THE ARGENTINE REPUBLIC

REPORT
OF
THE FEASIBILITY STUDY AND THE PRELIMINARY DESIGN
FOR
THE AMPLIFICATION OF AN INSPECTION AND REPAIRING WORKSHOP FOR ELECTRIC ROLLING STOCK

II

(PRELIMINARY DESIGN)

SEPTEMBER 1986

JAPAN INTERNATIONAL COOPERATION AGENCY
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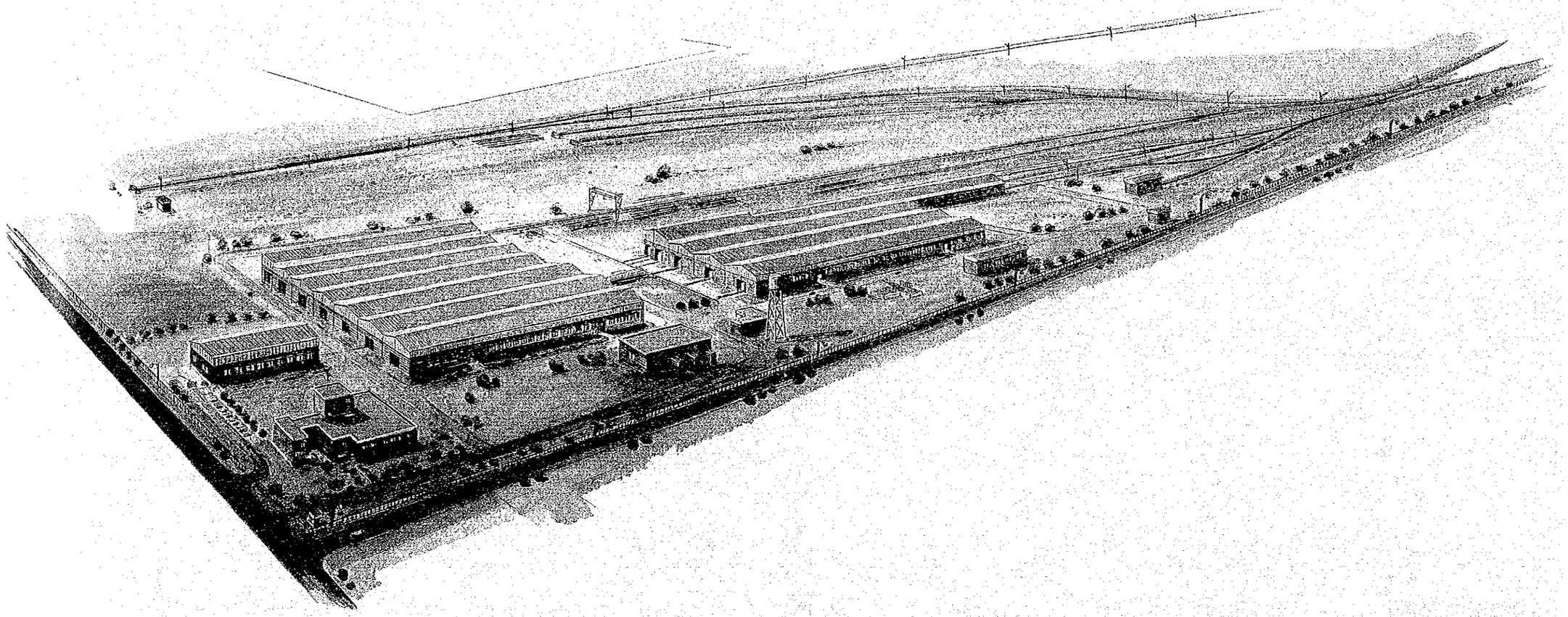

BIRD'S-EYE VIEW OF KM-10 WORKSHOP

SUMMARY OF THE STUDY

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The purpose of this study is to determine the site for the Inspection/Repairing Workshop for electric railcars to be put into service following the 2nd Step electrification (Plaza Constitución - La Plata) of the General Roca Line, and the facilities to be installed to meet the operation requirements.

First, traffic demand forecasting for the year 2000 was carried out for the region where the electrification is planned. A railway transportation plan was drawn up based on the forecast and the number of electric railcars required to meet this traffic demand was calculated. The number of electric railcars thus obtained determined the scale of the workshop. To be specific, it was decided that the KM 10 Workshop (156 cars assigned) planned for the 1st Step electrification should be amplified to cope with the number of electric railcars required for the 2nd Step electrification. In drawing up the amplification plan, four proposals were chosen. Technical and financial studies for them were then carried out, and finally, the optimum plan was chosen.

The decision for the optimum plan was made after full discussion with counterpart personnel of the Argentine Railways in November - December, 1985, on which occasion, the Interim Report was submitted. Then the preliminary design was worked out to carry this optimum plan into action.

The following is a summary of the respective items.

1. Preconditions

This study was carried out on the basis of the following preconditions which were discussed with the Argentine Railways and decided at the time this study was begun.

(1) It is difficult at this time to specify the timing of the 2nd Step electrification to La Plata. It is, however, presumed that it will have been carried out by the year 2000, and thus, passenger volume is

forecasted for this point in time. Based on these results, the amount of electric railcars required for electrification to La Plata should be calculated and the scale of the workshop should be so decided.

(2) The workshop required to meet the 1st Step Electrification is assumed to have already been constructed and operating at a site 10 KM from P. Constitución on a scale capable of handling the 156 railcars assigned.

(3) The inspection and repair system should be studied and the workshop layout made assuming that the electric railcars introduced for the 2nd Step Electrification are to have basically the same specifications as those introduced for the 1st Step Electrification.

2. Total Number of Electric Railcars Needed for the 2nd Step Electrification

It is necessary to know the total number of electric railcars in order to decide the scale of the workshop for the 2nd Step Electrification, and for this, the following procedures were taken.

(1) The population in the southeastern suburban area of Buenos Aires in the year 2000, which will be served by the 1st Step and the 2nd Step Electrifications, was estimated and the trip generation/attraction was obtained.

(2) The traffic volume per day and that per hour during the rush hours were calculated for each route on the General Roca Line. In this connection, the Plaza Constitución - Avellaneda section with the largest traffic had a traffic volume of 204,500 persons per day and a rush hour volume of 23,100 persons per hour.

(3) The transportation plan was drawn up based on the traffic demand forecast and it was found that 28 trains would be needed. These trains, in principle, are composed of six-car formations but there are some nine-car and three-car formations.

(4) As a result of this transportation plan, the total number of cars was set at 315, that is, 273 cars for daily operation, 15 cars for extra operation, and 27 cars to cover inspection/repairing.

3. Workshop Construction Plan in Accordance with the 2nd Step Electrification

Based on the number of electric railcars calculated in the preceding paragraphs, 54 sorts of amplification plans were studied according to the process shown in the following paragraphs, and four proposals were selected from among them.

(1) The number of railcars required for the 1st and 2nd Step Electrification was calculated to be 315 cars as already mentioned. Since this number is practically the same as the 318 cars estimated by the Argentine Railways before, the number 318 will be used hereafter.

(2) As the construction of the KM 10 Workshop (156 cars assigned) is scheduled to cope with the 1st Step Electrification, the scale of this workshop will be amplified to handle 318 assigned cars for the 2nd Step Electrification.

(3) In drawing up the amplification plan, first, the following three processes for Overall Inspections were set up.

Process A: This is basically the same process as planned for the 1st Step KM 10 Workshop.

Process B: Entrance inspections by three-car unit is omitted from Process A, shortening the bogie disassembling and washing process by half a day to eliminate the waiting time for bogie washing.

Process C: In Process B, a bogie washing machine was used for washing wheels and axles as well, but in Process C, a wheels and axles washing machine is newly installed to eliminate the waiting time for wheels and axles washing.

(4) Intervals between shop-ins for Overall Inspections and Intermediary Inspections were set at nine days, respectively, according to the inspection periodicity, the number of assigned cars, and the annual number of working days. The difference between Overall Inspection and Intermediary Inspection shop-in dates can be seen in nine ways, -3, -2, -1, 0, 1, 2, 3, 4, and 5. The figure -3, for instance, means that shop-in for Intermediary Inspections will occur three days earlier than that for Overall Inspections. Two proposals were drawn up regarding the direction in which No. 1 Workshop is to be extended.

Therefore, altogether there are 54 (i.e., 3 9 2) different proposals.

(5) In consideration of the capacity of each shop and the fluctuations of work amount, four proposals were chosen, Proposal Ia (A + 2), Proposal Ib (A + 2), Proposal II (C + 2), and Proposal III (C - 1).

(6) The shop layout was studied in relation to these proposals.

4. Selection of the Optimum Plan for the Workshop Amplification

The optimum plan was chosen from among the four proposals after making a technical study first and then a financial study.

(1) The technical study included studies of the load of machines in each shop and space usage conditions. As a result, it was found that the crane operating frequency and bogie disassembling/assembling frequency in the bogie shop in Proposal Ia and Proposal Ib were too high with not much extra handling capacity, making it difficult to maintain the standard Process in case some disorder should arise in the process. Therefore, Proposal II and Proposal III were chosen from the four proposals.

(2) Next, a financial study was made of these two proposals.

(3) Finally, as a result of a general evaluation, Proposal II was selected as the optimum for the workshop amplification plan because of its technical and financial superiority.

(4) The results of the feasibility study (Interim Report) were reported to the Argentine Railways in November - December 1985, and as a result of discussions between the two parties on that occasion, the adoption of Proposal II was decided.

5. Preliminary Design

Based on the results of the above-mentioned feasibility study, the preliminary design was made to give shape to the workshop amplification plan.

(1) In preparing the preliminary design, the relevant preconditions were first discussed and decided with the Argentine Railways counterparts.

(2) Next, based on these preconditions the layout of the workshop as a whole and of individual shops within it were arranged and the inspection and repair machinery to be added was decided.

(3) Furthermore, a study was made of tracks, catenary, buildings and their incidental facilities and equipments based on the preceding paragraphs.

(4) Finally, a study was made of the work process for the execution of amplification work and construction costs, etc.

The preliminary design and drawings were each compiled as separate volumes besides the volume on the feasibility study.

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CHAPTER 1 OBJECTIVE OF THE STUDY

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In November 1985 the General Roca Line inaugurated transportation services by electric railcar train in the sections Plaza Constitución - Temperley, Temperley - Ezeiza, and Temperley - Glew. For these transportation services, 156 A.C. electric railcars were put to use and they are playing an active part in it.

As the next step, the electrification of the P. Constitución - La Plata section, the so called 2nd Step Electrification, is planned and in that stage the number of the electric railcars will be doubled.

"What should be done to enable the Inspection/Repairing of these electric railcars" has been studied in the Feasibility Study of this Report. Namely, a study was made of how the functions of the KM 10 Electric Railcar Workshop in accordance with the 1st Step Electrification should be amplified to cope with the 2nd Step Electrification, being planned by the Argentine Railways.

Consequently, Proposal II (see "Feasibility Study") was adopted as the optimum.

In order to give a concrete form to this plan, a preliminary design is worked out hereunder.

CHAPTER 2 OUTLINE

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To cope with the 2nd Step Electrification down to La Plata, the capacity of the KM 10 Workshop should be raised from 156 cars to 318 cars. The study for the above has been made in this Preliminary Design. As a result, it has become clear that the following measures should be taken on the 1st Step Workshop.

(1) As each shop will have to be expanded, an addition of inspection/repairing shops totaling 7,800 m^2 will be necessary, raising the inspection/repairing building area of the Workshop to about 21,000 m^2 in all.

(2) Necessary machines to be added number 160, and among the machines used in the 1st Step Workshop, 51 will have to be relocated.

(3) The total construction cost for the workshop amplification will be about $21,000,000.

(4) This amplification work will take 2 years and 6 months after its commencement.

CHAPTER 3 PRECONDITIONS FOR PRELIMINARY DESIGN

CHAPTER 3 PRECONDITIONS FOR PRELIMINARY DESIGN

Proposal II was selected from the Feasibility Study that had been finalized already. Based on Proposal II, the preliminary design was made. The preconditions for the preliminary design are as follows.

3-1 Preconditions for Operating the Workshop

The preconditions for operating the Workshop, which are necessary to work out the preliminary design, are as shown in Table 3.1.1.

Table 3.1.1 Preconditions for Operating the Workshop

Number of cars assigned		106 units (318 cars)	
Periodicity of Inspection	Overall Inspection	800,000 km or less 48 months or less	
	Intermediary Inspection	400,000 km or less 24 months or less	
	Temporary Inspection	In case need arises The number of cars temporarily inspected at the Workshop in a year is to be 10% of the cars assigned to the workshop.	
Average running km per day		560 km/day	
Annual workshop workdays		268 days/year	
Inspection/repairing unit		1 unit (3 cars)	
Inspection/repairing Process	Overall Inspection	19 days The shop-in pitch (1): 9 days	The shop-in day difference (3): 2 days
	Intermediary Inspection	14 days The shop-in pitch (2): 9 days	
	Temporary Inspection	5 days (average)	
Inspection/repairing Man-hours	Overall Inspection	2,400 man-hours/car	
	Intermediary Inspection	1,500 man-hours/car	
	Temporary Inspection	250 man-hours/car (average)	

(1) The number of days between one unit shop-in and the next unit shop-in for Overall Inspection
(2) The number of days between one unit shop-in and the next unit shop-in for Intermediary Inspection
(3) The number of days between one unit shop-in for Overall Inspection and the very next unit shop-in for Intermediary Inspection