CHAPTER 9 EDUCATION AND TRAINING

CHAPTER 9 EDUCATION AND TRAINING

This Project is one of the important items of the JABOTABEK Master Plan. And, the increase in staffing and the implementation plan of education and training are as previously specified in the Master Plan (by JICA in March 1981).

The scheduled opening of the New Railway for the Jakarta International Airport Cengkareng will require new assignment of staffs including train drivers, conductors, station staffs, rail car maintenance workers and track and equipment maintenance men (track, structures, buildings, electrification system and signalling and telecommunication systems mainly for newly constructed portions). Therefore, necessary education and training courses must be provided in advance of opening of the new line.

The Project envisages completion of the construction about half a year ahead of the scheduled opening, and then followed by the training of actual operation for the subsequent half of a year. It is therefore necessary for the main force of relevant personnel to finish their preliminary training courses before they will be assigned to training of actual operation. Especially, it is preferable that those core members of the staff should become fully familiarized through their engagement with the practical way of train operation and maintenance at the present organization or to be newly established organization.

The outline of training plan and schedule is as shown in Table 12.

Table 12 Training Schedule Outline

Job type	No. of personnel necessary at operation start	6 month	6 month	6 month	6 month	Remarks
		Construction; Operation practice start; Operation practice; Operation start				
		New organization start				
Driver	20	Training (Core personnel)	Attending actual operation; Training	Operation practice		
Conductor	35	Training (Core personnel)	Attending actual operation; Training	Operation practice		
Station personnel	120	Training (Core personnel)	Attending actual operation; Training	Operation practice		For the new stations
Rolling stock maintenance	25	Training	Attending actual operation; Training	Operation practice		
Track maintenance	30	Training (I)	Working on the installation (Core personnel); Training (II)	Preventitive maintenance management; Operation practice		For the new facilities
Structure (building) maintenance	10	Training (I)	Working on the installation (Core personnel); Training (II)	Operation practice		
Electrification facilities maintenance	35		Training	Operation practice		
Signal/telecommunication facilities maintenance						

CHAPTER 10 INVESTMENT SCALE AND WORK SCHEDULE

CHAPTER 10 INVESTMENT SCALE AND WORK SCHEDULE

10.1 Premises for Construction Cost Calculation

(1) Construction costs are calculated based on labor cost, equipment cost, material cost and other necessary expenses by classified construction work.

- Costs are calculated on the assumed basis of international tendering for contracts.
- Each unit cost is based on the price level as of September, 1982, but no price escalation is considered.
- Costs for equipment and materials are calculated on such assumption that those imported items could be exempted from duty.
- Construction costs are divided largely into the portions of foreign currency and domestic currency.

(2) Both foreign currency and domestic currency are categorized on the following basis.

Foreign currency portion should include:

- Imported equipment and materials
- Foreign currency portion for procurement of specific items out of all equipment and materials locally available in Indonesia.

Domestic currency portion should include:

- Domestic currency portion for procurement of equipment and materials locally available in Indonesia
- Wages payable to local workers
- Tax payments
- Expenses for local contractors

(3) Labor cost, material cost and equipment price are estimated referring from past marketing record data in both Indonesian and Japan.

(4) Land acquisition cost and compensation cost for housing removal are estimated referring from the recorded data available from DKI Jakarta.

(5) Construction supervision cost is estimated at 5 percent of total construction cost for the civil work and 10 percent for the electrical installation work.

(6) Contingency cost for civil work structures is estimated at 15 percent of a total of construction cost, land acquisition cost and compensation for house removal while contingency cost for electrical installation is estimated at 5 percent of electrical installation work.

(7) Exchange rate is set at RP670 = US$1.00 = ¥270.

10.2 Investment Scale

The scale of investment is estimated for the alternative plans of Route A and Route C. The total investment sum including the purchase of rolling stock is as shown in the following Tables. Initial investment sum including rolling stock at the stage of single track operation is estimated at 67.7 billion Rp for Route A and 56.5 billion Rp for Route C. However, for the case of Route C, if improvement investment for Tangerang Line is included, may cost 70.5 billion Rp in total as initial investment.

Table 13 Summary on Investment Scale

Unit: Billion Rp

Stage			Phase 1		Phase 2	Total
Route	Track		Single track		Double track	
Route A	Construction cost	Foreign currency	24.7		13.6	38.3
		Domestic currency	35.2		14.5	49.7
		Sub-total	59.9		28.1	88.0
	Rolling stock cost	(Number of cars)	(22)	(21)	(43)	(86)
		Foreign currency	7.5	7.1	14.6	29.2
		Domestic currency	0.3	0.3	0.6	1.2
		Sub-total	7.8	7.4	15.2	30.4
		Total	67.7	7.4	43.3	118.4
Route C	Construction cost	Foreign currency	20.6		6.9	27.5
		Domestic currency	28.1		7.4	35.5
		Sub-total	48.7		14.3	63.0
	Rolling stock cost	(Number of cars)	(22)	(21)	(27)	(70)
		Foreign currency	7.5	7.1	9.1	23.7
		Domestic currency	0.3	0.3	0.4	1.0
		Sub-total	7.8	7.4	9.5	24.7
		Total	56.5	7.4	23.8	87.7

Table 14 Construction Costs for Single Track

Billion Rp

	Route A			Route C		
	Foreign currency	Domestic currency	Total	Foreign currency	Domestic currency	Total
Track/civil structure	9.9	10.8	20.7	11.2	12.8	24.0
Electrification	4.7	2.0	6.7	3.2	1.3	4.5
Signal/telecommunication	3.4	1.6	5.0	2.7	1.2	3.9
Station construction	4.5	5.0	9.5	1.3	1.1	2.4
Land acquisition & compensation	0	12.6	12.6	0	8.5	8.5
Airport station	2.2	3.2	5.4	2.2	3.2	5.4
Total	24.7	35.2	59.9	20.6	28.1	48.7

Table 15 Construction Costs for Double Track

Track/civil structure	7.7	8.3	16.0	3.4	3.5	6.9
Electrification	2.9	1.3	4.2	1.9	0.9	2.8
Signal/telecommunication	0.9	0.8	1.7	0.5	0.4	0.9
Station construction	1.1	1.0	2.1	0.1	0.1	0.2
Land acquisition & compensation	0	1.7	1.7	0	1.1	1.1
Airport station	1.0	1.4	2.4	1.0	1.4	2.4
Total	13.6	14.5	28.1	6.9	7.4	14.3
Grand total	38.3	49.7	88.0	27.5	35.5	63.0

Table 16 Improvement Costs for Tangerang Line

Billion Rp

	Investment cost		
	Foreign currency	Domestic currency	Total
Track/civil manufacture	3.9	4.5	8.4
Electrification	1.8	0.9	2.7
Signal/telecommunication	1.0	0.5	1.5
Compensation for housing removal		1.4	1.4
Total	6.7	7.3	14.0

Table 17 Rolling Stock Investment

Billion Rp

		No. of units	Investment cost		
			Foreign currency	Domestic currency	Total
Route A	1987	22	7.5	0.3	9.8
	1996	21	7.1	0.3	7.4
	2006	43	14.6	0.6	15.2
	Total	86	29.2	1.2	30.4
Route C	1987	22	7.5	0.3	7.8
	1997	21	7.1	0.3	7.4
	2008	27	9.1	0.4	9.5
	Total	70	23.7	1.0	24.7

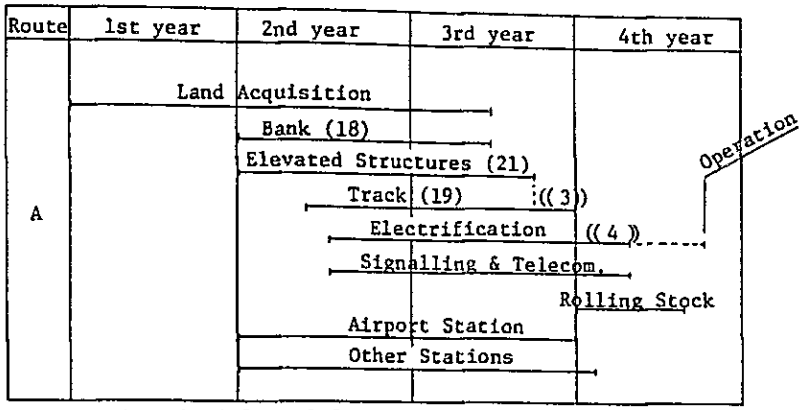
10.3 Work Schedule (Fig. 15)

- Construction of the New Railway Line is planned by two phases. Phase 1 envisages construction on a single-track basis to comply with traffic demand. This work schedule is formulated for construction at a single-track system but including acquisition of total land to be required for both Phase 1 and Phase 2. Therefore, the work schedule for Phase 2 does not include any other elements than the construction work of facilities.

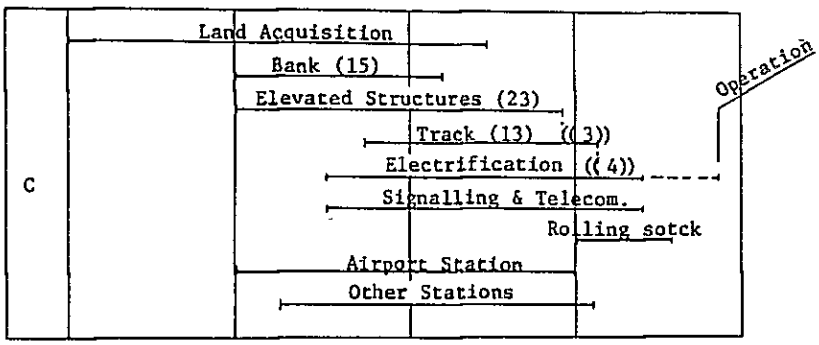
- Two pattern of work schedule are presented for Alternative Route C. The one is based on such assumption that before scheduled completion of construction for the New Airport Access Railway System, all the improvement work including doubling of track and electrification of the Tangeran Line should have been completed between Duri and Rawa Buaya. The other is the work schedule formulated on assumption that those improvement works for the Tangeran Line should be executed as a part of construction for the New Airport Access Railway System.

  Fig. 15 shows the work schedule.

Work Schedule of Route A



Work Schedule of Route C



Work Schedule of Route C Included Tangerang Line

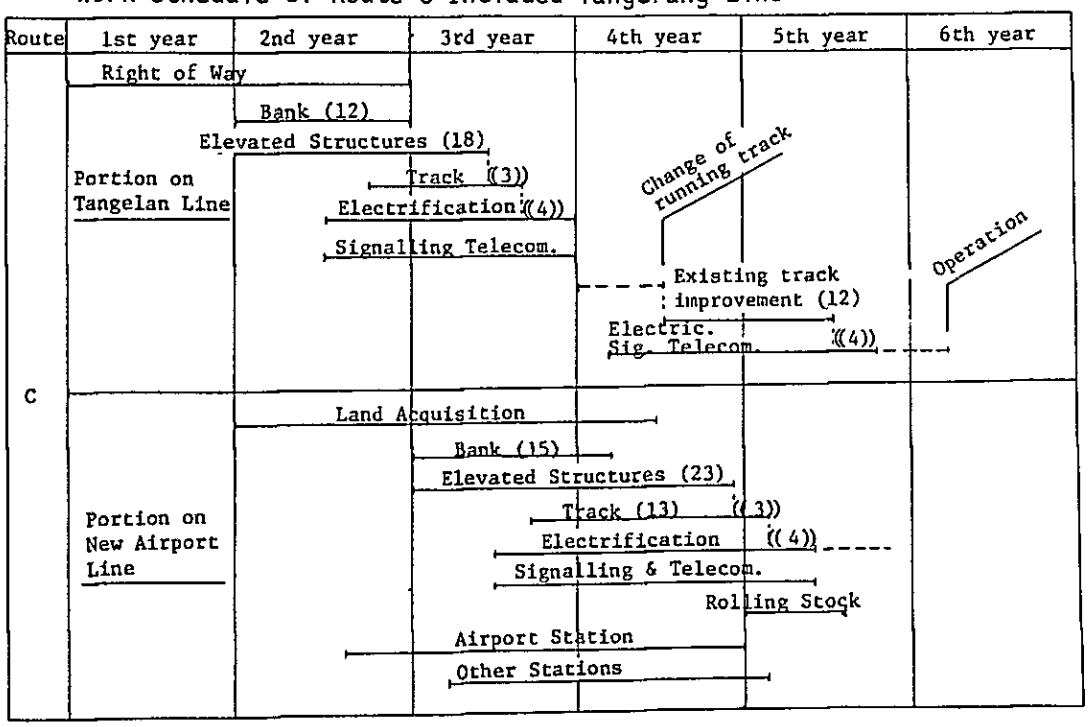


Fig. 15 Work Schedule

CHAPTER 11 ECONOMIC ANALYSIS

CHAPTER 11 ECONOMIC ANALYSIS

11.1 Basic Concept

Economic Internal Rate of Return is calculated based on the concept of difference in investment cost, operating & maintenance cost, benefit between "with the project" (in case the project is implemented) and "without the project" (in case the project is not implemented).

11.2 Estimation of Total Person km and Total Person Hour

We used the data of person kilometers and person hours produced by our demand forecast on alternative routes A and C.

The new railway traffic is seen as traffic converted from the road traffic in the project area, and induced traffic is not considered for the analysis.

11.3 Concept of With/Without

Estimation of investment cost, operating and maintenance cost, values of E.I.R.R. are implemented according to the items shown in Table 18 for the cases of with and without.

Table 18 Concept of With/Without for Estimation of Investment, Operating, Maintenance cost, and Benefit

	Investment item	Operating, maintenance cost item	Calculation of EIRR	
			Cost	Benefit
With	Ground facilities rolling stock	Personnel cost, Maintenance cost, Electricity cost	Investment difference	(1) Saving of operating & maintenance cost (2) Time saving { Rail user / Road user
Without	Road vehicles (buses)	Personnel cost, Maintenance cost, Fuel cost		

11.4 Investment, Operating/Maintenance Cost of "Without"

We calculate the difference of traffic volume of buses and passenger cars between With and Without, and use this difference as the basis for calculating the investment, operating, maintenance cost difference between with and without.

Based on this traffic volume difference of buses, passenger cars, we calculate the number of vehicles to be required for operation and investment. (For the sake of conservative analysis, only bus investment is included for the calculation of E.I.R.R.) We also calculate the difference of operating/maintenance costs of road vehicles between With and Without.

This difference of operating/maintenance cost includes the maintenance of operating costs of buses, and exclude the operating/maintenance costs of passenger cars for the sake of conservative analysis.

11.5 Evaluation

We calculated the E.I.R.R. of the two alternatives.

Table 19 Calculated E.I.R.R. for Alternatives A and C

	Alternative A	Alternative C
E.I.R.R.	14.3%	14.3%

11.6 Sensitivity Analysis

11.6.1 Cost Overrun Analysis

In order to confirm the project viability of each alternatives, we carry out sensitivity analysis of cost increase for 10% and 20%.

Results are shown in Table 20. Results show that Route A and C are both feasible even in the most pessimistic cost overrun case of 20% in relation to the socio-economy of Indonesia.

11.6.2 Sensitivity Analysis on Traffic Demand

We implemented sensitivity analysis under the assumption that JIAC related person trip stays at the same level after year 2000. (In other words, JIAC related person trip for year 2010 is equal with year 2000.)

The sensitivity analysis also shows that both alternatives are viable in terms of E.I.R.R.

Table 20 Sensitivity Analysis

Cost Overrun (10%, 20%) Analysis

Alternative			
A	Base case	E.I.R.R. 14.3%
	Cost overrun (10%)	E.I.R.R. 13.6%
	Cost overrun (20%)	E.I.R.R. 12.9%
C	Base case	E.I.R.R. 14.3%
	Cost overrun (10%)	E.I.R.R. 13.5%
	Cost overrun (20%)	E.I.R.R. 12.9%

Traffic Demand Sensitivity Analysis

Alternative			
A	When JIAC related person trip does not increase after year 2000	E.I.R.R. 13.9%
C	- do -	E.I.R.R. 13.9%

11.7 Other Benefits

In case of Alternatives A and C, the benefits mentioned in the following table are expected. Those good effect should be fully evaluated from the viewpoint of the socio-economy of Indonesia.

Note: For the calculation of E.I.R.R., exchange rate as of September 1982 is used.

RP 670 = US$ 1 = Yen 270

Table 21 Additional Benefits

	Items	Details
A	Road traffic accident avoidance (person)	5,400 (over 26 years) (all accidents) not included for E.I.R.R. 540 (over 26 years) (death accidents)
	Fuel saving benefit of road vehicles (k l)	Only fuel saving of bus is included for E.I.R.R. 1.57 MIL kl
	Job creation (Construction period)	4×10^6 man-day
	Operational persons (person) (Directly involved employees only)	Year 1990 232 Year 2000 236 Year 2000 347
C	Road traffic accident avoidance (person)	4,800 (over 26 years) (all accidents) not included for E.I.R.R. 480 (over 26 years) (death accidents)
	Fuel saving benefit of road vehicles (k l)	Only fuel saving of bus is included for E.I.R.R. 1.39 MIL kl
	Job creation (Construction period)	3×10^6 man-day
	Operating persons (person) (Directly involved employees only)	Year 1990 214 Year 2000 219 Year 2010 275

Note: Annual average saving of fuel for the case of Route A is 61,000 kl, which is roughly 0.3% of annual fuel consumption of Indonesia of 1981.

Annual average saving of fuel for the case of Route C is 53,000 kl, which is roughly 0.2% of annual fuel consumption of Indonesia of 1981.

CHAPTER 12 FINANCIAL EVALUATION

CHAPTER 12 FINANCIAL EVALUATION

12.1 Purpose and Proposition

12.1.1 Purpose of Financial Evaluation

Main purpose of this evaluation is to study the following items.

(i) From the profit & loss projection of this project, we determine the necessity of government subsidies at operating profit & loss level.

(ii) To study the most appropriate financing of debt for the project, and also evaluate the debt repayment ability from the cash flow projection of the project.

(iii) To study the fare level for the new line.

Financial evaluation is carried out for alternative Route A which has been considered as the best alternative from the viewpoint of technical studies and economic analysis.

12.1.2 Proposition for Cash Flow Analysis

Project life, exchange rate, and concept of inflation are exactly the same as for the economic analysis.

For the financial evaluation, all tax portions are added back to the economic costs.

1) Foreign currency portion

Since PJKA is a governmental institution, we have supposed that there will be no import duty imposed.

2) Local currency portion (material & equipment)

In line with the feasibility study on the central line track elevation, producer side tax 20%, and MPO, PPN of 4.5% are added back to the economic price.

3) Local currency portion (labor)

No tax adjustment is necessary, therefore we used exactly the same data as for the Economic Analysis.

We studied these cases of cash flow, namely Base Case, Case 1, Case 2 according to three cases of funding the investment cost.

Table 22 shows the three cases of likely financings.

Table 22 Finance Programme

	Foreign currency	Local currency
Base Case	6% p.a. 27 years, including 7 years grace period	Government Budget
Case I	3% p.a. 30 years, including 10 years grace period	Government Budget
Case II	6% p.a. 27 years, including 7 years grace period	13.5% 10 years, including 4 years grace period

12.2 Results of Financial Evaluations

1) Government subsidies necessary for operation

Results of the financial evaluation shows that if the present rail fares of JABOTABEK are applied, the new line operation needs government subsidies in order not to incur the operating losses. Table 23 shows the annual subsidies necessary for operation of new rail way line.

Table 23 Annual Subsidies Necessary for Operation

(MIL RP)

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996
Subsidy	1,642	1,460	1,331	1,209	1,076	931	773	602	1,045
Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
Subsidy	1,122	900	659	384	163	NIL	NIL	NIL	NIL
Year	2006	2007	2008	2009	2010	2011	2012	2013	
Subsidy	94	1,425	977	599	213	NIL	NIL	NIL	

2) Recommended fares for the new railway line

There should be two categories which determines the new rail fares.

(1) Fare level which mitigates the government subsidies at the operational level

14% increase of fares will be necessary under the assumption that traffic demand remains as forecasted, in order to minimize the government subsidies through the project life.
But it should be remembered, this increase is not good enough to cover debt service, but just enough to cover the operating expenses through the project life.
When the fare is increased by 14%, almost no government subsidy will be necessary from the year 2000 as far as operation is concerned.

(2) Fare level which produces enough cash flow for debt services

Adequate increase of fares will be necessary under the assumption that traffic demand remains as forecasted, in order to service the debt. We estimate necessary fare levels according to three cases of financings.

A. Base case (Foreign Currency Loan of 6% interest p.a, Government Budget for local currency)

Net cash flow of the base case continues to be in red ink through out of the project life.

The ratio (net cash flow/revenue) shows that if the financing for the base case is chosen, it will be necessary to increase the present fare by nearly 104%.

Table 24 Cash Flow for Base Case

(MIL RP)

	1984-1988	1989-1993	1994-2000	2001-2013	Total
Revenue	1,157	7,525	17,693	68,745	95,120
Net cash flow	-2,713	-11,022	-28,402	-56,746	-98,883
Ratio	234%	146%	160%	82%	104%

If, traffic demand remains unchanged, in order to achieve positive net cash flow, it is necessary to implement above mentioned fare increase to service the debt (repayment of capital cost and interest).

B. Case I (Low interest 3% p.a. for foreign currency, Government Budget for local currency)

This financing plan incorporates the concessional loan from overseas, therefore the negative net cash flow becomes the smallest among all cases.

The ratio (net cash flow/revenue) is summarized as follows.

Table 25 Cash Flow for Case I

(MIL RP)

	1984-1988	1989-1993	1994-2000	2001-2013	Total
Revenue	1,157	7,525	17,693	68,745	95,120
Net cash flow	-1,607	-5,491	-17,368	-53,184	-77,650
Ratio	138%	73%	98%	77%	82%

For the case I, in order to make net cash flow positive and service the debt, roughly it is necessary to increase present fare by nearly 80%.

C. Case II (Foreign Currency Loan of 6% interest p.a., Local Currency Loan of 13.5% interest p.a.)

Negative net cash flow of the case II is the largest among all three cases, because of the debt burden is the largest.

Table 26 Cash Flow for Case II

(MIL RP)

	1984-1988	1989-1993	1994-2000	2001-2013	Total
Revenue	1,157	7,525	17,693	68,745	95,120
Net cash flow	-9,490	-64,076	-57,738	-56,746	-188,050
Ratio	820%	851%	326%	83%	197%

According to the above table, for the case II it may be necessary to increase by nearly 200% in order to service the debt burden.

12.3 Conclusion

If the present fare is increased by nearly 14%, roughly speaking there will be no subsidies necessary at operating profit and loss level after the year 2000. 14% increase of fares will make cumulative operating revenue and operating loss equal by year 2013.

Our study shows that the financing plan of Case I (concessional loan from overseas and government budget) is the most preferable financing if the project is to service the debt.

The evaluation shows that this project becomes viable if the following necessary measures are taken.

(1) Local portion should be financed by government budget.

(2) Low and long term concessional loan should be sought for the foreign currency portion.

(3) At least, 14% increase of the existing fares will be necessary in order to produce operating profit on a cumulative basis.

(4) If the project has to produce the funds for debt service, under the assumption that most preferable funding is applied, it may be necessary to increase the present fares by 80%.

Cash flow for the Base Case is shown in the following table.

Table 27 Major Items of Cash Flow

(MIL RP)

	1984-1988	1989-1993	1994-2000	2001-2013	Total
Revenue	1,157 (1,157)	7,525 (1,505)	17,693 (2,528)	68,745 (5,288)	95,120
Operating profit	-1,710 (-570)	-6,007 (-1,201)	-5,485 (-784)	487 (35)	-12,715
Net profit	-3,157	-12,739	-14,513	-22,756	-53,165
Investment	67,906	0	8,175	53,446	129,527
Debt service	5,245	10,590	24,399	31,547	71,781
Net cash flow	-2,713 (-904)	-11,022 (-2,204)	-28,402 (-4,057)	-56,746 (-4,365)	-98,883

( ) is annual average.

Following is the present JABOTABEK fare-table used for the analysis.

Table 28 Present Railway Fares in JABOTABEK (RP)

Distance (km)	Passenger fares
1 - 10	50
11 - 20	100
21 - 30	100
31 - 40	150

Repubahan dan Tambhan No. 2. Pada Buku STP No. 03350/SK/82, 1 Reburari 1982, PJKA.

Table 29 Financial Cost of Investment

(MIL RP)

			1984-1988	1989-2000	2001-2013	Total
Route A	Electrification	FC	4,748		4,423	9,171
		LC	1,935		1,592	3,527
	Telecom. & signals	FC	3,383	610	2,263	6,256
		LC	1,611	147	1,031	2,789
	Civil engineering	FC	14,359		8,522	22,881
		LC	15,845		9,422	25,267
	Land	FC				
		LC	12,827		856	13,683
	Rolling stock	FC	7,469	7,129	22,067	36,665
		LC	302	288	892	1,482
	Airport	FC	2,208		1,010	3,218
		LC	3,218		1,370	4,588

* FC stands for foreign currency portion, LC stands for local currency portion. Cost includes reinvestment.

CHAPTER 13 OPTIMUM ALTERNATIVE ROUTE

CHAPTER 13 OPTIMUM ALTERNATIVE ROUTE

After comparative study, the two (2) alternatives of Route A and Route C are chosen out of the total ten (10) alternatives, it is recommended that Route A will be the optimum alternative of a preferable choice for the following reasons, although both of the two alternatives have achieved an equal rate of 14.3 percent in terms of E.I.R.R.

(1) Route A has greater advantage for passengers' convenience since it would run through both administrative and commercial centers of Jakarta and would be linked directly into junction with the stations of urban center such as Gambir, Sawa Besar and New Cikini.

(2) Whilst Route A will cross the existing railway line by grade separation at only one point near Kota, Route C will cross by grade separation at three points near Rawa Buaya, Grogor and Duri. This means that the work for Route C would become more complicated than that for Route A.

(3) Alternative Route C is based on assumption that double tracking and the electrification work for the Tangerang Line should have been completed before scheduled completion of the New Airport Access Railway System. Therefore, the scheduled opening date of the New Airport Railway may be affected largely depending upon the work progress for improvement of the Tangerang Line.

(4) Because of high probability toward realization of the track elevation of the Central Line, Route A provides high potentiality for train operation in strict accordance with the operation diagram. As a contrast to that, the future train operation on Route C would be affected by any disturbance in train operation on the existing railway lines, since Route C would jointly use the existing line for a long section, and also the West Line would be congested in the future.

(5) The time schedule for completion of Route C would be affected seriously by required removal of houses over a distance of 4.8 km along the Tangeran Line. Since the time for completion of the New Airport Access Railway System is tightly limited, the construction work for Route C would be delayed largely behind the scheduled date of completion if there is any delay in removal of obstructive houses.

(6) Suppose if Route C requires crossing in grade separation with the West Line and J.L. Hasym, it would take a form of crossing in three storied grade separation, which would result in a vast sum of construction costs.

CHAPTER 14 DETAIL PLANNING OF AIRPORT STATION

CHAPTER 14 DETAIL PLANNING OF AIRPORT STATION

In designing the facilities for the airport station, special considerations have been given to the following points.

14.1 Basic Concept

1. Easy access for transfer from bus to train or its vice versa for international flight passengers carrying luggages of heavy weight.

    1) To design bus floor, platform surface and car floor at equal level and elevation

    2) To design so as to enable both bus and train to stop side by side of the same platform so that the walking distance for passengers from bus to train or its vice versa can be reduced to most minimum.

2. The station building will be designed with traditional design and style to manifest as the gateway to Indonesia.

3. A large space of green zone will be developed to create the place for relaxation and refreshment.

14.2 Design Standard

Design standard for detailed planning of the airport station are as follows.

Track structure*	50N rail, 6 mm track pad and 39 PC ties per 25 m length, 250 mm crushed stone for ballast
Track center distance	4.0 m in and outside station yard
Formation level width	2.7 m (from track center)
Designed load	KS18

* As this Report is in the stage of the feasibility study of the whole project, and it was seemed that the type of rails and number of sleepers did not exert great effects upon the results as far as the specifications were to allow the modern railway transportation. Therefore, in this Report the type of rails and number of sleepers were tentatively agreed upon as indicated above between the Study Team and the Indonesian side.

However, the final decision should be made through careful comparisons and calculations and according to the Indonesian standard in the study of the Detailed Design. With regard to ballast thickness the following study has been carried out, and the final decision should be also made after further review in the Detailed Design.

14.3 Design Outline

Layout of tracks at station yard	Two (2) tracks of arrival and departure One (1) storage track
Platform	195 m in length 8 m in width

Platform shed	195 m in length
Building	Main station building Ticket sales office Signal handling station
Station plaza	23,400 m^2
Bridge	RC concrete 2-span box rigid structure
Crossing	2 crossings, with automatic barrier and alarm

Figs. 16 thru 18 present drawings of designing on the basis of the foregoing conditions.

CHAPTER 15 CONCLUSION

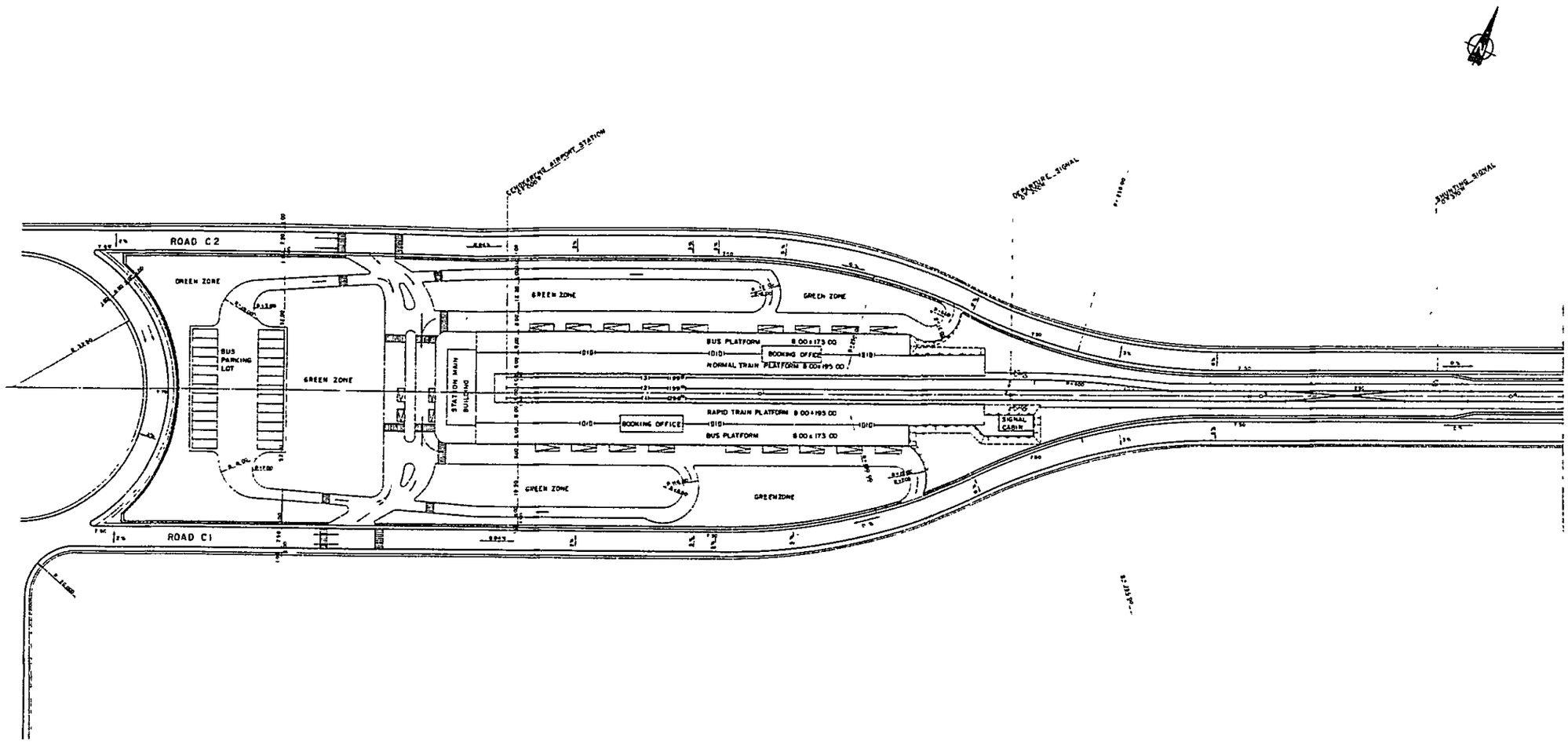
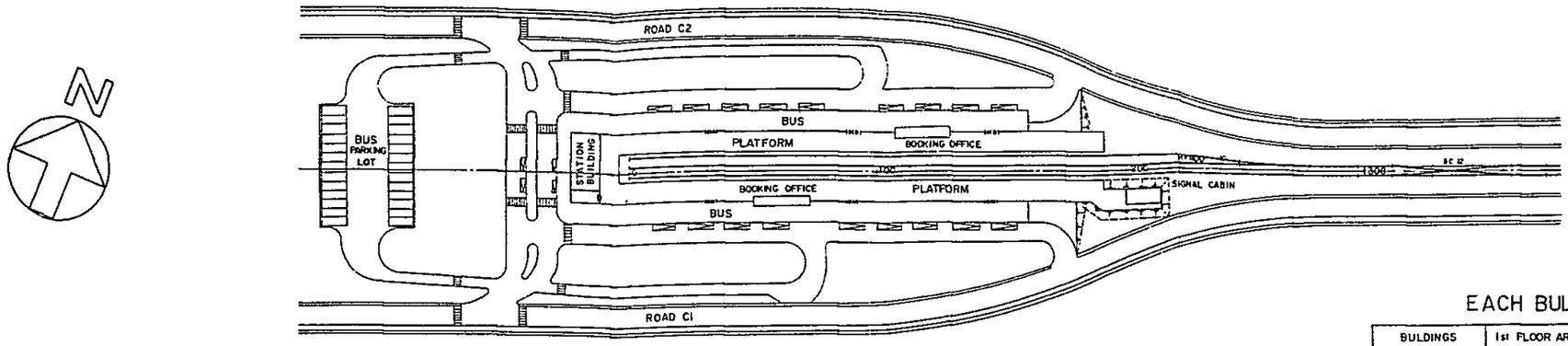


Fig. 16 NEW RAILWAY LINE FOR CENGKARENG AIRPORT

PLAN NO. 1

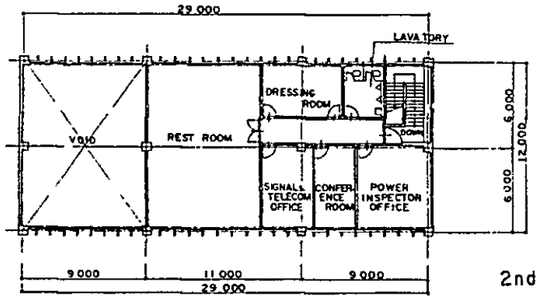
SCALE 1 : 500
(REDUCED)



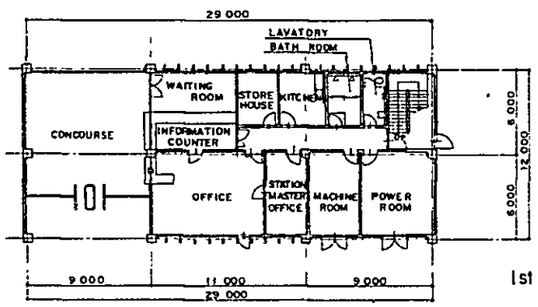
PLOT PLAN s=1/1000

EACH BULDING AREA

BULDINGS	1st FLOOR AREA	2nd FLOOR AREA	TOTAL FLOOR AREA
STATION BUILDING	348 000 m²	348 000 m²	696 000 m²
BOOKING OFFICE	156 000 m² x 2		312 000 m²
SIGNAL CABIN	48 000 m²	84 000 m²	132 000 m²

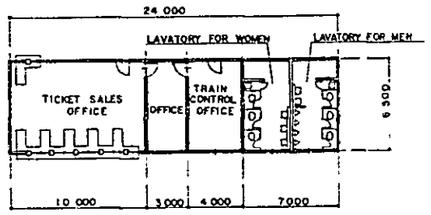


2nd FLOOR PLAN
S=1/200

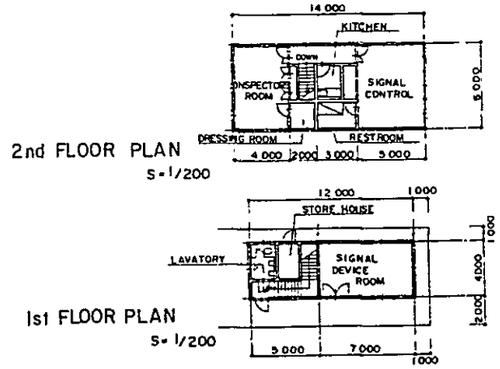


1st FLOOR PLAN
S=1/200

STATION BUILDING PLAN



BOOKING OFFICE PLAN
S=1/200



2nd FLOOR PLAN
S=1/200

1st FLOOR PLAN
S=1/200

SIGNAL CABIN PLAN

SIGNAL CABIN ELEVATION S=1/200

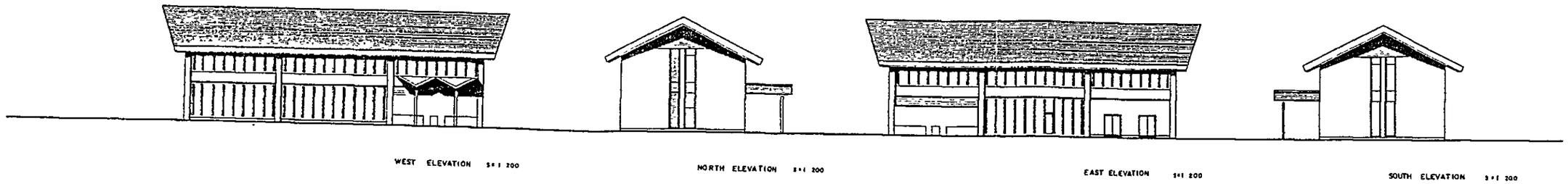
BOOKING OFFICE ELEVATION S=1/200

Fig. 17 NEW RAILWAY LINE FOR CENGKARENG AIRPORT

STATION BUILDING

NO. 1

SCALE 1 : 1000
1 : 200
(REDUCED)

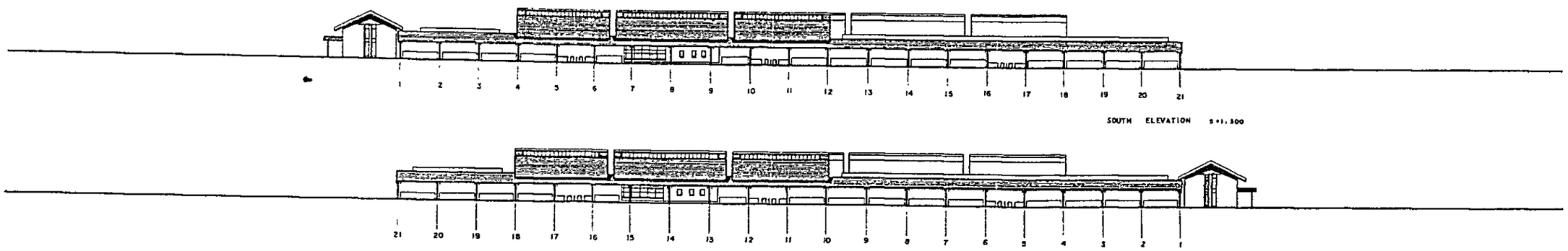


WEST ELEVATION 1:1 200

NORTH ELEVATION 1:1 200

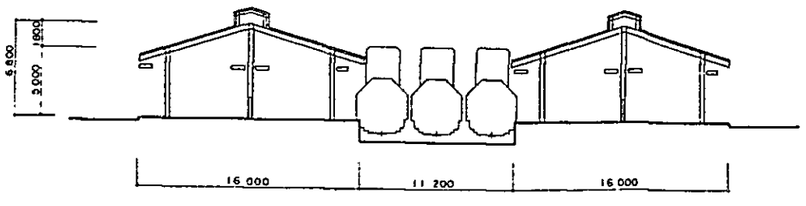
EAST ELEVATION 1:1 200

SOUTH ELEVATION 1:1 200

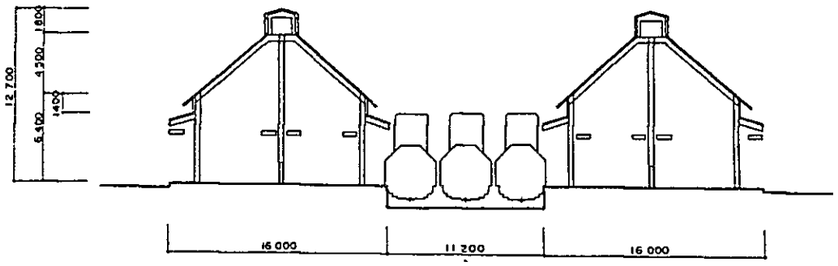


SOUTH ELEVATION 1:1,500

NORTH ELEVATION 1:1 500



CROSS SECTION 1:1 200



CROSS SECTION 1:1 200

Fig. 18 NEW RAILWAY LINE FOR CENGKARENG AIRPORT

STATION BUILDING

NO. 2

SCALE 1 : 500
1 : 200
(REDUCED)

CHAPTER 15 CONCLUSION

After detailed study on this project, it can be concluded that the New Railway Line for Cengkareng Airport is fully feasible from the technical aspect and that the project has the great contribution to the future development of the international city of Jakarta from the viewpoint of the nation's economy.

Since the New Airport is to be open to traffic in a few years, it is highly recommended that the project should be implemented at the earliest opportunity, all the necessary measures being taken toward the execution of its construction.

It is sincerely hoped that the implementation of this New Railway Line construction project will serve as an impetus to the other improvement works of the JABOTABEK Railway Lines, which will in turn open the way toward modernization of the whole railway system in Indonesia.

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