commence in the country without undue delay.

(f) *Locomotives purchased from TELCO*:

65. The number of locos ordered on and turned out by TELCO by September, 1955 are as under:—

	No. ordered	No. turned out
YG type	200	50
YP type	170	86
	370	136

66. The Railways have also invested a sum of Rs. 2 crores in 5% cumulative preference shares of Rs. 100 each in the Tata Engineering and Locomotive Company Limited. No dividend has been declared by the Company upto 1954-55.

67. The Cost of locomotives delivered has not yet been finalised. Provisional payments have been made at Rs. 3·50 lakhs for Y.G. and 3·52 lakhs for Y.P. locomotives during development stage. For locomotives turned out during 1-7-1954 to 31-3-1955, the firm has later claimed Rs. 6·54 lakhs per locomotive. In this connection, the Committee would like to refer to the recommendation made in para 17 of the 5th Report of the Public Accounts Committee that efficient and accurate cost accounting and their check on behalf of Government are necessary for the proper allocation of costs among the several contracts. The reference is also invited to paras 50 to 61 of the 13th Report of the Public Accounts Committee.

68. The Committee understand that the "higher cost" not having been accepted by the Railway Board has been referred to the Tariff Commission for enquiry. The Tariff Commission will be assisted by one or two technical experts of high calibre from abroad.

The terms of reference to the Tariff Commission include locomotive industry in India as a whole and the Commission is expected to examine the working of the Chittaranjan Locomotive Works incidentally in the course of their enquiry. The Committee may be apprised of the findings of the Tariff Commission and the orders of the Government thereon in due course.

69. As stated earlier, M.G. locomotives used to be manufactured at Ajmer. This was discontinued with the establishment of the Chittaranjan Locomotive Works and the Tata Locomotive and Engineering Co. Ltd., Jamshedpur as the capacity of the Ajmer Workshops was required for repairs. If satisfactory arrangements for a steady manufacture of M.G. locomotives at a reasonable price cannot be arrived at with TELCO, the Committee suggest that the question of suitably expanding the workshop at Ajmer to undertake the manufacture of M.G. locomotives should be carefully reviewed by the Railway Ministry.

(g) *Average size Locomotives*:

70. Locomotives recently standardised for the Indian Railways vary widely both in size and power. These variations range from 51 tons to 239 tons by weight in working order and from 13,700 lbs. to 66,600 lbs. in tractive effort. All Railway systems are equipped with repair workshops, where the locomotives are overhauled periodically. In order to measure the performance of the repair workshops as well as the amount of work done on a locomotive under repair, a standard unit of repair was evolved many years ago.

71. With the establishment of locomotive manufacture in India and the increase in tempo of production, it became necessary to fix a standard unit for locomotive production to measure the output and performance in the Locomotive Manufacturing Works. The yardstick for repair units is not applicable to manufacture as only certain working components on a locomotive need repair or renewal, while in locomotive manufacture every part has to be processed and fashioned to make a whole locomotive. Accordingly the Central Standards Office for Railways evolved a basis of evaluating the output from the locomotive manufacturing workshops in terms of a standard unit, as follows:—

The total number of each type of locomotive likely to be in service on Indian Railways in the near future, was estimated and tabulated. Their empty weights and the number required was multiplied and average worked out. This average locomotive for broad and metre gauge was a unit, whose empty weight was 93·5 tons and the nearest class of locomotive to this average loco in common use was the HGC, the BESA standard Goods locomotive.

The quantum of work that is involved in the manufacture of a particular class of locomotive is dependent to a very great extent

on the surface area of its major components, as the amount of machining, forging, number of stays, rivets etc. depend on this surface area. Applying the principle of dimensional similarity to locomotives, the surface area is proportional to square of the linear dimension and since the linear dimension varies as the cube root of the volume of weight (weight of loco or boiler unit) $\frac{2}{3}$ may be taken as an index for the surface area of any class of locomotive. The worked surface area, therefore, is a suitable criterion for judging the quantum of work involved in locomotive manufacture until more accurate data is available.

The standard unit of a locomotive for production was thus a locomotive weighing 93·5 ton (empty) and with the surface area (index 93·5) $2/3 = 20{\cdot}25$. For practical purposes, however, the standard unit is taken as the nearest by weight locomotive, *viz.*, HGC class locomotive, whose empty weight is 89·95 and a surface area index of 20·05. Based on these standard size locomotives, the quantum of work involved in the manufacture of all locomotives for both Broad and Metre Gauges, has been worked out and is given in Appendix VI.

The amount of work involved in the production of 'WG' is nearly 1·23 times that of the standard locomotive. Thus, with the initial designed capacity of C.L.W. for 120 average size locomotives, the production of 97 WGs would equate to this capacity figure. With the output enhanced to 12 WG locomotives per month, the rate of production would equate to approximately 15 standard (average size) locomotives each, or 180 a year.

(h) *Fortnightly Bulletin 'Chittaranjan'*:

72. The Committee understand that a fortnightly bulletin called 'Chittaranjan' is published simultaneously in English, Bengali and Hindi depicting the activities of the staff in the social, cultural, sports and literary spheres. The normal circulation of 'Chittaranjan' is as under:

English		1500 copies
Bengali		1000 copies
Hindi	...	500 copies

Cost of production of 'Chittaranjan' (exclusive of block-making charges) is as under:—

English	..	Rs. 170/-
Bengali	..	Rs. 125/-
Hindi	..	Rs. 100/-

73. The Committee understand that the bulletin is not self-supporting. While the Committee appreciate that the issue of 'Chittaranjan' bulletin is treated as a measure designed to promote enthusiasm and sense of pride amongst the staff, the Committee recommend that steps should be taken to make it self-supporting.

II. THE INTEGRAL COACH FACTORY, PERAMBUR

A. Introduction

74. In 1948, the Government of India decided that a separate Railway Coach Building Works should be established with a view to attain self-sufficiency in coaches for Indian Railways. A technical Aid Agreement was concluded on 28th May, 1949 with the Swiss Car and Elevator Manufacturing Corporation Ltd. of Switzerland, who have been pioneers in the field of light-weight coach building for obtaining the necessary technical assistance in the establishment of a factory in India for building the coaches. A supplemental agreement was signed on 27th June, 1953. After a comprehensive survey of several alternative sites for locating the factory, the vacant Railway land to the west of the Loco Repair Shops of the Southern Railway at Perambur was chosen as the final site in June, 1951. The site is ideally situated with rail connections to the factory readily available and a nearby suburban railway station to bring workmen to the factory.

75. Planned for an output of 350 B.G. coaches annually on a single shift basis, this factory besides making the Indian Railways self-sufficient in the matter of supply of coaches would provide employment for more than 4,000 workers. The factory is the largest of its kind in Asia and one of the largest in the world.

76. The project has been named 'Integral Coach Factory' after the integral type of coach of modern design that will be manufactured in the factory. Claimed as the latest in the field, three major factors, which contribute towards the comfort and safety of the travelling public, are smooth running, light-weight and strength of the coach. The tubular character of the coach forms a structure of great strength along its axis. The design incorporates all-welded trough floor system, integral with the body and permits the forces sustained by the coach to be borne by the entire body including the skin. It is this feature of the coach that gives it the name "Integral Coach". As the coach is light-weight, being seven tons lighter than the conventional 42 ton coach, more integral coaches can be hauled by an engine without any extra cost in fuel. The extent to which overcrowding will ease can very well be imagined by the fact that in a train of 10 bogies, there would be a saving of 70 tons of dead weight *i.e.* equivalent of two additional coaches. Also the axle-boxes, which are an important part in a coach, are fitted with spherical roller bearings. The old jerky axle-box guides have been eliminated and have been replaced by an entirely new arrangement of guides working in an oil bath sealed against dust and water thus ensuring smooth working. The axle-box helical springs are controlled by shock absorbers. In the event of an accident, the coach will give greater protection to passengers inside it, since it has been built for strength, with an anti-telescopic device and its body cannot get smashed up as easily as in

the usual type of coaches in which the body gets separated from the underframe and smashed in an accident. The new third class coach will accommodate 80 passengers. It has four lavatories and four doors on either side. The coach is 70 ft. long and 10 ft. 8 inches wide. The space between the seats is 1 ft. 9 inches.

B. Details of the Scheme

(a) *The Factory*:

(i) *The lay-out*:

77. The factory covering an area of 8,48,600 sq. ft. consists of 10 shops, the biggest being 1000 ft. long and 260 ft. wide. The design of the steel-work of the structures has been drawn up on the most uptodate lines with a liberal provision for welding. The workshops are all founded on R.C.C. piles with reinforced concrete top caps to take the heavy stresses coming on them due to cranes and wind loads. The Shops are well-ventilated with modern lighting and provided with dustless concrete floors and uptodate working conditions.

78. The factory has been so planned that raw material will be received at one end and processed through the factory in a uniflow direction; the coach shell will be finished by the time it reaches the other end of the factory and from this end, one coach will roll out every 6 working hours.

(ii) *Plant and Machinery*:

79. The machinery and equipment for the factory include big guillotine shears, several brake presses, rolling and straightening machines and hydraulic presses of 1,000 tons capacity. The Machine Shop and Blacksmith Shop are being equipped with such machines of the latest model as would eliminate to a large extent the necessity of handling by manual labour. Similarly, the Tool and Die Sinking Shop and the Mill-wright Shop are being equipped with the latest machinery for producing complicated jigs, fixtures and tools required for the manufacture of coaches on a mass production basis.

(iii) *Electrical Services*:

80. The electrical services for the factory have been equally well-planned. The main receiving 11 K.V. Sub-station will be fed from the Madras Electricity System and will connect the 9 sub-stations, 6 for the Shops and 3 for the Staff Colony, located at load centres.

81. The total connected load for full production is computed to be in the region of 10,000 B.H.P. with annual current consumption of 6 million units. 13·5 miles of H.T. and L.T. mains inside the Workshops will feed about 713 machines. There will be 30 overhead

travelling electric cranes in the Shops with 3 additional traversers for transferring the coaches from one manufacturing shop to another. While the electric lighting of the shops will be of 5 to 8 ft. candles at working levels, each machine will have its own special lighting for precision work.

(iv) *Canteen for the Factory*:

82. A large canteen for the works of the factory providing them cheap and wholesome food is housed in a modern double-storeyed building.

(v) *Office building*:

83. A three-storeyed Administrative Office for the factory is under construction with provision for adding a fourth floor in the years to come.

(b) *Training of Personnel*:

84. Visualising the need for specially trained technicians capable of working on the manufacture of the integral type of coaches, the project provides for the establishment of a Training School with its own satellite workshops and a hostel. After training about 600 men annually during the initial four years, the School will switch over to training apprentices on the regular scheme of 3½ years, the number being reduced to approximately 150 a year. The Administration is also constructing a hostel for 250 apprentices. The Committee recommend that the training facilities to be provided should be of the same standard as at Chittaranjan. Apprentices from other Railways might also be sent for training at Perambur and Chittaranjan for short periods.

(c) *The Township*:

85. The project also provides for a township on a 32 acre plot of land within a few furlongs from the factory well served by the transport system of the city of Madras. The township consists of 400 staff quarters of various types, for staff belonging to certain essential categories, an Institute, a children's park, a playground and other amenities. The township is self-contained with complete underground drainage, water supply, tarred roads etc. As the total number of workers to be employed would be of the order of 4,000, the provision of only 400 staff quarters in the township appears to be inadequate. The Committee, therefore, recommend that the feasibility of suitably expanding the township should be examined by the Railway Ministry. They also recommend that the standard of amenities to be provided in the township should be the same as at Chittaranjan.

The water supply for the factory and the colony, which had been estimated at 2 lakhs gallons per day will be received through a 11 mile pipe line to be laid from Ennore.

(d) *Estimate of expenditure*:

86. The amount of the sanctioned estimate for the whole project is Rs. 7,35:15 lakhs and the break-up of the total cost and the appropriate expenditure against each upto the end of August, 1955 are as follows:—

(In thousands of Rs.)

	Sanctioned Estimate	Approx. Expenditure to the end of August, 1955
I. *Engineering Works* :		
(1) Preliminary expenses	3,94	1,02
(2) Land	5,80	2,61
(3) Permanent Way	11,31	9,44
(4) Shop structure and ancillaries	1,55,52	1,11,36
(5) Other buildings	14,29	10,71
(6) Roads	10,03	6,17
(7) Quarters	35,61	31,15
(8) Drainage and Sewage	4,71	3,73
(9) Water Supply	8,50	6,65
(10) Welfare Buildings such as Technical Training :		
School 2,05 153		
Canteen 1,30 163	5,77	5,44
Institute 41 38		
Others 2,01 190		
(11) Furniture for offices and Welfare Buildings	2,88	96
(12) Electrification	49,20	33,37
(13) Telephone and Tele-communication	4,40	1,27
II. *Plant and Machinery* :		
Workshop Plant Machinery and Equipment	3,21,87	1,31,90
III. *General Charges* :		
(1) Construction Plant	11,24	9,37
(2) General charges, such as Pay and Allowances, Office expenses and freight	90,06	40,62
TOTAL	7,35,13	4,05,77

(e) *Target of Production*:

87. The project was completed in 1955 and production in the factory has commenced from the 2nd October, 1955.

88. The full production target of 350 coaches in a year will be attained through annual stages, as indicated below in 1960:—

1st year of production	20
2nd year of production	100
3rd year of production	200
4th year of production	300
5th year of production	350

(f) *Organisational set up*:

89. The organisational set up of the Integral Coach Factory is indicated in the chart in Appendix VII. It might be stated in this connection that, in terms of the Supplemental Agreement of 1953, which was concluded after keeping in view the comments made by the Public Accounts Committee in para 13 of their 5th Report,

Schlieren shall undertake their full share of technical and executive responsibility for the establishment of production in the Integral Coach Factory. In this connection the Committee would like to refer to para 77 of the Thirteenth Report of the Public Accounts Committee. In accordance with the terms of the Agreement, the Swiss Consultants are responsible for furnishing the following technical data:—

1. Supply of lists of machinery and plant required for the Integral Coach Factory.
2. Supply of a detailed list of raw materials required for coach manufacture together with their specifications.
3. Supply of all drawings required for the production of the Schlieren type coach bodies and bogies.
4. Details of factory layout, shop layouts and plant layout for the erection of machinery for the installation of compressed air pipe-lines, water mains, oil pipe-line etc.
5. A complete production report indicating full details of the production plant for the I.C.F.

90. In addition, Schlieren have also been receiving in their works selected Indian personnel for specialised training sections of coach manufacture.

91. The work of issuing global tenders for the procurement of machinery and plant and tabulating them was also done by Schlieren on behalf of Government. Schlieren have also been entrusted with the work of the inspection of the plant and machinery on order, and have also been assigned the work of collaborating with the Director General, India Stores Department, in the procurement of imported raw materials.

(g) *Swiss team of Engineers and Specialists*:

92. The Technical Aid Agreement, which Government have entered into with M/S Swiss Car and Elevator Manufacturing Corporation, Schlieren extends up to May, 1961. In terms of this agreement and in the discharge of their technical and executive responsibility for the establishment of production in the factory, a team of 40 Swiss Engineers and Specialists are to be deputed to India for such period or periods as may be mutually agreed upon and to continue in their engagements for such period as may be mutually agreed between Schlieren and Government. This team would consist of 14 Officers as mentioned below and 26 specialists:—

Chief Technical Manager	1
Deputy Chief Technical Manager	1
Superintendent, Mechanical Administration	1
Superintendent, Design	1
Superintendent, Production	1
Superintendent, Manufacturing I	1
Superintendent, Manufacturing II	1
Superintendent, Manufacturing III	1

Chief Draftsman Design	1
Chief Designer Jigs and Fixtures	1
Progress Engineer	1
Planning Engineer	1
Technical Assistant Plant and Maintenance	1
Senior Instructor	1
TOTAL	14

93. The Swiss Engineers and Specialists at Perambur are on 3-year contracts commencing from varying dates from March, 1954. Indian Engineers and Technicians have been posted to work as their counterparts in the various branches of coach manufacturing. The Committee were informed that as the production had only just commenced, it was too early to foresee for what period it would be necessary to retain the services of the Swiss Engineers and Specialists. **The Committee would, however, like the Railway Ministry to keep** a very close watch over the progress of the training of the Indian Officers posted in the Coach Factory with a view to avoid the possibility of extending the Agreement beyond 1961. The Railway Ministry should arrange to depute staff from the Railways to the factory periodically, so that the technique is properly understood and widely known.

94. 44 Indian technicians and 3 Officers have received training in the works of Schlieren in the different sections of coach manufacture. A batch of 19 technicians are now undergoing training in Schlieren and it is proposed to send a further batch of 17 technicians for training early in 1956.

95. The Committee understand that four machine shop group leaders from the Hindustan Aircraft Ltd. have been admitted for training in the Integral Coach Factory Training School and the Railways have also agreed to take a few of their Welder Technicians for training in the School. The Committee recommend that the question of deputing more men of the Hindustan Aircraft Ltd. for selected periods in the factory may be discussed with the appropriate authorities, so that more and more qualified Indians get to know the technique.

96. As a matter of fact, the Committee would like the Railway Ministry to think about their requirements for the Third Plan and take steps to see that a nucleus of trained men is available in time for building adequate number of coaches and locomotives during the Third Plan period. Import of rolling stock should be put a stop to by the end of the Second Plan period, if not earlier.

C. Cost of Construction

(a) *Number and cost of coaches purchased from abroad in recent years*:

97. The Committee understand that in Broad Gauge only, light weight, integral type, all metal coaches were imported during the

period 1951-52 to 1954-55 from Switzerland as shown below:—

	Landed cost per coach Rs.
1. 2 Nos. proto-type fully furnished	5,42,689 (Average)
2. 50 Nos. fully furnished coaches (1st order)	3,42,745 (Average)
3 50 Nos. unfurnished coaches (2nd order)	1,68,000
Cost of furnishing per coach in Railway Workshops	59,000
TOTAL	2,27,000
4. 50 Nos. unfurnished coaches (3rd order)	1,68,000
Cost of furnishing per coach in Railway workshops	59,000
TOTAL	2,27,000

(b) *Cost of construction of coaches in India:*

98. All metal conventional type Broad Gauge coaches on standard under-frames are at present being built by M/S Hindustan Aircraft Ltd., Bangalore. Below is given the price (Approximate) of such a coach:—

	Rs.
(*i*) Price of fully furnished class III coach body shell :	
(*a*) Manufactured upto February, '52	99,000
(*b*) Manufactured after February, '52	94,731 (Provisional)
(*ii*) Price of a standard under-frame, ex: Belgium at present being used for these coaches :	
(*a*) Price of the under-frame.	38,000
(*b*) Price of wheels and axles	5,000
TOTAL	43,000
(*iii*) Total cost per coach, built after February '52	1,37,731 (Provisional)

99. The Integral Coach Factory is a modern factory planned for the mass production of coaches equipped with the latest machinery, jigs and fixtures. The wage levels in this factory are not appreciably higher than at Hindustan Air-craft Ltd. Furthermore, there is a saving of approximately 7 tons of steel in the I.C.F. coach. For the above reasons, the Committee understand that the cost of an I.C.F. built coach, when full production is reached, will compare favourably with the present cost of an HAL coach. But the cost of the unfurnished coaches manufactured at Integral Coach Factory will be naturally high in the earlier stages. The cost of the first unfurnished coach produced has been estimated at Rs. 1,80,000 approximately. The cost of furnishing is estimated at Rs. 60,000. It is anticipated that, when the factory is in full production, the cost will come down to about Rs. 1,17,000 per unfurnished coach. This is only a rough estimate and would be subject to variation depending upon cost of material and wages prevalent at the time.

100. The Committee also understand that for the next few years, it is intended to produce unfurnished coach shells suitable for furnishing as III, II and I class coaches. The Railway Board proposes to start work from this year on the design of other types of coaches, such as brake, luggage, vans, postal vans etc.

(c) *Cost of Plant and Machinery:*

101. Machinery and plant necessary for inaugurating production have been received and installed. Of the 608 items of machinery, plant and equipment ordered on global tenders and indigenously, 585 have been received at site. Of the latter number, 285 machines do not require to be installed as they are portable welding sets and equipment. Of the remaining 300 machines received, 229 have been installed and 174 of these are completely ready. The Committee understand that the development of the Integral Coach Factory has been planned to be carried out to achieve the out-turn of 350 unfurnished coaches in the fifth year commencing from October, 1955 and the machinery plant and equipment are being obtained accordingly. The number and cost of additional machinery and plant that will be required for attaining the full target of 350 coaches are as under:

Procurement		Total Cost of machinery to be ordered	
To be ordered to step up production to 350 body shells			
Immediately	Later on, after experience	Immediately	Later on, after experience
228	190	Rs. 31,75,760	Rs. 32,16,050

(d) *Import of components:*

102. The Committee understand that from the 5th year of production, the entire production of 350 coaches is expected to be from I.C.F. manufactured parts except for wheels, axles, springs, and proprietary articles.

103. The coach to be manufactured consists of 1043 components of which 769 are to be manufactured in the I.C.F. from raw materials. The remaining items are components, which will be produced in the finished state and a few in the semi-finished state to be finished in the I.C.F. These include wheels, axles, springs, aluminium extrusions, light alloy castings, steel castings, rubber fittings, vacuum brake equipment etc., which do not constitute economic units for manufacture in the I.C.F. and which will, therefore, be produced from outside sources. 6 casting semi-finished items and 10 finished are being imported at present. Every effort is being made by the Railway Ministry to develop capacity in the country for these items in consultation with the 'Development Wing' of the Commerce and Industry Ministry. Most of the items are either in steel or cast steel.

104. Wheels and axles at present imported are proposed to be obtained from the Tatas in semi-finished condition as also the other imported items. 66 finished components and 11 semi-finished components are being procured through indigenous sources. The Committee understand that the position in regard to supply of wheels and axles and springs indigenously will improve, when the new steel plants go into commission. The Committee recommend that the Railway Ministry should take various and proper steps to see that all the components required for the Integral Coach Factory at Perambur are manufactured indigenously.

D. Miscellaneous

(a) *Replacement of steel by aluminium in coach building:*

105. The Committee understand that so far the Railway Board have agreed to the building of only 50 coaches by M/S Hindustan Aircraft Ltd., Bangalore with body side panel plates in aluminium. No all-aluminium coach has been built, so far. The Board have, however, accepted the offer of M/S Hindustan Aircraft Ltd. to build an all-aluminium Metre Gauge coach on the basis that the extra cost of the aluminium prototype coach over that of the steel body coach of similar design will be borne by M/S Indian Aluminium Co. Ltd.

106. In regard to the cost of coaches already built with aluminium body side panel plates, the matter is under reference with Hindustan Aircraft Ltd., who have not yet finalised their accounts. The Committee were informed that some wagons and coaches with certain fittings made of aluminium had been placed on line recently, but that in regard to durability, it is perhaps too early to express an opinion, as the coaches have not been in service for long.

107. The Committee feel that greater utilisation of aluminium in coach building is desirable subject to technical considerations. The Committee understand that, during the work of the Railway Equipment Committee, it was found that aluminium could be substituted for steel with great advantage, particularly in coach building and on roofs of wagons, where steel plates had to be replaced too frequently (2 to 6 years) due to corrosion. If aluminium were to be used, it might last for 25, 30 or even 40 years with no corrosion. The initial cost might be about two and a half times more than that of steel, but taking into consideration other factors such as life, maintenance and repairs, it might prove to be cheaper in the long run. Moreover, whatever stock of aluminium is available in the country is not being fully utilised at present. In the U.S.A. and other Western countries, the bold use of light alloy metals has resulted in considerable savings being effected in dead weight. The Committee, therefore, suggest that the question of manufacturing some coaches and wagons entirely or partly of aluminium should be given more serious consideration.

(b) *Increase of capacity of the Hindustan Aircraft Ltd.:*

108. The Committee understand that the proposal to step up the capacity of the Hindustan Aircraft Ltd., beyond 180 coaches per annum is still under consideration. The question is whether the Hindustan Aircraft Ltd. will expand the capacity beyond the figure in making ordinary coaches or whether they will make integral coaches. The plans of the Railway Board are that in future, the Integral Coach Factory shall fully go in for the manufacture of integral coaches. In case the Hindustan Aircraft Ltd. make integral coaches, they may go in for the production of 300 or so of such coaches. The Committee suggest that speedy decision should be arrived at in the matter in view of the acute shortage of coaching stock on Indian Railways.

(c) *Establishment of a M.G. Coach Factory*:

109. The Committee understand that full plans regarding the setting up of the M.G. Factory have not yet been drawn up, and that the same would be finalised in about three to four months' time. The factory will be under Indian management, but Government may also take advantage of the existing agreement with Schlierens. The Committee were informed that, if the benefits of the existing agreement could be utilised for the manufacture of M.G. coaches, it would probably be financially advantageous, because Government would not have to pay fresh royalties to someone else. The Committee suggest that the question of utilising the agreement with Schlierens for the Metre Gauge Factory should be carefully examined in consultation with the financial and legal experts. As far as possible, indigenous engineering talent should be made use of in the new venture.

110. The Committee repeat here that the Railway Ministry should aim at self-sufficiency in their requirements of Rolling Stock by the end of the Second Five Year Plan, if not earlier.

(d) *Increase of production capacity by double shift*:

111. During the initial years, numerous teething troubles and production problems would have to be encountered and this initial period will inevitably be taken up by the Indian Engineers, Supervisors and Workers concentrating on acquiring the 'know-how' from the Swiss Engineers and Technicians. The Committee were informed that the question of improving upon the present production target of 350 coaches could not be considered earlier than the year 1959-60. In order that the production may be stepped beyond the planned target of 350 coach shells per year, it would be necessary to undertake a detailed investigation on the following lines:—

(i) Expansion, where necessary, of the shops,

(ii) Introduction of a second shift in the shops, wherever feasible,

(iii) Procurement of additional plant and machinery,

(iv) Advance procurement of raw material both from abroad and from indigenous sources and maintenance of adequate stocks,

(v) Expansion of the Technical Training School facilities with a view to finding the extra skilled personnel—both trade apprentices and supervisors—that may be required for achieving the increased target.

112. The Committee were informed that the earliest date by which the present maximum target of 350 coaches could be stepped up would be only after 1959-60. With the proper planning from now on, it may be possible to increase the out-turn of 350 to 400 coaches in 1960-61, but a definite figure can only be worked out after gaining experience with the building of about 450 coaches and when a stage is reached so that coaches are turned out from Perambur shops completely with indigenous material excepting wheels and axles, springs and proprietary articles.

113. The Committee suggest that the investigations visualised by the Railway Board may be undertaken immediately with a view to attaining self-sufficiency in the coaches as early as possible. It is desirable that the factory should be made to work in two shifts in order to obtain the most economical use of plant and machinery on which heavy expenditure has been incurred. Modern machinery and equipment are so costly that single shift working is uneconomical. Double shift working will reduce the costs to a great extent and will secure more production, which will ultimately reduce the existing chronic over-crowding in the Railways.

(e) *Recruitment of scheduled caste candidates for the Integral Coach Factory.*

114. The percentage of scheduled caste candidates recruited for the I.C.F. is considerably lower than the prescribed quota fixed by the Government except in class IV service in which the number recruited was more than the quota. The Committee were given to understand that this was due to suitable trained candidates not forthcoming. The Railway Ministry have brought the matter to the notice of the Labour Ministry for their assistance. The Railway Ministry have also issued special instructions to the Railway Service Commissions. The Committee hope that with the joint efforts of the two Ministries, the position will improve and that the prescribed quota of scheduled caste candidates will be filled without undue delay.

(f) *Joint Production Committees.*

115. In their Twenty-fourth Report, the Committee have dealt with the question of efficiency of Railway Staff and have suggested the steps needed to improve the same. The Committee recommend that Joint Production Committees consisting of representatives of the management and the workers should be formed in both the Chittaranjan Locomotive Works and the Integral Coach Factory, which should meet at stated intervals and discuss ways and means of improving the quality and quantum of production. The minutes of the meetings of the Production Committees of the two factories should be circulated to each other and should also be seen by the Railway Board, so that useful suggestions emanating from the meetings can be implemented in other Railway Workshops. If the results of the experiment are encouraging, the question of extending the scheme to other Railway Workshops may be considered with advantage.

(g) *Efficient working of the Chittaranjan Locomotive Works and Integral Coach Factory.*

116. The two units have been in existence for relatively short periods. According to the Railway Board, there is not the same need for an expert check from outside, as would be necessary in the case of longstanding institutions, the work of which is likely to drift to routine and non-critical methods. The Committee understand that the Railway Board is having now a scheme of obtaining technical experts from abroad both under the "Aid Programme" and under direct terms and some of these experts will also work as demonstrators and as advisers in regard to the efficiency of organisation and output in the Railway Workshops including the two production units. The Committee welcome the proposed step

and suggest that, as a regular measure, a team of experts drawn from leading manufacturing establishments from within the country as well as from abroad should be asked to go into the working of these two projects as also other major Railway Workshops every quinquennium. Such an impartial study into the working of the important projects will result in useful suggestions to improve the working, both from the point of view of efficiency and economy.

(h) *Special features to be introduced at Perambur.*

117. The Chittaranjan Locomotive Works have the following special features, which the Committee suggest should be introduced at the Integral Coach Factory:

(i) Production Control;

(ii) Proper system of inspection, independent of production wing;

(iii) Scientific system of costing;

(iv) Incentive Bonus Scheme;

(v) Comprehensive Training Scheme; and

(vi) A well laid out township with modern amenities, to meet local requirements.

118. *Staff for the Projects.*—Regarding the question of staff utilisation in such projects, the Committee would like to reiterate their recommendation in para. 24(iii) of their Sixteenth Report that the Officers and staff employed in the nationalised undertakings should be representative of every part of the country. (The Railway Ministry have indicated that it would be difficult to apply this principle to class IV service, as it is unlikely that in class IV service, the two projects under reference would attract people from all over the country).

III GANGA BRIDGE PROJECT

A. History of the Project

119. The proposal to build a bridge over the Ganga at Mokameh was first mooted in the early years of this century, but for one reason or another, construction of the bridge was not taken in hand although the need increased progressively. The partition of the country with the consequent loss of the Hardinge Bridge over the Ganga at Paksey and the construction of the Assam Rail Link had occasioned a major re-orientation of traffic and increased the necessity for the bridge considerably. As observed by the President while laying the foundation-stone of the bridge on the 26th February, 1956, the absence of a direct rail and road link between North and South Bihar was a grave handicap. "Inadequate facilities of transport between these two parts of Bihar have had a deleterious effect on the development of North Bihar. Is it not surprising that it should be easier to transport coal from Dhanbad to Delhi than to northern districts of Bihar on the other side of the Ganga." In 1948 the Government approved of the commencement of the construction of the bridge at Mokameh, and an engineer-in-chief was appointed and considerable preliminary work done. But due to the difficult ways and means position of the Government and other considerations, the construction had to be postponed. Meantime, model experiments were conducted by the Hydraulic Research Station, Poona, both for a bridge at Mokameh as proposed by the Railways and for one at Patna favoured by the Bihar State. To decide the question of site finally, a Committee was appointed in 1952 with Shri M. Visvesvarayya as Chairman and three assessors; they examined the possible sites and recommended the Mokameh site as the most suitable. The whole of this Project lies in the State of Bihar, the south bank of the river being in the Patna district and the north bank in the Monghyr district. The construction of the Bridge will provide a direct rail link between South Bihar and North Bihar and from Calcutta side to North Bengal and Assam.

B. Description of the main works

120. The Project as contemplated will consist of the following main works:—

(a) Construction of the main bridge of 14 spans of 408 ft. each on well foundations and 2 spans of 100 ft. each at either end;

(b) Construction of an armoured guide bund along the left bank;

(c) Closure of the North Channel and construction of the North Approach bank;

(d) Approach lines to the bridge on the South side and junction arrangements with the Eastern Railway;

(e) Approach lines to the bridge on the North side from the new transhipment yard and Barauni Junction and junction arrangements with the North Eastern Railway; and

(f) A modern BG/MG transhipment yard on the north bank.

(a) *Construction of the Main Bridge.*

121. The width of the river at the bridge site is over 10,000 ft. of which about 6,000 ft. will be bridged, and the remaining portion blocked. The bridge will carry a single broad gauge track up to main line loading standard. It will also carry a 24 feet wide roadway on a deck above the railway deck, with 6 feet wide foot-paths on either side. A clear navigation headway of 35 ft. above the mean high flood level for the past 10 years will be provided.

The bridge is situated in a high intensity earthquake area and the design provides G/10 Seismic factor at the deepest scour neglecting the braking action.

Girders are designed mostly in high tensile steel for which orders have been placed abroad.

(b) *Construction of an armoured guide bund.*

122. There will be only one guide bund on the north end of the bridge, 5,000 ft. on the up-stream and 1,000 ft. on the down-stream of the bridge centre line, measured straight; the actual length along the curved heads being about 8,350 ft. The design of the guide bund and the waterway had been tested by the Hydraulic Research Centre, Poona and found to be satisfactory and its findings were corroborated by a retired Director of the Poona Research Station, who was specially invited from the U.K. for the purpose. South bank consists of clay which is known not to have eroded for the last century or so. The approximate quantity of earthwork involved in the Guide bank is 300 lakhs cft. The quantity of pitching stone required in the apron and side slopes is 210 lakhs cft. 200 lakh cft. of standard size and 55 lakhs cft. for undersized pitching stone for ballast, are already in stock.

(c) *Closure of the North Channel and construction of the North Approach Bank.*

123. After the heavy flood in 1948, although the main channel still remained on the south bank, a subsidiary channel formed on the north side. The channel having a winter discharge of 8,000 to 10,000 cusecs will have to be blocked before the North Approach Bank can be constructed.

124. The North Approach Bank will carry at different levels both the railway and the roadway and will also seal off the river on the North of the Guide Bank. The quantity of earth-work in the closure of the North Channel and the construction of the North Approach Bank is estimated at 500 lakh cft. although this will, of course, depend on the actual bed level at the time of cons-

truction. Stone required for dykes in connection with the closing of the North Channel will be several lakhs cft. and pitching for the upstream side slopes of the North Approach Bank will be 7 lakh cft.

The complete Guide Bank and the blocking of the North Channel along with the construction of the North Approach Bank to a safe level will have to be completed in one working season (*i.e.* within about 6 to 8 months).

(d) *South Approach lines to the bridge and junction arrangement.*

125. On the South bank the 'UP' main line of the Eastern Railway will have to be diverted and the approach lines to the bridge from Dumra Railway Station on the East and Tal Railway Station on the West joined up to "fly over" the down main line. The length of the Broad Gauge line is 16·6 miles made up of the following portions:—

From the centre line to Dumra Station to the centre of Barauni	10·4	miles
Tal approaches to the centre of Tal block hut	2·1	,,
Diversion of main line	4·1	,,
	16·6	,,

126. Junction arrangements on the Broad Gauge Section of the Eastern Railway will be required at Dumra, Tal and Mokameh junctions.

127. The items of works will be the construction of the various banks (at which the total quantity of earth-work is estimated at 550 lakhs cft.), the laying of track for the main line and sidings and the construction of quarters for the staff and passenger platforms.

(e) *Approach line to the bridge on the North side from the new transhipment yard and Barauni Junction and junction arrangements with the N.E. Railway.*

128. On the north side the passenger line connection is taken up to Barauni but near Garhara, which has been fixed as the side of the transhipment yard, Broad Gauge goods trains will take a turnout to enter that yard. On the Metre Gauge side a new goods loop (4·4 miles) between Tilrath and the Barauni provides an independent entrance to the new transhipment yard. Junction arrangements will be required at Barauni and Tilrath.

129. The items of works are the construction of the banks (the estimated quantity of earthwork being 50 lakhs cft.) the laying of track for sidings and the new loop quarters for the staff, passenger platforms and sheds.

(f) *Transhipment yard.*

130. As Barauni does not lend itself to much development, the goods transhipment yard has been planned at a suitable site as close to it as possible. The transhipment of passengers will, however, take place at Barauni junction. Near the southern end of

the transhipment yard a new station has been provided for. The main items of work in the transhipment yard will consist of:—

(a) Earthwork for the yard proper, the estimated quantity being 450 lakhs cft.

(b) Construction of offices, transhipment platforms, quarters for the staff, goods sheds, turn table, weighbridge and gentry cranes for heavy load transhipment etc.

(c) Marshalling and sorting yards—18 miles Broad Gauge and 26 miles Metre Gauge lines to be constructed by the Project are to main line standards.

131. The Barauni transhipment yard is expected to be ready by the time the bridge is completed. It has been designed to transhipment the increased volume of traffic which the Bridge will carry. Provision is being made for 350 wagons B.G. to be transhipped daily with room for dealing with 500 wagons per day in the future.

(g) *Earth Work.*

132. As the quantities of overall earthwork in the various items are huge and involve long leads, it has been decided to carry out the earthwork departmentally by the earth moving plant. Progress of earthwork up to the end of January, 1956 is 320 lakhs cubic feet.

(h) *Contract for construction of Main Bridge and other works.*

133. Global tenders were invited for the construction of the Main Bridge and the work has been awarded to Messrs. The Ganga Bridge Construction Company Ltd.

C. Expenditure on the Project

(a) *Estimated expenditure.*

134. According to the abstract estimate, the Project is estimated to cost Rs. 14·62 crores (excluding interest during construction and receipts on capital account) of which the share of expenditure pertaining to the roadway is estimated at Rs. 4·14 crores. The following statement shows the distribution of the proposed outlay over various works to be done:—

(In lakhs of rupees)

(*i*) Preliminary expenses (Surveys etc.)	16·30
(*ii*) Land	52·98
(*iii*) Formation	1,06·70
(*iv*) Bridge work	8,41·89
(*v*) Ballast	11·67
(*vi*) Permanent way	77·15
(*vii*) Stations and Buildings	1,28·93
(*viii*) Misc. expenditure such as fencing, electric telegraphs etc.	5·20
(*ix*) Plant construction	25·00
(*x*) Pay and allowances	1,51·26
(*xi*) Office expenses including Office accommodation	17·00
(*xii*) Residential quarters for construction staff	23·41
(*xiii*) Misc. expenditure such as general charges on stores, drawing and Surgical instruments, recreation facilities for staff etc.	4·51
TOTAL	14,62·00

135. The details of the cost of Curzon Bridge at Allahabad (built in 1905) and the Hardinge Bridge at Paksey, now in East Pakistan (built between 1908 and 1915) are shown in Appendix VIII, alongside the corresponding figures for the new Ganga Bridge at Mokameh for purposes of comparison. It is to be noted that the figures for the Curzon Bridge exclude the cost of plant and general charges and the cost of the road decking which was built by the P.W.D. The Hardinge Bridge, unlike the new Ganga Bridge proposed at Mokameh was purely a rail bridge and not a rail-*cum*-road bridge.

136. Of the estimated cost of Rs. 14:62 crores for the new Ganga Bridge at Mokameh, the road authorities are to bear 4·14 crores. The cost of the Mokameh Bridge also includes about Rs. 1·6 crores on account of a large modern transhipment yard and residential colony for the staff on the north bank. In the case of the other two bridges, there is no such transhipment yard.

(b) *Period of construction*:

137. The whole Project is expected to be completed by March, 1960. The Committee understand that the river training works and the construction of the Bridge proper have already been taken in hand from November, 1955 and that the programme is being implemented in full swing. Up to now the progress of the Project has not been held up due to shortage of steel. All steel for foundation work has been received. As regards girders for which high tensile steel is being imported, the arrangements and programme of shipping have been made to suit the fabricators' schedule and at present it is not apprehended that the progress of the Project will be held up on this account. The Committee also understand that the process of construction of the Bridge would not in any way affect the transhipment and ferrying capacity of the existing traffic as separate arrangements including transhipment and also ferrying across the river of boulders and other material have been made for the Project. Boulders are being obtained from the Jamalpur Hills through four contractors. The overall physical progress as on 31st March, 1956 has been more than 20% and the total expenditure upto the end of 31st March, 1956 is about Rs. 4·5 crores. The Committee are glad to learn from the Railway Board that the work is expected to be completed within the scheduled time.

(c) *Justification*:

138. Owing to the present limited Broad Gauge/Metre Gauge transhipment capacity of Ghat stations, the transhipment of coal, cement, steel, road metal, foodgrains and other goods to North Bihar, North Bengal and Assam is restricted and at certain times involves long delays. For the economic development of these areas, it is essential that the transport of supplies to these areas, and the outward despatch of their agricultural and other produce should be easy and unhampered. The replacement of the ferry service by road-*cum*-rail bridge at Mokameh is designed to achieve these objects.

139. The volume of new traffic as a result of the construction of the Bridge from the South of the river to the North West of Katihar was estimated at 1,60,000 tons distributed as under:

Coal	... ...	1,00,000 tons
All other goods	...	60,000 tons
Total	...	1,60,000 tons

140. The estimate of increase in 'all other goods' works out roughly to one-third of the average annual traffic forwarded from the Eastern Railway to the North-Eastern Railway *via* Mokameh Ghat during the 21 years from 1931-32 to 1951-52.

141. The volume of estimated new traffic from North to South originating from West of Katihar is 50,000 tons and the volume of additional traffic to and from Assam and North Bengal is estimated at 50,000 tons (25,000 tons of general goods traffic in each direction).

142. The above figures of traffic were estimated when the expansion envisaged in the Second Five Year Plan was not known. The Railways are planning for 50% more traffic at the end of the Second Five Year Plan and the traffic across the Ganga Bridge is also bound to increase considerably. In this connection the Committee gather that when the original project report (1947) was prepared the proposal was to carry the double Metre Gauge line from the North Bank to the South Bank. But it was later on decided to have a single Broad Gauge line from the South Bank to the North Bank. The question was again raised in 1954 at the time the abstract estimate came up for sanction, when it was approximately calculated that the cost of a double line bridge will be roughly 1·75 crores more than the single line bridge as is now being constructed. In the present Project, however, this has been changed, after consideration of all factors, into a B.G. Bridge. The Committee were assured by the representative of the Railway Ministry that a single line is adequate even if the present traffic trebles or quadruples itself.

(d) *Financial implications*:

143. The following statement shows the financial implications of the Project:—

	(In lakhs of rupees).	
(*a*) Railway share of the cost of the Project (including receipts on capital accounts)		10,45·00
(*b*) Add interest during construction		79·85
(*c*) Railway share of the cost of the Project including interest during construction (*a*) plus (*b*)		11,24·85
(*d*) Annual contribution to the Depreciation Reserve Fund on item (*a*) above		17·43
(*e*) Railway share of annual repairs and maintenance of the Bridge		6·00
(*f*) Net earnings from the existing traffic to be diverted over the Bridge		11·00
(*g*) Net earnings from the new traffic over the existing system		34·50
(*h*) Annual saving in working expenses		
(*i*) Working expenses of the Ferry	18·45	
(*ii*) Cost of Ghat shifts	3·13	
(*iii*) Interest etc. charges on capital cost of surplus assets	4·60	
(*iv*) Detention to M. G. wagons	3·72	
		29·90
(*i*) Net Income creditable to the Project		
Items (*f*) and (*g*) and (*h*) +	75·40	
less items (*d*) and (*e*)	23·43	
		51·97
(*j*) Percentage return on capital		4·62

D. Miscellaneous.

(a) *The strength of the Staff*:

144. The strength of staff depends on the extent to which works are carried out departmentally or through the agency of contractors. It also varies from time to time according to actual requirements. The contractors employ a large force of technical and unskilled labour in addition to departmental staff.

145. The sanctioned strength of staff for the Ganga Bridge Project and the actual strength as on 1st September, 1955 is given below:—

Category	Sanctioned strength	Actually employed on 1-9-1955
1. Classes I and II	36	31
2. Class III	724	671
3. Class IV	605	538
4. Casual Class III	233*	233
5. Casual Class IV	2,271*	2,271

*NOTE :—Items 4 and 5 are works-charged establishments appointed from time to time according to actual requirements. The figures indicate the numbers so far sanctioned.

146. Appendix IX shows the organisation set-up of the Project.

147. The recruitment of Class III staff has till recently been conducted by the Allahabad Railway Service Commission but recently orders have been issued that the recruitment will now be conducted by a Committee consisting of a Member of the Allahabad Railway Service Commission and an Officer of the Ganga Bridge Project at Dinapore. This should provide full opportunities for the employment of local residents.

148. The Committee are of the opinion that local men, whose lands have been acquired for the Project may be given due consideration at the time of recruitment without in any way sacrificing the question of merit and past experience.

(b) *Settlement of claims of persons*:

149. The claims of persons whose lands have been acquired for the Project are being dealt with by a Special Land Acquisition Officer under the Government of Bihar. The Committee were informed that payment to practically all the parties concerned on the South Bank has been completed in early February, 1956.

150. As regards the North Bank, the Committee understand that the estimates have just been sanctioned by the Bihar Government and the Special Land Acquisition Officer will now be making his awards and payments. The Committee hope that the work will be completed expeditiously.

(c) *Direct Purchases:*

151. The stores for the Project are, at present, being obtained through the Central Purchasing Organisation, in the same way as for the individual Railways. The Stores Purchase Committee have recommended in para. 37 of their Report that major projects may be empowered to make their purchases direct. The Committee understand that the question of giving this facility to the Ganga Bridge Project is under consideration. The Committee suggest that this facility may be afforded to the Project if it is likely to facilitate the progress of the work.

(d) *Spirit of healthy competition:*

152. The Committee suggest that a spirit of healthy competition should be introduced amongst different sections. For instance, the earthwork done by the staff under different supervisors can be compared and an efficiency shield might be given to the team which puts forth the best performance. The feasibility of utilising voluntary labour for expediting the work might also be examined. The Committee also suggest that the General Manager and Chief Engineer should have daily, weekly and monthly charts in his office indicating the physical progress made under different heads and the progress of expenditure incurred.

BALVANTRAY G. MEHTA,
Chairman,
Estimates Committee.

NEW DELHI;
The 3rd May, 1956.

APPENDIX 1

Value of Rolling stock and its components purchased by Class I Railways and Government Railways

(*In thousands of rupees*)

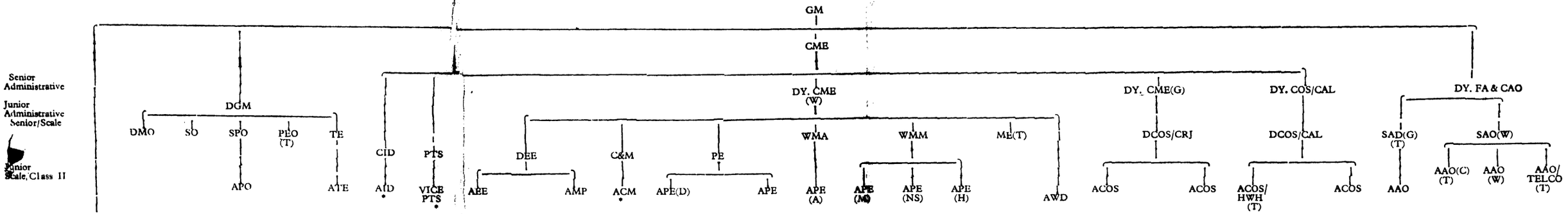
Year	Steam locomotives and their parts and fittings including brake gear but excluding electrical material			Railway carriage and wagon underframes and components including brake rigging but excluding electrical material and train lighting material			Railway carriage and wagonbody components excluding electrical, gas, rubber and textile fittings			Grand Total (4+7+10)
	Stores imported direct (including customs charges)	Imported stores purchased in India	Total (2+3)	Stores imported direct (including customs charges)	Imported stores purchased in India	Total (5+6)	Stores imported direct (including customs charges)	Imported stores purchased in India	Total (8+9)	
1	2	3	4	5	6	7	8	9	10	11
1938-39	72,76	60,38	1,33,14	29,69	43,83	73,52	4,36	25,73	30,09	2,36,75
1939-40	83,98	69,56	1,53,54	17,34	29,99	47,33	3,15	40,46	43,61	2,44,48
1940-41	32,09	74,76	1,06,85	16,99	23,44	40,43	1,54	25,75	27,29	1,74,57
1941-42	22,02	41,71	63,73	7,58	18,38	25,96	2,37	4,11	6,48	96,17
1942-43	7,49	34,18	41,67	2,52	8,62	11,14	1,19	12,39	13,58	66,39
1943-44	16,66	45,79	62,45	5,74	42,54	48,28	23	14,97	15,20	1,25,93
1944-45	2,49,31	4,22,31	6,71,62	2,66	2,30	25,75	3,12	73,49	76,61	7,73,98
1945-46	2,34,11	3,04,88	5,38,99	2,93	2,82,14	2,85,07	39	92,64	93,03	9,17,09
1946-47	—91,86	3,87,46	2,95,60	2,09,99	1,95,49	4,05,48	82	18,57	19,39	7,20,47

1947-48	1,35,75	45,58	1,81,33	50,55	94,80	1,45,35	59	13,00	13,59	3,40,27
1948-49	55,98	5,30,67	5,86,65	13,36	4,53	17,89	2,06	35,87	37,93	6,42,47
1949-50	7,80,23	50,30	8,30,53	72,52	13,88	86,40	81,87	4,38	86,25	10,03,18
1950-51	2,51,47	4,21,67	6,73,14	1,14,02	16,84	1,30,86	21,90	17,03	38,93	8,42,93
1951-52	9,96,25	1,64,07	11,60,32	6,03,24	16,95	6,20,19	95,99	1,16,83	2,12,82	19,93,33
1952-53	4,53,43	5,21,84	9,75,27	2,14,90	14,53	2,29,43	6,61,25	1,37,33	7,98,58	20,03,28
1953-54	3,77,62	6,34,68	10,12,30	86,88	1,50,31	2,37,19	6,83,66	74,33	7,57,99	20,07,48
1954-55	5,64,98	2,92,28	8,57,26	2,18,29	54,98	2,73,27	1,76,28	3,40,63	5,16,91	16,47,44
TOTAL	42,42,27	41,02,12	83,44,39	16,69,20	10,34,34	27,03,54	17,40,77	10,47,51	27,88,28	1,38,36,2

APPENDIX II

ORGANISATION CHART

CHITTARANJAN LOCOMOTIVE WORKS



References :—

G. M.	General Manager.
C.M.E.	Chief Mechanical Engineer.
D.G.M.	Deputy General Manager.
DY. CME (W)	Deputy Chief Mechanical Engineer (Works).
DY. CME (G)	Deputy Chief Mechanical Engineer (General).
DY. COS/CAL	Deputy Controller of Stores—Calcutta.
DY. FA & CAO	Deputy Financial Adviser & Chief Accounts Officer.
D.M.O.	District Medical Officer.
S.O.	Security Officer.
S.P.O.	Senior Personnel Officer.
P.E.O.	Public Relations & Estate Officer.
T.E.	Town Engineer.
D.E.E.	District Electrical Engineer.
P.T.S.	Principal Technical School.
C.I.O.	Chief Inspecting Officer.
C & M	Chemist & Metallurgist.
P.E.	Production Engineer.
W.M.A.	Works Manager Assembly.
W.M.M.	Works Manager Manufacturing.
M.E.	Mechanical Engineer.
D.C.O.S./CRJ	District Controller of Stores—Chittaranjan.
D.C.O.S./CAL	District Controller of Stores—Calcutta.
S.A.O. (G)	Senior Accounts Officer (General).
S.A.O. (W)	Senior Accounts Officer (Works).
A.S.	Assistant Secretary.
A.P.O.	Assistant Personal Officer.
A.T.E.	Assistant Town Engineer.
VICE. PTS	Vice Principal Technical School.
A.I.O.	Assistant Inspecting Officer.
A.C.M.	Assistant Chemist & Metallurgist.
A.M.P.	Assistant Manager Plant.
A.P.E.(D)	Assistant Production Engineer. (Drawing Office & Development).
A.P.E.	Assistant Production Engineer.
A.P.E. (A)	Assistant Production Engineer (Assembly).
A.P.E. (M)	Assistant Production Engineer (Manufacture).
A.P.E. (NS)	Assistant Production Engineer (Night Shift).
A.P.E. (H)	Assistant Production Engineer (Hot).
A.W.O.	Assistant Welfare Officer.
A.C.O.S.	Assistant Controller of Stores.
A.C.O.S. (HWH)	Assistant Controller of Stores (Howrah).
A.A.O.	Assistant Accounts Officer.
A.A.O.(W)	Assistant Accounts Officer (Workshop).
A.A.O./TELCO	Assistant Accounts Officer (TELCO).
A.O.(C).	Accounts Officer (Costing).
A.E.E.	Assistant Electrical Engineer.
(T)—*Temporary Posts.*	*—Post not yet filled or held in abeyance.

N.B. *Leave Reserve.* In addition to the above posts of Assistant Officers, free leave reserve posts in junior scale in the mechanical department and one in the stores were sanctioned recently which have not yet been filled.

APPENDIX III

Statement showing No. and type of locos ordered abroad during 1951-52 to 1954-55 and their cost

Country	No. and type	Cost per loco F.A.S/F.O.B	Estimated landed@ cost (in lakhs of Rs.).
		BROAD GAUGE	
U. K. . .	7 electric general purpose	£ 63,865	10·64
U. K. . .	10 WL	£ 32,327	5·39
U. K. . .	25 WG*	$ 81,470=£ 29,096 approx.	4·85
Germany .	30 Diesels shunting	£ 39,500	3·25
Germany .	100 WG	£ 33,000	5·50 (5·15)c
Italy . .	25 WG	£ 33,000	5·50 (5·14)c
Austria .	60 WG	£ 33,000	5·50 (5·15)c
Japan . .	75 WG	£ 31,500	5·25 (5·74)c
Japan . .	25 WG*	$ 81,470=£ 29,096 approx.	4·85
Belgium . .	80 WG	Bel. Francs. 4,715,600=£ 33,683 approx.	5·61 (5·25)c
U.S.A. . .	50 WG*	$ 178,200=£ 63,643 approx.	10·61
Canada . .	120 WP†	$ 86,935=£ 28,226 approx.	4·70
U. K.	20 Diesel general purpose	£ 31,300	5·22
Germany .	150 YP	£ 20,408	3·40
Japan . .	75 YG	£ 19,100	3·18
Japan . .	12 YM	£ 11,300	1·88
		NARROW GAUGE	
Germany .	10 ZE	£ 18,940	3·16
Germany .	8 Diese	£ 16,500	2·75
Japan . .	5 ZP	$ 53,844 (U. S.) CIF Madras or Calcutta=£ 19,230 approx.	2·77(b)
Japan . .	10 ZE	£ 14,000	2·33

*Under T.C.M.
†Under Colombo Plan

* @Landed cost represents the FAS/FOB cost (converted into rupee at conversion rate of £=Rs. 13 1/3) plus freight, Custom duty and other incidental charges etc. at 25% of FAS/FOB cost. (*b*) C. I. F. cost in rupees plus 8% for customs and other incidental charges of C. I. F. cost (*c*) Based on debits so far received.

APPENDIX IV

Extent of Production in the Chittaranjan Locomotive Works

1. *Locomotive Manufacture*:

In the manufacture of locomotives the conditions in India are different from those in the industrially advanced countries where components for locomotives are readily available from the ancillary industries. In India a locomotive manufacturing workshop has to depend largely on itself for producing a much larger proportion of the components that go to make a locomotive. Chittaranjan Locomotive Works has been designed against this background. To encourage local enterprise in this direction, however, constant endeavours have been made to obtain as many components as possible from the indigenous producers. As a result, it has been possible to procure locally some 769 minor items such as cotters, split pins, rivets, etc. and 474 items of machined bolts and nuts. It has not been possible to establish permanent local sources of supply for any of the major components.

2. *Source of supply of basic material*:

A steam locomotive today is very largely made up of steel. The 'WG' locomotive now under manufacture in C.L.W. contains 102 tons of steel in rolled sections, plates, castings and pipes out of its total weight of 123 tons, and the remaining 21 tons are 15 tons cast iron castings, 3·5 tons non-ferrous castings and 2·5 tons other items. This steel except castings required for locomotive manufacture is procured through the Iron and Steel Controller. With the steel production in the country being about a third of the demand, the Iron and Steel Controller makes arrangements to supply steel by coordinating imports and indigenous production to meet the requirements of different manufacturing and fabricating concerns. In these circumstances, it is a matter of expediency with the Iron and Steel Controller whether the requirements of steel for manufacture of locomotives will be met partly or wholly from indigenous sources or largely from imports. What concerns a processing unit such as C.L.W. is that it is supplied with the basic materials to enable it to manufacture locomotives.

3. *Locomotives components*:

The 'WG' locomotive which is now built in C.L.W. consists of 5,335 different types of components; components of similar nomenclature but different in size and material are counted separately. Thus Asbestos Mattresses and Manganese Liners of identical quality but of differing shapes have been taken as 10 and 14 different components respectively. Similarly, 38 boiler flue tubes and 118 smoke tubes which are identical in size and material, are taken as one component each. It is on this basis that the 'WG locomotive contains, as

has been mentioned before, 5,335 different types of components. These components are sub-divided as follows:—

(a) 14 components, imported at present and essential to locomotive manufacture,

(b) 45 components, imported at present. They are desirable components on a modern locomotive but

(c) 5275 components, indigenously produced either in C.L.W. or by local enterprise.

(a) *Essential Imports*:

The fourteen components comprise of (i) electric lighting equipment, (ii) steel castings, *viz.*, wheel centres front drag casting and crossheads, and (iii) vacuum and pressure gauges etc. There appears to be no reason why (i) electric lighting equipment, and (iii) vacuum and pressure gauges should not be manufactured in this country except perhaps the demand does not justify economic production. These (ii) steel castings are complicated and unlike some others these cannot be fabricated. With the establishment of steel foundries at TELCO and other places, such imports would stop.

(b) *Refinements*:

Certain design features of the locomotives currently being built at C.L.W. are such refinements which are not available in the country at present. These are desirable for use on engines but not inescapably essential. They are roller bearings on carrying axles, fabric liners, magnesium, asbestos, insulation, etc. Some of these items will, in the near future, be available in the country while others will have to await the establishment of suitable ancillary industries. For instance, the development of locomotive roller bearing manufacture by the National Bearing Co. of Jaipur would make the Railway self sufficient in this item while there are as yet no plans for the establishment of industries for producing fabric liners etc. The requirements of fabric liners etc. for Railways use are limited and it would be uneconomical for the Railways to set up a factory for this purpose.

4. *Basic Material Requirements*:

C.L.W. has been equipped with a Pattern Shop Brass and Iron Foundries, Smithy and Forge shops, Machine shops, Boiler and Erecting shops. These shops are designed to process material to be supplied in certain sections and forms and all such materials are the basic materials for C.L.W. Thus pig iron, brass scrap, copper ingots, blooms, billets and rounds are basic material for the Foundries and Smithy and Froge shops; bars and hexagonals for the Machine shops and all plates including boiler plates and other steel sections such as angle rings, channels, tees etc. for the Boiler and Tender shops. Similarly, steel castings, boiler tubes, superheater elements and other pipes are basic material for Machine and Boiler shops as no steel foundry or tube mill have been provided in C.L.W. These basic materials are supplied from smelting plants, steel makers, rolling mills, tube mills and steel founders.

At the present state of the country's development, some of this material has to be imported, for instance, although a certain quantity of rolled steel sections and steel castings is available, it falls far short of the Nation's requirements. There is at present no tube mill and therefore boiler and other tubes required have to be imported. Efforts are, however, being made to produce these items in the country with the establishment of two new steel plants, a tube mill etc., and more steel foundry capacity.

All processing shops have by now fully developed in C.L.W. and given the basic materials, for which C.L.W. is not equipped, C.L.W. today is able to produce 100% of the components for a Locomotive.

APPENDIX V

SYSTEM OF COSTING IN THE CHITTARANJAN LOCOMOTIVE WORKS

Scope of casting

The costing system adopted for the Chittaranjan Locomotive Works is designed to achieve a two-fold purpose:

(a) the costing of a batch of locomotives with a view to finding out the cost per locomotive per batch, and

(b) the costing of individual components, sub-assemblies and assemblies per batch.

Elements of cost

Following the normal pattern, the cost of manufacture of a set of components, sub-assemblies and assemblies for a batch of locomotives is divided into three main elements of cost, *e.g.*

(i) Direct Labour,

(ii) Direct Stores,

(iii) Overheads,

each of which is built up from detailed records.

Direct Labour:

In order to facilitate correct booking of labour, Time Recording Clocks have been installed in all the shops and booking of time on Job Cards, on which the allocation and other particulars of the Job are pre-printed, is done with the aid of these clocks.

Direct Stores:

The materials required are drawn on Stores Requisition Form on which is pre-printed the quantity of the specified stores necessary for a job.

Overheads:

In common with other big factories, Overheads account for a large but variable percentage of the total cost of production in Chittaranjan which in its production utilises costly plant, equipment, etc. The collection and distribution of overheads in Cost Accounts has, therefore, been given special attention.

(a) *Classification*:

In order to ensure proper control, the overheads expenditure has been broken up into four groups:

(1) Factory Overheads,

(2) Administrative Overheads,

(3) Township Overheads, and

(4) Stores Overheads.

Each production shop is treated as a separate unit and separate Overhead rates leviable in each such unit are worked out under the first three categories mentioned above.

(b) *Distribution*:

(i) The items of expenses generally falling under the Factory Overheads are enumerated in the Annexure. The share of the expenditure in the non-production shops allocable to production shops is arrived at on the basis of service rendered *e.g.* the expenditure of Pattern Shop, which is a service shop, is distributed over the Foundries only in proportion to the number of men employed in pattern making for each foundry and is not allocated to other production shops. The expenditure of the Works office is distributed on all the shops—production and service—on the basis of the number of men employed in each shop and thus the share of the works office expenses is first merged with the service shop expenditure before the latter is distributed over the production shops.

(ii) Administrative Overheads represent the expenditure of the various general departments, *viz.*, General Administration, Security, Medical, Electrical and Accounts. A share of the expenditure of the relevant departments is charged to Town Administration, Stores etc. for direct services rendered to them *e.g.* in the case of Accounts Department, which has separate sections dealing with the Stores Department and Township, the expenditure on these sections is included in the Stores Overheads and Township Overheads respectively and only the remnant is kept under the Administrative Overheads. Likewise, a share pertaining to General Administration, Medical and Security Department is transferred to the Township overheads and Stores Overheads on the basis of number of men employed in the Town Engineering Department and the Stores department so that in the Township Overheads and Stores Overheads is reflected a proportionate share of the General Administration relatable to them. The balance constitutes the Administrative Overheads.

(iii) In view of the fact that about half of the total capital cost of the Chittaranjan Project amounting to about Rs. 7 crores was spent in the township, it was thought proper to create a separate Township Overhead rate so that the incidence of township expenditure on the cost of production may be kept under constant review. The Township Overheads include the expenditure of the Town Engineering Department after allowing for expenditure chargeable directly to the General Administration, Stores Department and the Works.

(iv) Stores Overheads consist of the expenditure on the personnel and contingencies etc., of the Stores Department to which is added a proportionate share of the associated departments, such as the Accounts, General Administration, Medical and Security Departments as stated in para. (ii) above.

(c) **Allocation of Overheads**

(i) All Overheads, except Stores, are levied as percentage extensions of direct labour charges in the production shops. In the

first quarter of each calendar year these rates are determined shop-wise on the basis of estimated expenditure of the various departments classified into the different categories of Overheads and the anticipated charges of direct labour in each production shop. The rates so worked out are applied in the following financial years to actual direct labour expended on each job.

(ii) The Stores Overheads, being representative of the stores service rendered, are levied as a percentage on the value of stores issued.

Periodic Reviews of Overheads

As the overheads are levied on jobs at predetermined rates, a monthly review is made of the overheads recovered as against overheads incurred and the rates are revised to confirm to actual expenditure whenever there is a sizeable difference between the two sets of figures.

Mechanisation

(a) In order that the two objectives stated in para 1 above may be attained simultaneously from the same set of documents soon after the jobs are done, the mechanical accounting equipment is made use of, the costing processes have been mechanised with the help of Hollerith machines and to facilitate mechanisation a system of numerals has been adopted which provides for the collection of costs, stage by stage, from a single component to a sub-assembly, thereafter to an assembly, and finally to a batch of Locomotives. Orders for the manufacture of Components, sub-assemblies, assemblies, etc., are released by the Production Officer together with the subsidiary documents *e.g.* Job Cards, Stores Requisitions etc., all of which show the numeral representing the component, sub-assembly ordered.

(b) The transactions on labour and stores documents pertaining to a particular job are reproduced on Hollerith cards from day to day which are, at the end of the month, sorted out with the help of the Hollerith sorter. These cards on which overheads figures are mechanically added are tabulated on the Hollerith Tabulator, the tabulations showing the job number and the expenditure incurred on the job during the month under labour, material and the different categories of overheads. The cost of each component is then transferred to a document on which the expenditure on the component is accumulated from month to month until it is completed. Simultaneously, the costs of all components which go to make up a batch of sub-assemblies, assemblies and locomotives are transferred to separate sets of documents on which the total expenditure pertaining to a particular batch of sub-assemblies, assemblies and locomotives is collected from month to month until the batch is completed.

(c) In order to make certain that no item of expenditure is omitted from Cost Accounts, a regular monthly reconciliation between the Financial Accounts and the Cost Accounts is made and adjustments, if any, are incorporated.

ANNEXURE

Classification of overheads

Factory Overheads 1	*Administrative Overheads* 2	*Township Overheads* 3	*Stores Overheads* 4
1. Wages, overtime etc. of supervisory & clerical staff and indirect labour.	1. Expenditure including pay and allowances of the Chief Mechancial Engineer's Office and Technical School.	1. Expenditure on the maintenance of the township including pay and allowances of the Engineering, Sanitation, Anti-malaria, Horticulture and Water Works Department.	1. Expenditure on personnel and contingencies of the Stores Department.
2. Leave pay and allowance excluding dearness allowance of direct and indirect labour.	2. Share of the expenditure including pay and allowances of the following departments relating to general administration. (*a*) General Management including schools. (*b*) Security Establishment. (*c*) Medical Department. (*d*) Electrical Department. (*e*) Accounts Department. (*f*) Town Engineering Department.	2. Share of the expenditure including pay and allowances of the following departments relating to township : (*a*) General Management including Schools. (*b*) Security Establishment. (*c*) Medical Department. (*d*) Electrical Department. (*e*) Accounts Department.	2. Share of the expenditure of the following departments relating to Stores service :— (*a*) Accounts Department. (*b*) Town Engineering Department. (*c*) General Administration including departments other than Chief Mechanical Engineer's Office and Technical School.
3. Wages for paid holidays, Sundays, Voluntary duty, idle time etc.	3. Electricity supply to General Administrative Offices.	3. Electricity Supply to township.	3. Rent on hired building in Calcutta.
4. Extra overtime wages payable to direct labour under Factories Act.	4. Depreciation on Administrative Buildings and a share of depreciation on water works.	4. Depreciation on township.	4. Depreciation on Stores buildings and equipment.
5. Dearness allowance of indirect workers and supervisory staff.			

6. Injury pay and compensation payable under Workmens' Compensation Act and other compensations.

7. Contribution to Provident Fund.

8. Pay and allowances of workshop staff on deputation for training in the U. K.

9. Other miscellaneous labour charges not allocable to jobs.

10. Repairs to machinery, plant, furniture, etc

11. Repairs and maintenance of workshop buildings.

12. Repair and working expenses of motor cars, shunting engines, cranes, etc.

13. Operation of machinery and power charges.

14. Cost of coke, coal, consumable stores etc.

15. Cost of small tools jigs and fixtures, patterns, stationery, uniforms etc.

16. Replacements, experimental and defective works.

17. Fire Protection.

18. Maintenance of canteens, meal sheds, etc.

19. Cost of minor works not chargeable to Capital.

20. The expenditure of service departments *e.g.*,
    (*a*) Pattern Shop.
    (*b*) Tool Room.
    (*c*) Mill wright Shop.

1	2	3	4
(*d*) Transport & Yard.			
(*e*) Electric Branch Shop.			
(*f*) Inspection.			
(*g*) Laboratory.			
(*h*) Dy. C.M.E.'s Office.			
21. Depreciation of workshop machinery and buildings, Works Office building and a share of the depreciation on water works.			

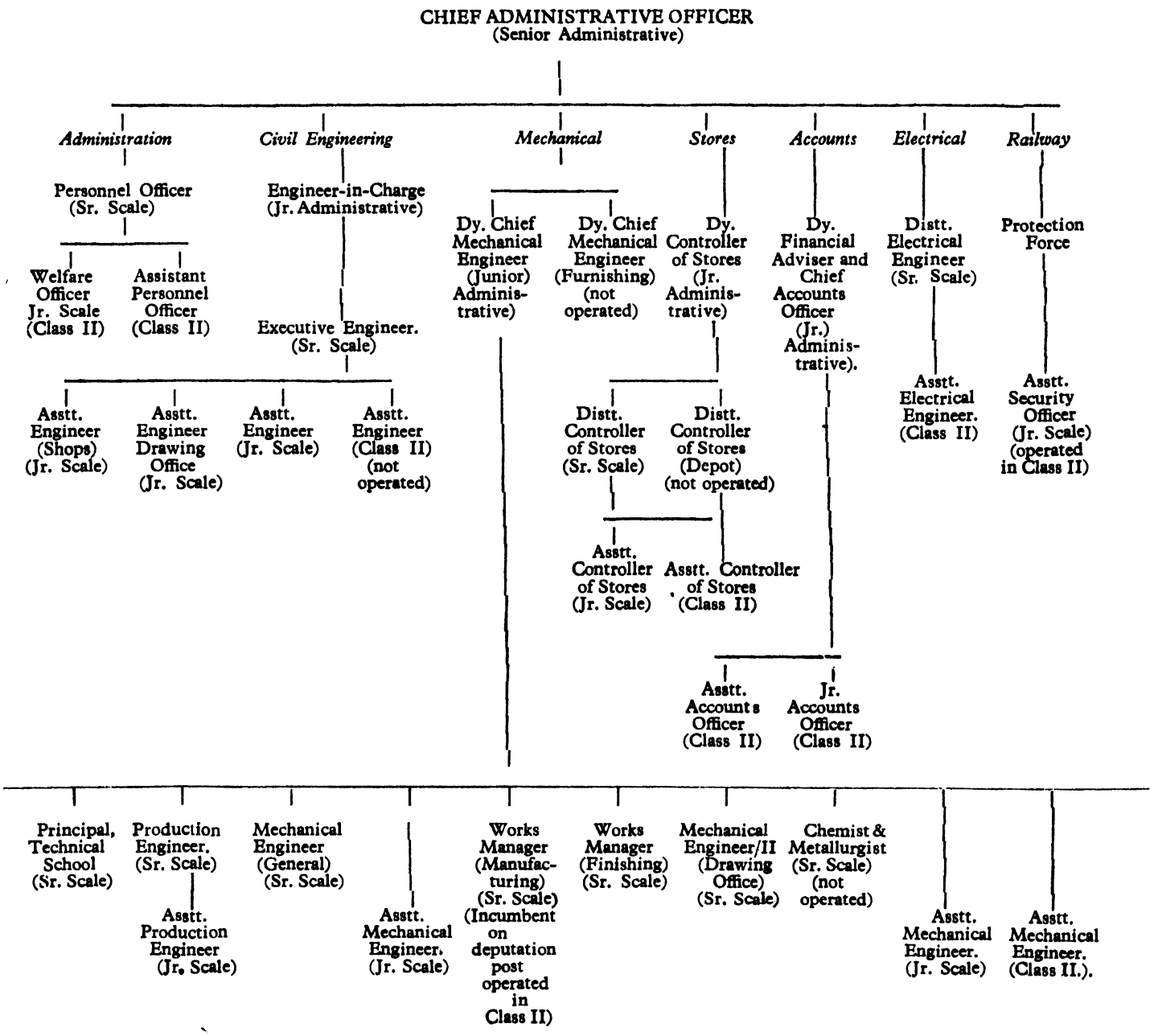
APPENDIX VI

Comparison of Indian Standard Locomotives for production purposes in terms of the standard (Average size Unit), HGC, BESA Locomotive

Class of Locos	Weight of empty Loco WE	Surface area index (WE) 2/3	Work load in proportion to standard loco = 1	No. of locos equivalent to standard loco outturn at 120
HGC	89·85	20·05	1·000	120
YP	68·15	16·68	·8319	144
YL	45·57	12·76	·6364	189
YM	40·99	11·89	·5930	203
YG	69·53	16·90	·8428	142
YHG	105·00	22·26	1·1102	108
YS	68·29	16·70	·8329	144
YB	61·91	15·65	·7805	154
HPS	98·05	21·26	1·0603	113
WP	123·61	24·81	1·287	97
WL	113·50	23·44	1·1690	103
WU	50·35	13·63	·6798	177
WM	73·05	17·48	·8718	138
WT	92·00	20·38	1·0164	11
WG	123·55	24·80	1·237	97
WHG	185·80	32·56	1·6239	74
WW	50·50	13·67	·6817	176
WS	113·60	23·46	1·1700	103

APPENDIX VII

Organisation Chart showing the position of Gazetted Establishment in the Integral Coach Factory (Perambur)



APPENDIX VIII

Estimated cost of the proposed Rail-Cum-Road Bridge over the Ganga at Hathidah near Mokameh as compared with the cost of the Hardinge Bridge and Curzon Bridge

(Figures in thousands of rupees)

	Hathidah (14×397′, 4×104—75′)	Hardinge (15×359′, 3×75′)	Curzon (15×200′)
Date of opening	..	1915	1905
Cost of Bridge proper.			
1. Foundation	2,69,21	1,29,86	18,59
2. Superstructure	2,86,59	71,82	8,99
3. Protection works	2,69,92	45,68	5,73
Total	8,25,72	2,47,36	33,31
Other Items			
4. Road approach viaduct etc.	9,68	No Roadway provided.	Not available, done by P.W.D.
5. Minor Bridges	6,51	1,53	..
6. Preliminary expenses	16,30	82	(included in col. 1)
7. Land	52,98	9,49	Free
8. Formation	1,06,70	29,93	..
9. Fencing etc.	5,20	2,04	..
10. Ballast and P. Way	88,82	17,11	1,00 (P. Way) (No Ballast).
11. Station and Buildings	1,28,93	3,39	..
12. Plant	25,00	12,06	..
13. General charges	1,96,18	32,86	(included in Colum 1, 2 and 3).
Total	6,36,30	1,09,23	100
Grand Total	14,62,02	3,56,59	34,31
Length of Bridge	6,074 ft.	5,894 ft.	3,200 ft.
Depth of foundation below water level	160·00 ft. to 170·00 ft.	148·21 ft. to 159·24 ft.	Average 106·18 ft.
Height from low water level to underside of girders.	64 ft.	71 ft.	55·72 ft.
Total weight of girders	12,850 tons	18,750 tons	4,962 tons

Name of bridge	Gauge	No. and length of clear spans (feet)	Length of bridge (feet)	Depth of foundation below water level (feet)	Height from low water level to underside of girder (feet)	Total weight of girders (tons)	Cost (lakhs)
Curzon Bridge, Allahabad.	B.G.	15 × 200	3,200	Average 106·18	55·72	4,962	*33
Hardinge Bridge .	B.G. double line	15 × 359 3 × 75	5,894	148·21 to 159·24	71	18,750	357
Hathidah Bridge (rail-cum-road bridge, roadway on top).	B.G. single line.	14 × 397 4 × 104·75	6,074	160·00 to 170·00	64	12,850	14,62

*Represents cost of foundation, girders and protection works.

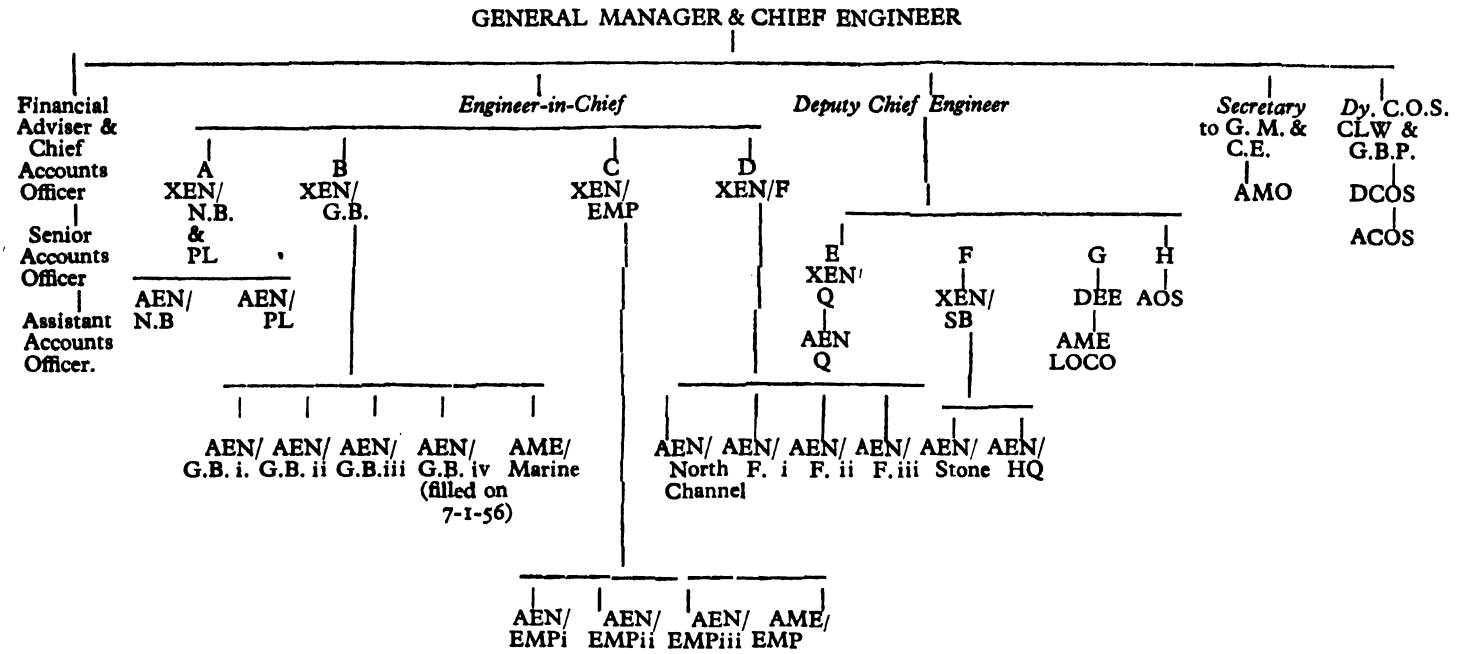
NOTE :—The present day rates for labour and materials are nearly 4 to 5 times the rates prevailing in the years 1910-1914 when the actual construction of the Hardinge Bridge was in progress. While data are not available regarding rates prevailing at the time of the construction of the Curzon Bridge in 1905 it is believed that the rates were still lower than the period 1910-1914

APPENDIX IX

ORGANISATION CHART

Ganga Bridge Project

(*a*) OFFICERS



(*b*) CLASS III STAFF

1	2	3	4	5							6	7
G.M. & C.E. Including *ENG. & Dy. C.E.* Office Staff 85; Inspector of Works 11; Out Door Staff 6	*F.A. & CAO* Office Staff 78	*Deputy Controller of Stores* Office Staff 3; Depot Staff 43	*Distt. Electrical Engineer* Office Staff 25	*Executive Engineer*	*A*	*B*	*C*	*D*	*E*	*F*	*A.M.O.* Doctors 5; Office Staff 4; Compounders & Sanitary Inspectors 8	*A.O.S.* Office Staff 3
				Office Staff	19	22	23	22	23	28		
				Inspectors & Assistant Inspectors.	6	14	1	17	4	11		

Abbreviations :

Dy. C.O.S.	Deputy Controller of Stores.	D.C.O.S.	District Controller of Stores.
XEN	Executive Engineer	A.C.O.S.	Assistant Controller of Stores.
AEN	Assistant Engineer	A.M.O.	Assistant Medical Officer.
D.E.E.	District Electrical Engineer.	A.O.S.	Assistant Operating Superintendent.
AME	Assistant Mechanical Engineer	HQ	Head Quarter.
N.B.	North Bank	PL	Planning.
G.B.	Guide Bank		
E.M.P.	Earth Moving Plant		
F.	Foundation.		
Q.	Quarry.		
S.B.	South Bank		

APPENDIX X

Statement showing the Conclusions/Recommendations of the Estimates Committee on the Ministry of Railways—Important Projects

Serial No.	Reference to Para. of the Report	Summary of Conclusions/Recommendations
1	2	3
		I *Chittaranajan Locomotive Works*
1	1	The Indian Railways have all along been dependent on imports for meeting their requirements of coaches, wagons, locomotives and their components and during the 17 years period from 1938-39 to 1954-55 they had to spend Rs. 138 crores for importing these basic requirements.
2	22	The Committee are favourably impressed with the facilities afforded to the workers at Chittaranjan. In order to raise the standard of living of the people, the Government have accepted the policy of rapid industrialisation. Care will, however, have to be taken to see that in the enthusiasm to build up large scale industry rapidly, the factor of labour exploitation, usually associated with rapid large-scale industrialisation does not creep in. The old patterns of unhygienic and insanitary conditions of living for the workers and the slum areas must not be repeated. The Committee, therefore, recommend that the living conditions and amenities provided at Chittaranjan should be accepted as the basic minimum for workers in all the Government enterprises in future.
3	26	Against the target of 268 locomotives to be turned out during the First Five Year Plan period, 341 have been turned out. Since July, 1955 Chittaranjan has been turning out 11 locomotives per month against the original target of 10 per month (120 locomotives per year), thus exceeding the target. The Railway Ministry have subsequently intimated that the C.L.W. is turning out 12 locomotives per month now.
4	29	The Committee understand that a tentative target date 1958, has been fixed for achieving the enhanced target. In view of the shortage of locomotives and the necessity of reducing the imports from abroad, the Committee would suggest that the Railway Board should seriously consider the feasibility of bringing forward the tentative date by at least one year.

1	2	3
5	30—31	The Committee were informed that the manufacture of W.P. locomotives at Chittaranjan will be considered in due course, when requirements of W.G. locomotives have been met in a large measure. The Committee feel that it would be advisable to make a small beginning in the manufacture of W.P. locomotives also simultaneously and suggest that a suitable target for W.P. locomotives may be set up at an early date.
6	33	The cost of production per locomotive under various heads has fluctuated widely and the same under the heads "Direct Stores" and "Stores Heads—Labour" has increased in 1954-55 when compared to 1952-53. The reasons for this fluctuation and particularly the increase under the two heads should be analysed and remedial action taken, as necessary.
7	36	Considering the fact that the Locomotive Works have been in existence for only a few years, the Committee note with satisfaction that the cost of the indigenous locomotives does not compare unfavourably with that of the imported ones. The Committee, however, hope that with greater experience in the technique of production and more rigorous control, the cost would be reduced further. With the increased target of annual production of 300, efforts should be made to reduce the cost of production (exclusive of interest charges on capital-at-charge) to bring it to the level of the estimated landed cost of U.K. and Japanese W.G. locomotives under the T.C.M. Programme. If this is achieved, it would result in an approximate annual saving of Rs. 1,41,00,000 on the basis of the average actual cost of a Chittaranjan Locomotive produced during 1954-55.
8	37	The Committee consider that the percentage of the cost of imported stores to the cost of direct stores consumed in the manufacture of a locomotive is on the high side and suggest that special efforts should be made to reduce it substantially.
9	38	The Committee suggest that the question of setting up subsidiary industries in the private sector for the manufacture of such of the parts as are not manufactured in the Chittaranjan Locomotive Works should be given prompt attention.
10	40—41	The Committee recommend that the Railway Ministry should make special efforts to set up indigenous industry for the supply of components that are at present being imported from abroad. Private industrialists or artisans

1	2	3
		should be given special encouragement for this purpose. The Committee hope that by the end of the Second Five Year Plan, Chittaranjan will be able to manufacture hundred per cent Swadeshi locomotives.
11	44	The Committee are glad to note that a scientific system of costing has been introduced at the Locomotive Works. The Committee reiterate their recommendation made in para 131 of their Twenty-first Report that the officers from the Indian Railways should be sent to Chittaranjan for a short period to receive intensive training in this subject and that a cost accounting unit should be set up in each major workshop of the Indian Railways. The system should be copied by other State enterprises also, with such modifications as are absolutely necessary.
12	53	The Committee refer to their recommendation made in para 129 of their Twenty-first Report that each Railway should evolve the system of piece-work rating and bonuses in its major workshops. The Committee suggest that advantage should be taken of the experience gained at Chittaranjan in this direction. The officers, who are deputed for the study of costing system at the Locomotive Works may also be asked to study the incentive bonus scheme in operation there. The system should be introduced in other state enterprises also, with such modifications as are absolutely necessary.
13	55	The Committee appreciate the training scheme introduced at Chittaranjan. In this connection, the Committee refer to para 69 of their Twenty-fourth Report, in which they have recommended that basic training centres should be organised on each Railway. The experience gained in the Technical School at Chittaranjan would be considerably useful for this purpose.
14	56	The Committee understand that the cost of an imported W.G. locomotive from the U.S.A. obtained under the T.C.M. Programme is Rs. 10·61 lakhs *i.e.* nearly double of that imported from other countries. The Committee were given to understand that one of the reasons for this was that the cost of production of steam locomotives in the U.S.A. was higher than in any other country. The Railway Ministry, however, pay to the general revenues the price at the usual world market rates. The Committee appreciate that under the T.C.M. Aid Programme, the Railway might not have any voice regarding the cost of the locomotives,

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		but the Committee suggest that the price at which the U.S. locomotives were being given the other countries (a) under similar aid programmes to those countries, and (b) through normal trade channels, may be ascertained and compared with the rate at which the locomotives were supplied to India in the corresponding periods.
15	60	The Committee understand that the suppliers of Hollerith accounting equipment, as a rule, refuse to sell their machines. The hire charges, however, include repairs and maintenance. The Committee also understand that the Hollerith machines are not manufactured in India. The Committee see no justification for the continued hire of these machines and suggest that they should be purchased outright. In case, the firm is not in a position to sell the machines to Government, the Committee suggest that the Railway Ministry should invite global tenders, so that other manufacturers will be forthcoming for the sale of similar accounting equipment manufactured by them. The Committee feel that the Government should not be at the mercy of any monopolistic firm.
16	62	The Committee hope that the proposal to set up a steel foundary at Chittaranjan which will assist in reducing the import of steel castings will be finalised without undue delay.
17	63	In order to keep locomotive production at the maximum during the developmental period, the overall production of Chittaranjan Locomotive Works has been related to the performance of the best shop. To achieve this objective, the output of other shops has been balanced by procuring the components in short production from indigenous sources as well as from abroad. While such a course of action might be unavoidable in the initial stages, the Committee feel that early steps should be taken to balance production in different shops by providing extra equipment and introducing double shifts wherever necessary. Dependence on imported components should be eliminated as early as possible.
18	64	The Committee suggest that the question of manufacturing electrical locomotives in India should be pursued vigorously so that their manufacture may commence in the country without undue delay.
19	68	The Committee may be apprised of the findings of the Tariff Commission who have been asked to enquire into the cost of the locomotives produced by TELCO and the orders of Government thereon in due course.

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20	69	If satisfactory arrangements for a steady manufacture of M. G. Locomotives at a reasonable price cannot be arrived at with the TELCO, the Committee suggest that the question of suitably expanding the Railway Workshop at Ajmer to undertake the manufacture of M. G. Locomotives should be carefully reviewed by the Railway Ministry.
21	72-73	The Committee understand that the fortnightly bulletin 'Chittaranjan' is not self-supporting. While the Committee appreciate that the bulletin is treated as a measure designed to promote enthusiasm and sense of pride amongst the staff, the Committee recommend that steps should be taken to make it self-supporting.
		II *Integral Coach Factory, Perambur.*
22	84	The Committee recommend that the training facilities to be provided at the Integral Coach Factory should be of the same standard as at Chittaranjan. Apprentices from other Railways might also be sent for training at Perambur and Chittaranjan for short periods.
23	85	As the total number of workers to be employed at the Integral Coach Factory would be of the order of 4,000, the provision of only 400 staff quarters in the township appears to be inadequate. The Committee, therefore, recommend that the feasibility of suitably expanding the township should be examined by the Railway Ministry. They also recommend that the standard of amenities to be provided in the township should be the same as at Chittaranjan.
24	93	The Committee would like the Railway Ministry to keep a very close watch over the progress of the training of the Indian Officers posted in the Integral Coach Factory with a view to avoiding the possibility of extendig the Agreement with Schlieren beyond 1961. The Railway Ministry should arrange to depute staff from the Railways to the factory periodically so that the technique is properly understood and widely known.
25(*a*)	95	The Committee recommend that the question of deputing more men of the Hindustan Aircraft Ltd. for selected periods in the Factory may be discussed with the appropriate authorities, so that more and more qualified Indians get to know the technique.
25(*b*)	96	As a matter of fact, the Committee would like the Railway Ministry to think about their requirements for the Third Plan and take steps to see that a nucleus of trained men

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		is available in time for building adequate number of coaches and locomotives during the Third Plan period. The import of Rolling Stock should be put a stop to by the end of the Second Plan period, if not earlier.
26	104	The Committee recommend that the Railway Ministry should take vigorous steps to see that all the components required for the Integral Factory are manufactured within the country.
27	107	The Committee feel that greater utilisation of aluminium in coach building is desirable subject to technical considerations. The Committee understand that, during the work of the Railway Equipment Committee, it was found that aluminium could be substituted for steel with great advantage, particularly in coach building and on roofs of wagons, where steel plates had to be replaced too frequently due to corrosion. If aluminium were to be used, it might last for 25, 30 or even 40 years with no corrosion. The initial cost might be about two and half times more than that of steel, but taking into consideration other factors such as life, maintenance and repairs, it might prove to be cheaper in the long run. Moreover, whatever stock of aluminium is available in the country is not being fully utilised at present. In the U.S.A. and other Western countries, the bold use of light alloy metals has resulted in considerable saving being effected in dead weight. The Committee, therefore, suggest that the question of manufacturing some coaches and wagons entirely or partly of aluminium should be given more serious consideration.
28	108	In view of the acute shortage of coaching stock on Indian Railways, the Committee suggest that a speedy decision should be arrived at in the proposal to step up the capacity of the Hindustan Aircraft Ltd., beyond 180 coaches per annum.
29	109	The Committee suggest that the question of utilising the agreement with Schlierens for the proposed Metre Gauge factory should be carefully examined in consultation with the financial and legal experts. As far as possible, indigenous engineering talent should be made use of in the new venture.
30	110	The Committee repeat that the Railway Ministry should aim at self-sufficiency in their requirements of Rolling Stock by the end of the Second Five Year Plan, if not earlier.

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31	111—113	The Committee suggest that the investigations visualised by the Railway Board for stepping up the production in the Factory beyond the planned target of 350 coach shells per year may be undertaken immediately with a view to attaining self-sufficiency in the coaches as early as possible. It is desirable that the Factory should be made to work in two shifts in order to obtain the most economical use of plant and machinery on which heavy expenditure has been incurred. Modern machinery and equipment are so costly that single shift working is uneconomical. Double shift working will reduce the cost to a great extent and will secure more production which will ultimately reduce the existing chronic overcrowding in the Railways.
32	114	Except in class IV the percentage of Scheduled Caste candidates recruited for the I. C. F. is considerably lower than the prescribed quota fixed by the Government due to the non-availability of suitable candidates. The Railway Ministry have brought the matter to the notice of the Labour Ministry for their assistance. The Railway Ministry have also issued special instructions to the Railway service commissions. The Committee hope that with the joint efforts of the two Ministries, the position will improve and that the prescribed quota of Scheduled Caste candidates will be filled without undue delay.
33	115	The Committee recommend that the Joint Production Committees consisting of representatives of the management and the workers should be formed in both the C. L. W. and the I. C. F. which should meet at stated intervals and discuss ways and means of improving the quality and quantum of production. The minutes of the meetings of the Production Committees of the two factories should be circulated to each other and should also be seen by the Railway Board, so that useful suggestions emanating from the meetings can be implemented in other Railway workshops. If the results of the experiment are encouraging, the question of extending the scheme to other Railway workshops may be considered with advantage.
34	116	The Committee welcome the proposal to obtain technical experts from abroad both under the "Aid Programmes" and under direct terms, some of whom will also be used as demonstrators and as advisers in regard to the efficiency of organisation and output in the Railway workshops including the two production units. The Committee, however, suggest that, as a regular measure, a team of experts drawn from leading manufacturing establishments from within the country as well as from abroad

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		should be asked to go into the working of the Chittaranjan Locomotive Works and the Integral Coach Factory, as also other major workshops every quinquennium. Such an impartial study into the working of the important projects will result in useful suggestions to improve the working, both from the point of view of efficiency and economy.
35	117	The Chittaranjan Locomotive Works have the following special features, which the Committee suggest should be introduced at the Integral Coach Factory:— (*i*) Production Control; (*ii*) Proper system of Inspection independent of production wing; (*iii*) Scientific system of costing; (*iv*) Incentive Bonus Scheme; (*v*) Comprehensive Training Scheme; and (*vi*) A well-laid out township with modern amenities, to meet local requirements.
36	118	The Committee would like to reiterate their recommendation in para 24 (*iii*) of their Sixteenth Report that the officers and staff employed in the Nationalised undertakings should be representative of every part of the country. The Railway Ministry have indicated that it would be difficult to apply this principle in class IV service.
		III. *Ganga Bridge Project*
37	137	The overall physical progress as on 31-3-1956 has been more than 20% and the total expenditure upto the end of 31-3-1956 is about Rs. 4·5 crores. The Committee are glad to learn from the Railway Board that the work is expected to be completed within the scheduled time, *i.e.* March, 1960.
38	148	The Committee are of the opinion that local men, whose lands have been acquired for the Project may be given due consideration at the time of recruitment without in any way sacrificing the question of merit and past experience.
39	150	The Committee hope that the work of award and payment of claims of persons whose land has been acquired on the North Bank of the Project will be completed expeditiously.
40	151	The Committee understand that the question of giving facility for making direct purchases (to the Ganga Bridge Project) is under consideration. The Committee suggest that this facility may be afforded to the Project if it is likely to facilitate the progress of the work.

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41	152	The Committee suggest that a spirit of healthy competition should be introducd amongst different sections. The earth work done by the staff under different supervisors can be compared and an efficiency shield might be given to the team which puts forth the best performance. The feasibility of utilising voluntary labour for expediting the work might also be examined. The Committee further suggest that the General Manager and Chief Engineer should have daily, weekly and monthly charts in his office indicating the physical progress made under different heads and the progress of expenditure incurred.

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