Appendix 7-1-10 Outline of Station Facilities, Building & Plaza

Station	Stop Train	Distance km (Interval)	No. of Commuters in 2005 (×1,000) Total	west	east	transfer	Rush Hour	Ticket Purchaser	Feeder Bus	Facilities: Ticket Window (unit)	Wicket (unit)	Passage Width (m)	Station Building: Area(m²)	west side	east side	Over-Track Style	Station Plaza: Area (1,000m²) Total	west side	east side
Rawang	LSF	355.5 (7.7)	31.5	12.5	19.0		4.4	6.3	28.5	4+α (2.6)	3+α (1.8)	2.0+α (1.5)	557±α	☆	☆ *★	(*)	4.9±α	2.0±α	2.9±α
Kuang	S	363.2 (2.3)	10.0	5.0	5.0		1.4	2.0	9.0	1+α (0.8)	1+α (0.6)	2.5 (0.5)	270±α	★			1.6±α	0.8±α	0.8±α
H 1	H	365.5 (4.3)	8.5	5.0	3.5		1.2	1.7	7.5	1+α (0.7)	1+α (0.5)	2.5 (0.4)	242±α	☆			1.3±α	0.8±α	0.5±α
Sungai Buloh	LS	369.8 (5.9)	6.5	4.5	2.0		0.9	1.3	4.5	1+α (0.6)	1+α (0.4)	2.5 (0.3)	200±α	☆	★		1.0±α	0.7±α	0.3±α
Kepong	H	375.7 (2.8)	18.0	9.5	4.5	4.0	2.5	3.6	12.5	2+α (1.5)	2+α (1.0)	2.5 (0.9)	393±α	☆			2.8±α	2.1±α	0.7±α
H 2	H	378.5 (2.0)	28.5	17.5	11.0		4.0	5.7	25.5	2+α (2.3)	1+α (1.6)	2.0+α (1.4)	523±α	☆	☆	(*)	4.4±α	2.7±α	1.7±α
Segambut	H	380.5 (3.7)	51.0	24.0	27.0		7.1	10.2	46.0	5+α (4.1)	3+α (2.9)	3.0+α (2.4)	760±α	☆	☆	(*)	7.9±α	3.7±α	4.2±α
Mall	H	384.2 (1.5)	45.5	5.0	23.5	17.0	6.3	9.1	25.5	4+α (3.7)	3+α (2.5)	3.0+α (2.1)	705±α			*	7.1±α	0.8±α	6.3±α
J.P. Menteri	H	385.7 (1.8)	75.5	14.5	36.0	25.0	10.5	15.1	45.5	5+α (6.1)	4+α (4.2)	4.0+α (3.5)	997±α			*	11.7±α	2.2±α	9.5±α
K.L.	LS	387.5 (3.8)	112.5	38.5	49.0	25.0	15.6	22.5	78.5	8+α (9.0)	6+α (6.2)	6.0+α (5.2)	1343±α	(★	★	*)	17.4±α	6.0±α	11.4±α
Siputeh	H	391.3 (3.2)	14.5	10.5	4.0		2.0	2.9	11.5	2+α (1.2)	1+α (0.8)	2.5 (0.8)	344±α		☆		2.2±α	1.6±α	0.6±α
Salak South	S	394.5 (4.5)	75.5	16.0	59.5		10.5	15.1	68.0	7+α (6.1)	5+α (4.2)	4.0+α (3.5)	997±α	*★		*	11.7±α	2.5±α	9.2±α
Sungai Besi	H	399.0 (5.1)	67.0	6.0	61.0.		9.3	13.4	47.0	4+α (5.4)	3+α (3.7)	4.0+α (3.1)	916±α	☆	☆	(*)	10.4±α	0.9±α	9.5±α
Serdang	S	404.1 (4.7)	28.0	28.0	0.0		3.9	5.6	25.0	3+α (2.3)	2+α (1.6)	2.0+α (1.3)	517±α	☆	★	(*)	4.3±α	4.3±α	0.0±α
H 3	H	408.8 (5.9)	14.0	10.0	4.0		1.9	2.8	12.5	2+α (1.2)	1+α (0.8)	2.5 (0.7)	336±α	☆			2.2±α	1.6±α	0.6±α
Kajang	LSF	414.7 (10.9)	36.0	20.5	15.5		5.0	7.2	32.5	3+α (2.9)	2+α (2.0)	2.0+α (1.7)	606±α	☆	☆ *★	(*)	5.6±α	3.2±α	2.4±α
Bangi	S	425.6 (9.6)	13.0	9.0	4.0		1.8	2.6	10.5	1+α (1.1)	1+α (0.8)	2.5 (0.6)	321±α	☆	★		2.0±α	1.4±α	0.6±α
Batang Benar	SF	435.2 (4.5)	0.1	0.0	0.1		-	-	-	1 (-)	1 (-)	2.5 (-)	-		★		-	-	-
Nilai	H	439.7 (7.0)	0.1	0.1	0.0		-	-	-	1 (-)	1 (-)	2.5 (-)	-	★			-	-	-
Labu	S	446.7 (5.3)	0.1	0.0	0.1		-	-	-	1 (-)	1 (-)	2.5 (-)	-		★		-	-	-
Tiroi	H	452.0 (8.8)	0.1	0.1	0.0		-	-	-	1 (-)	1 (-)	2.5 (-)	-	★			-	-	-
Seremban	LSF	460.8	17.5	7.0	10.5		2.4	3.5	16.0	1+α (1.4)	1+α (1.0)	2.5 (0.8)	387±α		★		2.7±α	1.1±α	1.6±α
Total		(105.3)	653.4						506.0										

Note :

Stop Train
- LSF : Long Distance Train, DMU & Freight Train
- LS : Long Distance Train & DMU
- SF : U & Freight train
- S : DMU (Refuge Tracks for Freight Train)
- H : DMU (Halt)

- ★ : Existing or Constructed in the DTP
- ☆ : Station Building (planned)
- * : Over-track Style Station (planned)
- (*) : Over-track Style Station (recommended)
- *★ : Removal of Station Building
- K.L. : (★ ★ *) : Existing

Rush hour Passengers : R= (All Day Passengers)×13.9%
13.9%=(All Day Passengers) ×63%/2/2.5hour ×1.1

Ticket Purchasers : T= (All Day Passengers)/2×40%

Ticket Window : t= T/2.5 +α (α : additional ones, usually 50%)

Wicket : w= R/0.7/3.6 +α (α : additional ones, usually 30% to 50%)

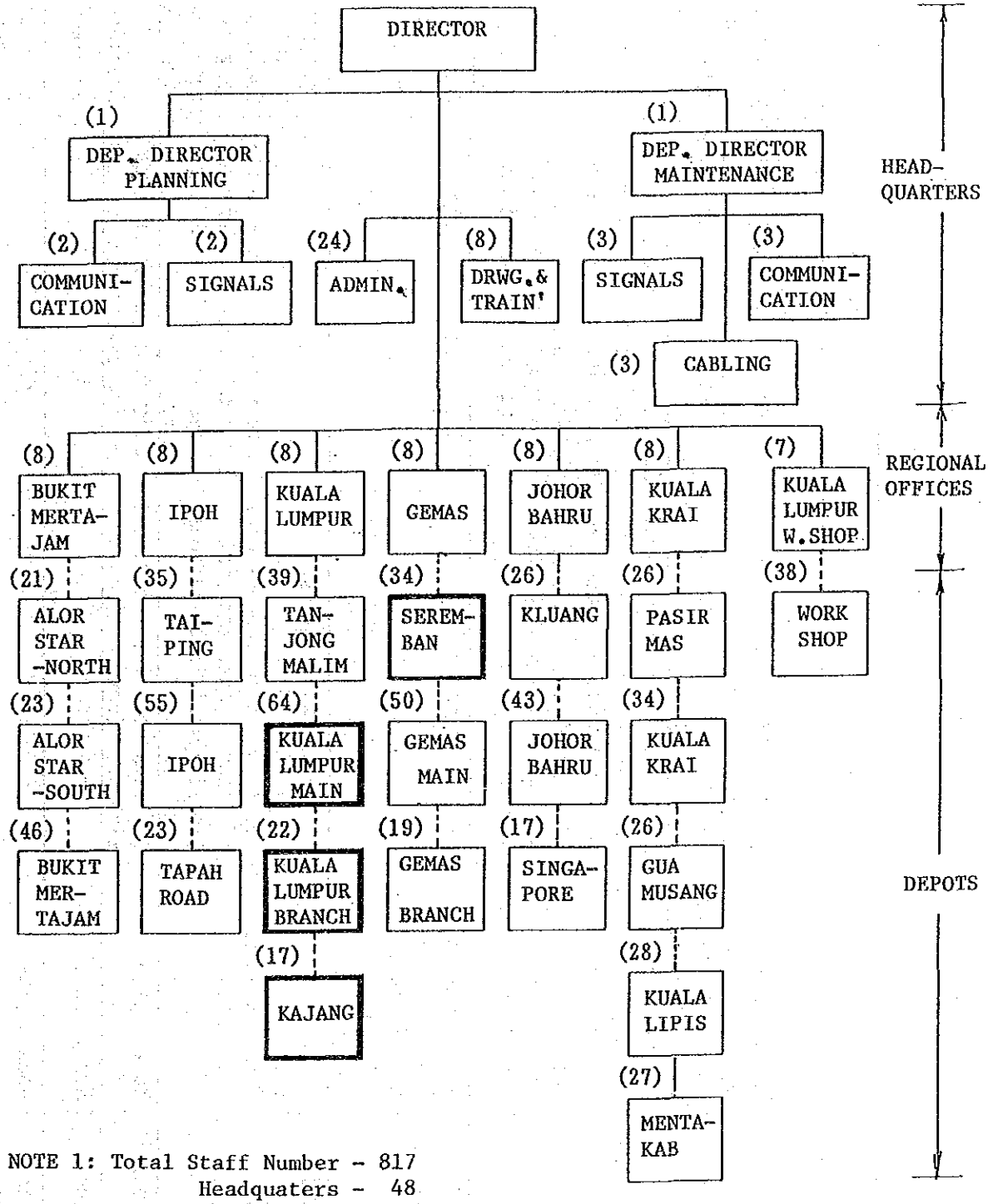
Passageway Width : p= R/3.0 +α (α : additional width, usually 1m to 2m)

(○○○) : (caluculated value)

Station Building Area (Commuter Station) : A= (3.6/(0.1 N +1)+0.9)×10 N ±α (α : fluctuation)

Station Plaza Area (Commuter Station) : A= 0.119 ×1.3N±α (α : fluctuation)

Appendix 7-2-1 Organization of Signalling and Communications Department, MRA



NOTE 1: Total Staff Number - 817
Headquaters - 48
Regional offices - 54
Depots - 715
2: Figures in brackets show staff number
3: Data Source: Signalling & Communications Department, MRA

Appendix 7-2-2 Signalling and Telecommunication Systems Included in RBCS

(RBCS 1/3)

No	SYS./EQUIPMENT	DTP SYSTEM	RBCS SYSTEM TO BE IMPROVED	DESCRIPTION	PROJECT LOCATION
1.	BLOCK SYSTEM	Tokenless Block	Automatic Block System		All inter-stations within the project section, hereinafter referred to as 'All inter-stations'
1)	Intermediate Signal	Partially installed: 2/3 aspects	Fully installed at average intervals of 600 m	3 aspect colour light signal	
2)	Train Detection	Partially installed track circuits	Continuous track circuits	Jointless AF track circuit	
3)	Reversible Block Working	Tokenless block system, Exclusive advance starter signal	Normal direction: Automatic block system Reverse direction: Tokenless block system	Exclusive indicators installed under the main starter signal, instead of advance starter signals	11 stations and 1 junction: Rawang, Kuang, Sungei Buloh, Kepong, Kuala Lumpur Salak South Jct, Serdang, Kajang, Bangi, Batang Benar, Labu and Seremban: hereinafter referred to as 'All Stations'
2.	SIGNAL	Colour light signals of 2/3 aspect	All colour light signals of 3 aspect	Inclusive of relocation of some signals installed under DTP	
3.	TRAIN DETECTION	DC track circuit in station yards and AF track circuits between stations	AF track circuits	Available for ATP system	
4.	INTERLOCKING SYSTEM	All relay interlockings	All relay interlockings		Equipment rooms at 5 stations: Rawang, Kuala Lumpur, Kajang Bangi & Seremban: referred to as 'Improved Stations'
1)	Relay logic	Relays mounted on relay racks	Modification to improvements of track layout, and additional signal installations	To provide for more effective train operation and enlargement of DMU stabling tracks	
2)	Local Control Panel	Mosaic panel	Modification of mosaic panel with additional modules	Modify face plates in line with improved track layouts	Stationmaster's room at Improved Stations
3)	Indication Panel	Mosaic panel	- ditto -	- ditto -	
4)	Technician's Ind. Panel	Mosaic panel	- ditto -	- ditto -	Equipment rooms at Improved Stations

No	SYS./EQUIPMENT	DTP SYSTEM	RBCS SYSTEM TO BE IMPROVED	DESCRIPTION	PROJECT LOCATION
5.	ATP SYSTEM	Optional Item	Employed: Continuous checking system		
1)	Train-born Equipment		To apply emergency brake when receives 'Red' signal or no signals	Inclusive of additional installations for the DMUs to be procured by DTP	DMUs for RBCS & DTP
2)	Trackside Equipment		AF track circuits to send speed signals	Available to use track circuits for train detection, Inclusive of replacement of DC track circuits within station yards	The whole project section, inclusive of station yards
6.	CTC System	Computer-based			
1)	Control Unit	With sufficient processing speed, memory and software for future applications	To allow local entry of train descriptions, and automatic train information reporting	Modification of software and loading/alteration of data tables	Control Room and Equipment Room in CTC Centre
2)	Transmission Equipment	TDM/PCM	Available for the above applications	Additional interface modules for 'Fringe-Boxes' Modification of interfaces with TD and ARI systems	
3)	Printing Machine	Batch processing	To print out automatically actual train timings, delays and statistical data	Additional installations of Serial/Laser printers	
4)	Fringe Box	Optional Item	To enable operators to input train descriptions & monitor train operation conditions	Installation of VDUs and Keyboards with processing units and MODEM	Rawang, Seremban, Sentul & Port Klang
7.	Signal Post Telephone	Within station yards & on intermediate signals	To allow MRA personnel along tracksides to communicate with nearby stationmasters and/or train dispatchers	To install telephone sets to be mounted on block signals	All inter-stations

No	SYS./EQUIPMENT	DTP SYSTEM	RBCS SYSTEM TO BE IMPROVED	DESCRIPTION	PROJECT LOCATION
8.	Train Radio System	UHF: 800 MHz Duplex - 6 ch. Simplex - 2 ch.	To enable adjoining trains to actuate ATP system for emergency stop	To modify train-borne equipment on DMUs & base station equipment provided under DTP	DMUs for RBCS & DTP
9.	Yard Radio System	Optional Item	To allow two-way, semiduplex communication between each shunter & locomotive driver	To install base station equipment and portable radio equipment	Rawang, Kuala Lumpur Bangi, Seremban
10	Service radio System	Optional Item	To enable maintenance personnel to communicate with any vehicle & any telephone connected with MRA telephone network, any personnel with service radio sets within a work area	To install base station, mobile and portable telephone sets	Same locations of base stations for train radio system DMUs for RBCS & DTP
11	Passenger Information Display	None	To provide passengers with prompt information by LED displays on train operation schedules	To install a processor, VDU/keyboard, MODEM and displays to be controlled directly with the data from TD system	All stations
12	Public Address System	Individual type	To allow automatic broadcasting on train operations, including announcement of train approaching and departure timing and BGM	To install a control unit, amplifiers, BGM instrument, MODEM and speakers, to be controlled directly by TD and CTC systems	
13	Synchronised Clock	Dry-cell clock	To enable slave clocks to show synchronised accurate time	To install master clocks, and slave clocks on platform and wicket, etc.	
14	Power Supply	Mains supply: commercial power Standby Power: UPS system with engine generator	To receive commercial power until railway-exclusive high tension power distribution lines be available by electrified railway introduction	To install power distribution lines from nearby LLN poles to the apparatus case for block signals; and power failures can be detected	All inter-stations

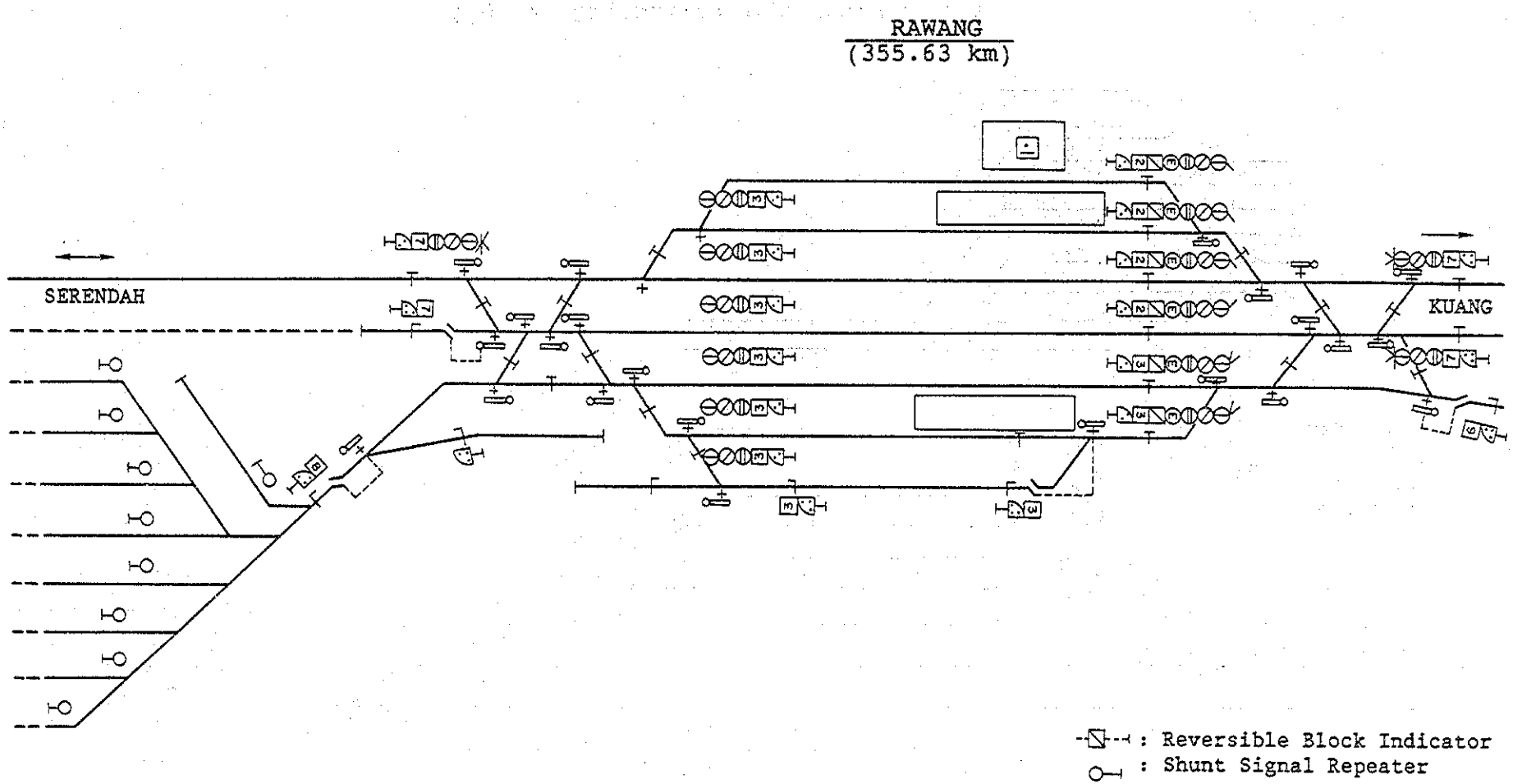


Fig. 1 Signalling Improvement Plan (Rawang)

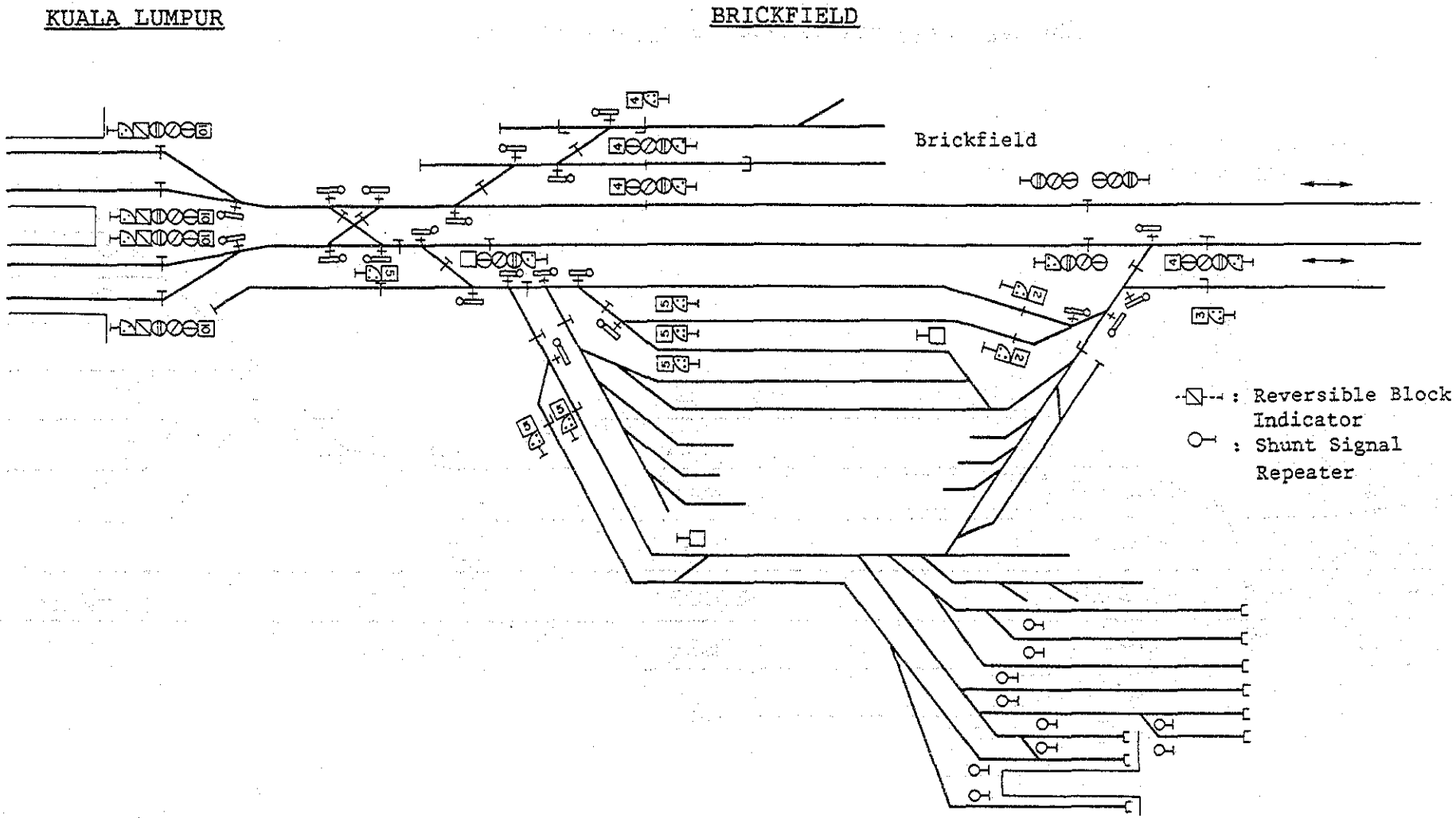


Fig. 2 Signalling Improvement Plan
(K.L. & Brickfield Coach Shed)

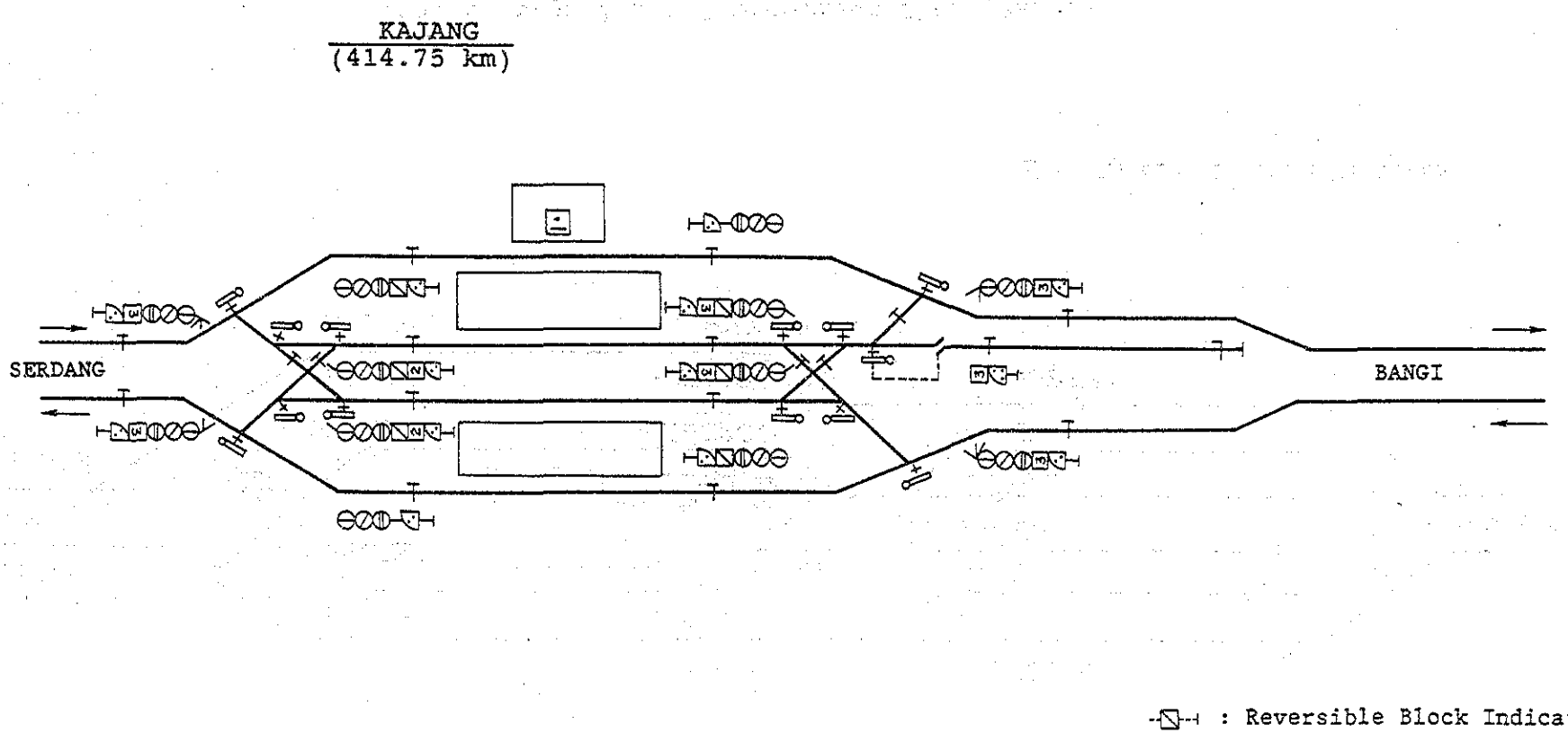


Fig. 3 Signalling Improvement Plan (Kajang)

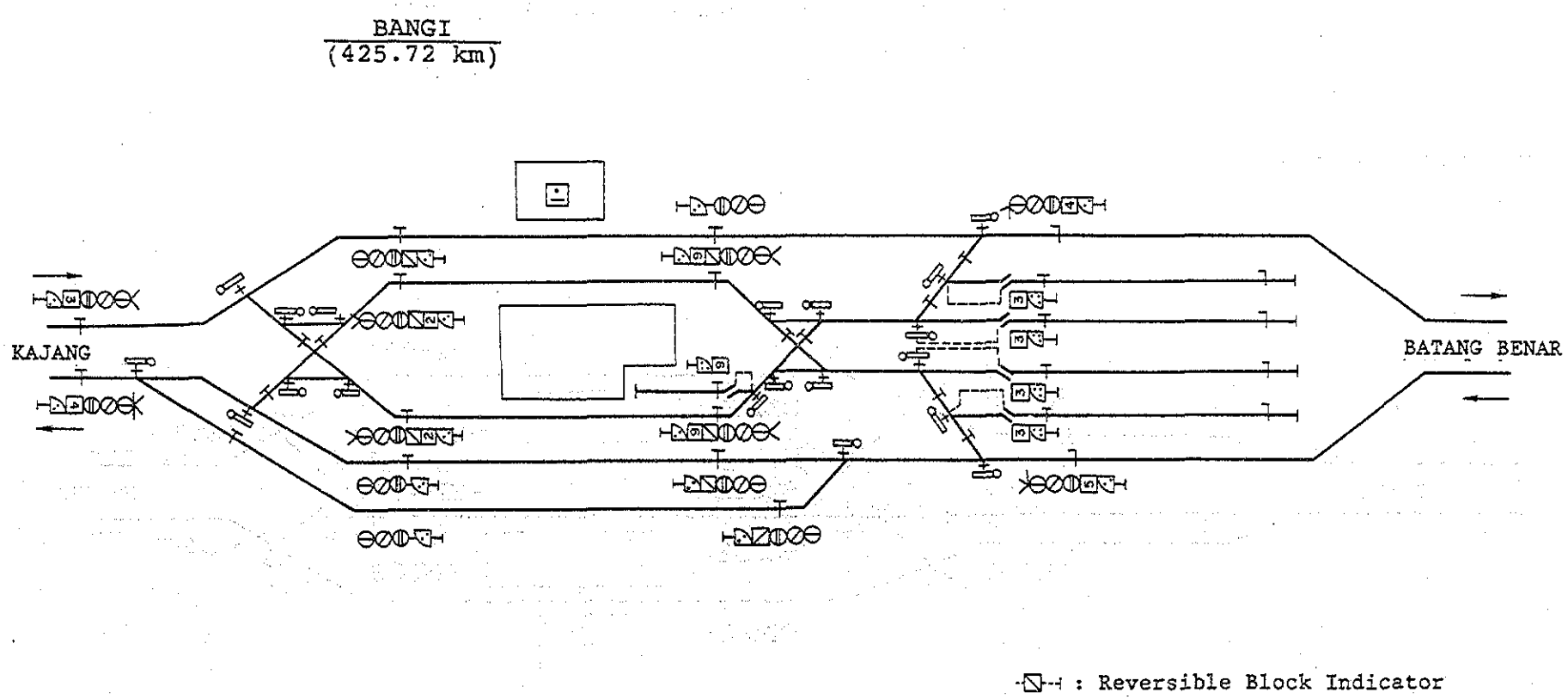


Fig. 4 Signalling Improvement Plan (Bangi)

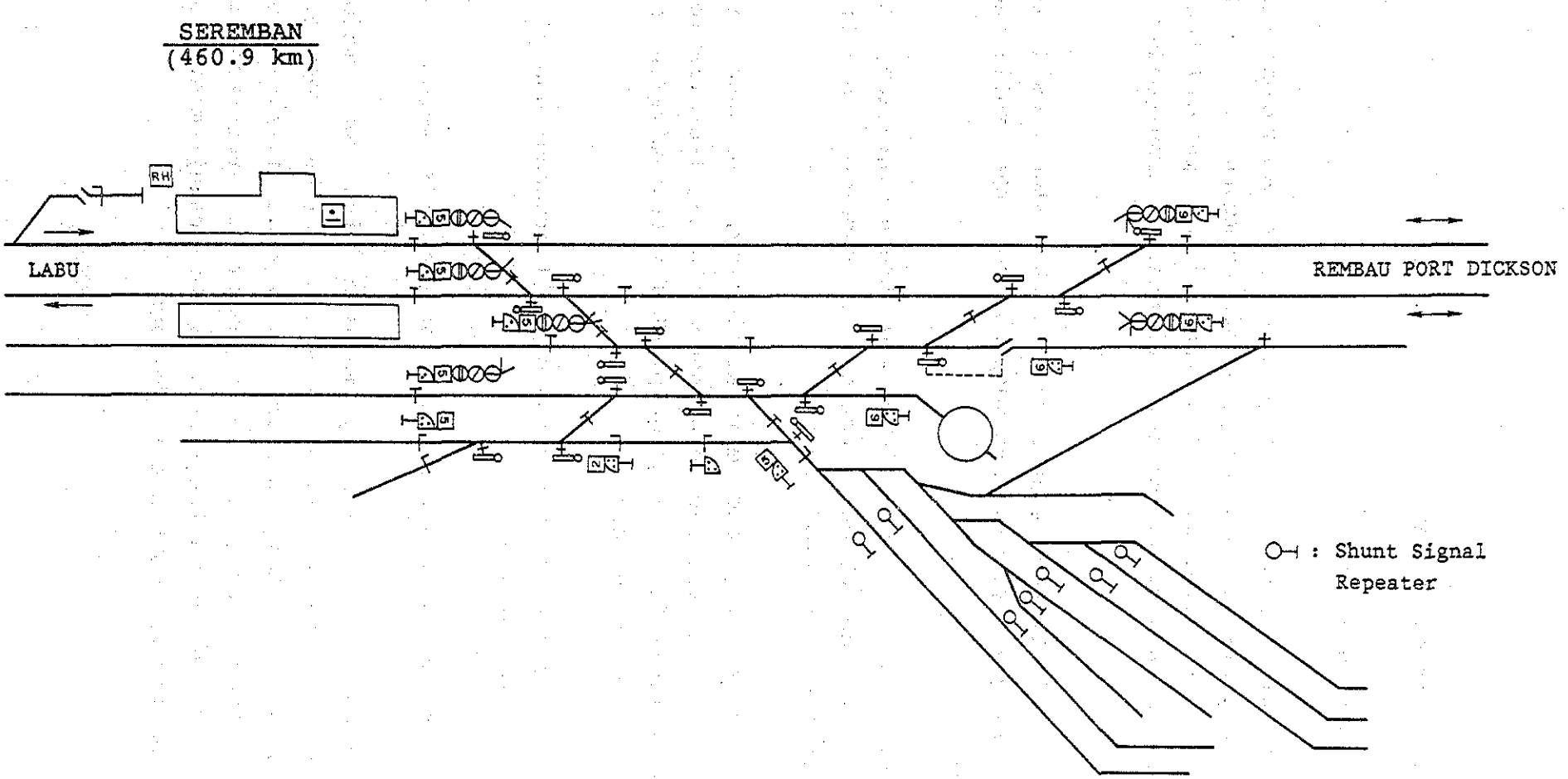


Fig. 5 Signalling Improvement Plan (Seremban)

Appendix 7-2-3 Track Circuit

(1) Train detection system

Train detection systems are classified into two types: the one is a continuous detection method by means of track circuit, loop coils, etc. The other is an intermittent detection method by use of axle counters, transponders, etc.

In this Project, the track circuit method widely used in modern railway systems are adopted for the following reasons:

- In view of safety and efficiency of train operation, the continuous detection function is superior to the intermittent detection function,

- High reliability and maintainability, because it utilizes rail itself, without necessitating installation of additional facilities/equipment for transmission of signal information, and

- Availability for the detection of rail breakage and also for data transmission.

(2) Requirements on the track circuit for the RBCS system

Track circuits are directly related with two major functions: train detection and wayside signal control. For the RBCS system, however, a signal transmission function from ground to can equipment is required in addition to the above functions. Major requirements of ATP system for the RBCS are as follows.

a. Train detection

Control length; 500 ~ 1000 m
Shunting resistance: 0.5Ω (to be ascertained in the designing stage)
Leakage conductance: 0.5 s/km (ditto)

b. Wayside signal control

Number of signal information to be transmitted through rail : 3 (R1, Y, G)

c. Signal transmission from rail to cab: 3 (R1, Y, G)

In addition to the above, in selecting the track circuit system the following particulars on the project section have to be taken into account:

d. Interference resistivity: AC/DC electrification, Lightening

e. Insulation for long rail: Non-insulation type

f. Rail-breakage detection: Double-rail track circuit

g. Maintenance: Durability to the surrounding conditions (temperature, flood, humidity, vandalism, etc.)
Concentration of transmitting/receiving devices in the signal cabin

(3) Applicability for the RBCS system

Among several types of track circuits used in major railways in the world as shown in Table 1, the audio-frequency (hereinafter referred to as 'AF') track circuit is selected for the RBCS system due to the following reasons;

The track circuits using DC and commercial frequency (hereinafter referred to as 'CF') can not transmit signal information required for 4-aspect signalling method, which should be employed in the future moreover DC(double) and CF track circuits are not applicable to AC electrification.

Meanwhile, both the AF and low-frequency (hereinafter referred to as 'LF') track circuit satisfy the aforementioned functions required for the RBCS system. The pros and cons of the AF and LF track circuits are as follows:

a. The LF track circuit can secure longer and better train detection function than the AF track circuit against deterioration of leakage conductance value, although the latter satisfies the control length required for the RBCS.

b. The AF track circuit is superior to the LF track circuit in the following aspects:

   - Larger numbers of information transmitted in the rail,

   - Easier to introduce can signal system and to constitute the non-insulation track circuit,

   - Smaller investment cost.

   In consideration of the above, the AF track circuit of non-insulation type is selected for the RBCS section. however, it is recommended to ascertain that the maximum leakage conductance of the track, to be constructed by the DTP, will be less than 0.5 s/km which is widely adopted as the standard value in the modern railway systems.

Table 1 Comparison of Track Circuit

Track Circuit	DC (Single rail)	DC (Double rail)	CF	LF	AF (non-insulation)
Frequency (Hz/sec)	Zero	Zero	50 or 60	25～400 (80)	1000～3000
Max. control length (G≦0.5 s/km)	2.5	2.5	2	4	1.2
Max. number of signal information transmitted in the rail	2	2	3	4	4～10
Expansion to cab signal (ATP/ATC)	×	×	×	△	○
Electrification - AC	△ (control length become less than 1 km)	×	×	○	○
- DC	×	×	○	○	○
Non-insulation	×	×	×	△	○
Centralization of ground facilities	×	×	×	△	○
Maintenance (Periodical checking)	· rail bond · rail insulator · primary battery	· same as left · same as left · same as left	· same as left · same as left	· same as left · same as left	· same as left
Power consumption (W)	10	10	150	220	150
Investment cost	1	1	1.5	2.0	1.5
Rail breakage detection	×	△	○	○	○

Note: ○: possible
×: impossible
△: difficult

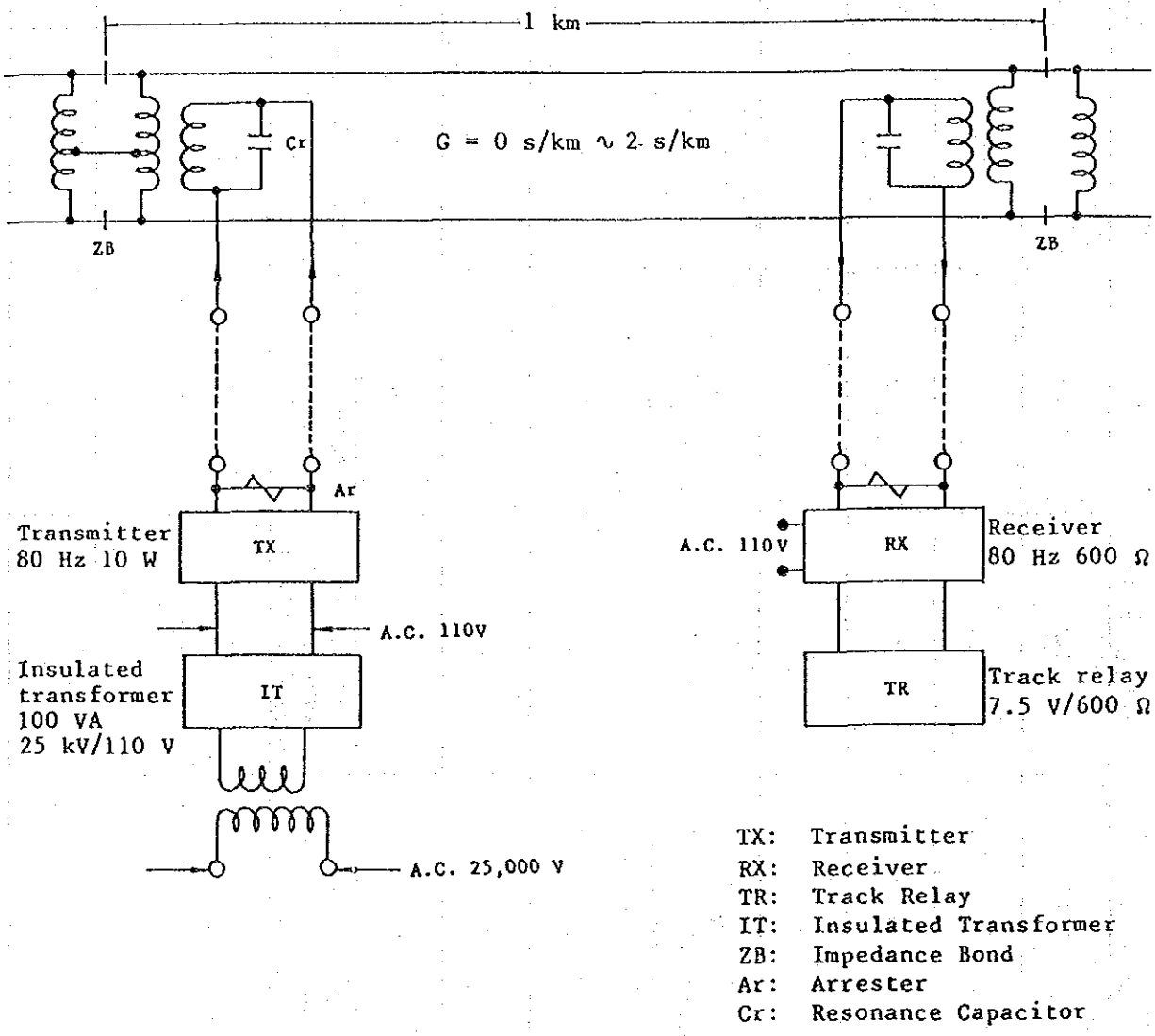


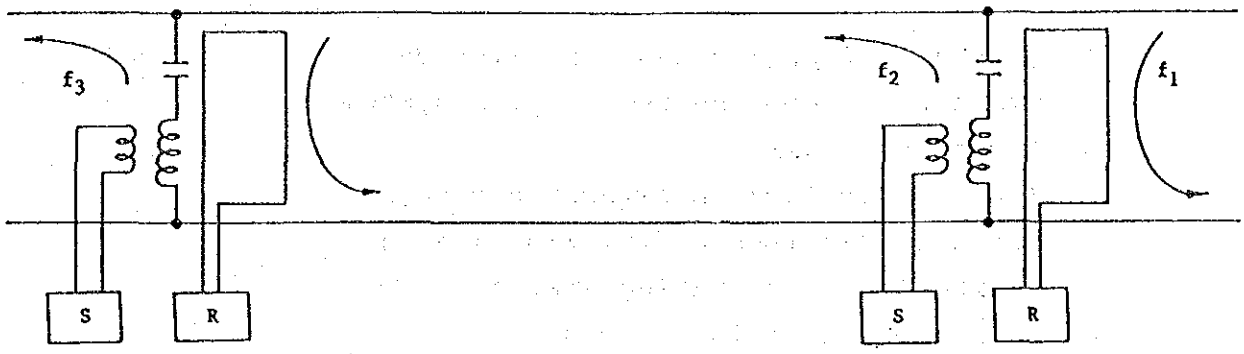
Fig. 1 Configuration of LF Code Track Circuit

Table 2 Characteristics of LF Code Track Circuit

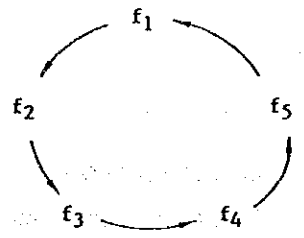
Items	Conditions
Applicability to electrification	A.C.
Variable range of leakage conductance	0 - 2 s/km
Control length of track circuit	Max. 1 km
Max. Shunting sensitivity	0.5 ohms
Max. traction current	A.C. 800A
Allowable interference current	50 Hz 40A 80 Hz 50 mA
Rail breakage detection	Possible
Non-insulation	Difficult (Boundary is not sharp.)
Concentration of devices	Possible
Number of signal aspect indication	4 aspect
Transmission of multiple information to the cab	Possible
Type of impedance bond	Resonance type with external condenser
Ambient temperature range	-10°C ~ 70°C
Humidity	$\leq$ 95% (45°C)
Power source	A.C. 110 V (90 V ~ 120 V) D.C. 24V $\pm$ 10%

Table 3 Characteristics of Non-insulated AF Track Circuit

Items	Conditions
Applicability to electrification	A.C.
Variable range of leakage conductance	0 ~ 0.5 s/km
Max. control length of track circuit	1.2 km with end-sending
Max. Shunting sensitivity	0.5 ohms
Max. overlap section	100 m
Max. value of traction current	A.C. 800A
Allowable harmonics interference current	6/f 1.65 (A) f: kHz
Unbalanced current factor	$\leq$ 5%
Rail breakage detection	Possible
Range of device concentration	Within 5 km
Number of signal aspect indication	Max. 6 aspect
Pararell condenser	None
Ambient temperature range	-10°C ~ 70°C
Humidity	$\leq$ 95% (45°C)
Power source	A.C. 110 V (90 V ~ 120 V) D.C. 24V $\pm$ 10%



Cyclic combination of frequency



S Transmitter: Voltage sending

R Receiver : Voltage & current receiving

Fig. 2 Configuration of Non-insulated AF Track Circuit

Appendix 7-4-1 Contents of Inspection and Repair

(1) Major item of POH :

1. Overhaul of engine and transmission
2. Overhaul of cooling and fueling system
3. Car-body repair
   (outside/inside/window/door system)
4. Bogie repair (bogie frame/wheel-set)
5. Overhaul of air-braking system
6. Repair of electrical items
   (controller/safety device/telecommunications system)
7. Repair of accommodation (seat/light/air-condition)
8. Overhaul of diesel engine generator
9. Painting (some line and marks)

(2) Major items of IOH :

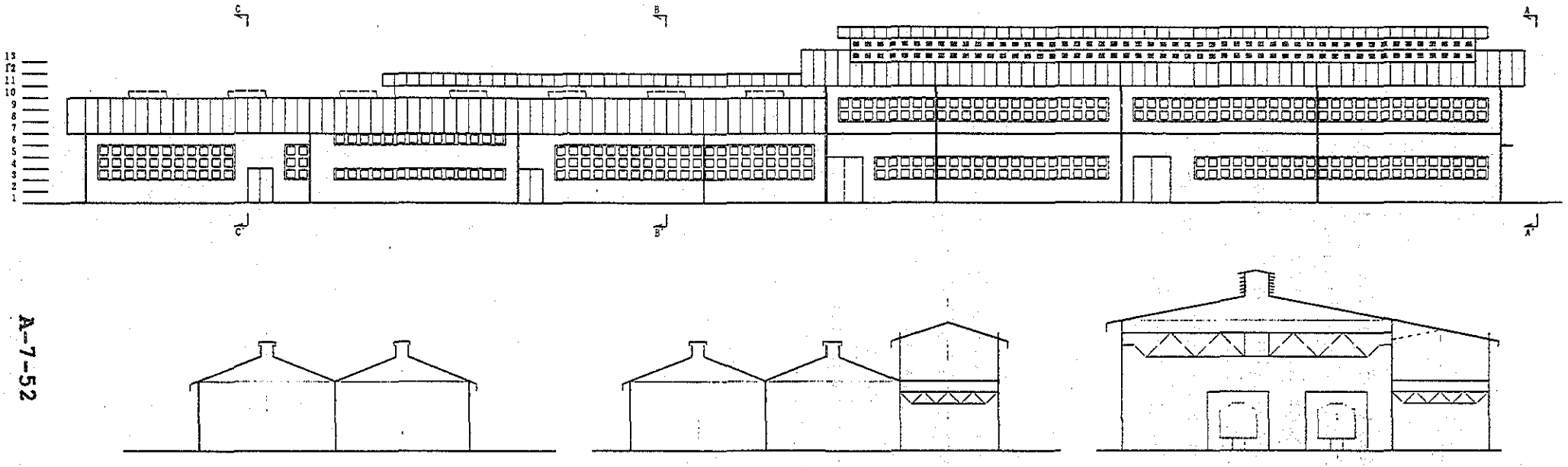
1. Repair of engine and transmission
2. Repair of cooling and fueling system
3. Car-body repair
   (inside/door system)
4. Bogie repair (bogie frame/wheel-set)
5. Inspection and repair of air-braking system
6. Inspection and repair of electrical items
   (controller/safety device/telecommunications system)
7. Repair of accommodation (seat/light/air-condition)
8. Inspection and repair of diesel engine generator

(3) Major points of M-I/R :

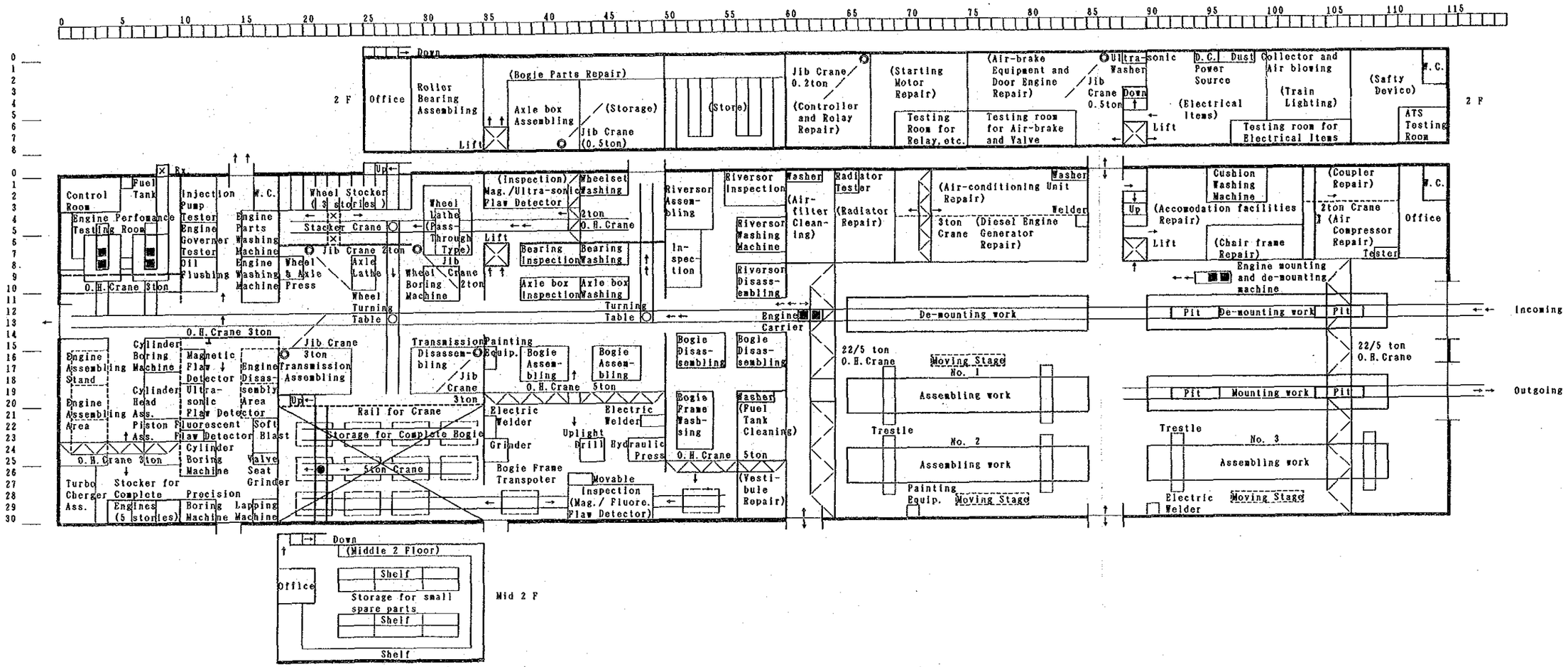
1. Inspection/adjustment of engine and transmission
2. Inspection/adjustment of cooling and fueling system
3. Inspection of air-braking system
4. Inspection/clean air-filter of air-intake
5. Inspection of safety device
6. Inspection/adjustment of brake linkage and cylinder
7. Inspection/replacement of brake block

(4) Major points of P-O/I :

1. Check fuel, engine oil, cooling water, temperature
2. Check brake blocks and brake linkage
3. Check tyre profile, flaw and defects of wheel-set
4. Check safety device and controller
5. Check door and telecommunication system
6. Check air-conditioning unit



Appendix 7-4-2 General View of the Main Building for the DMU Repair Shop



Appendix 7-4-3 Plant and Machinery Layout for the Main DMU Repair Shop

Appendix 7-4-4 Plant and Machinery for Workshop

Table 1 List of Plant and Machinery for POH and IOH, installed in the Workshop

Work Position	Name of Machine	Number of Machines
Incoming and Outgoing Inspection	Car shunting machine	1
	Wiring testing facilities	1
	Underfloor washing facility	1
	Re-fueling and water supply equipment	1
Car-body Repair Shop	Overhead crane (22ton/5ton/span-22m)	2
	Overhead crane (3ton/span-8m)	1
	Overhead crane (2ton/span-8m)	1
	Facilities for de-mounting and mounting engine	2
	Facilities for de-mounting and mounting machinery from underneath the floor	2
	Moving stage for high position work	3
	Staging for paint work	3
	Plasma arc cutting equipment	1
	Electric welder	3
	Painting equipment	2
	Forklift (2ton)	2
	Trestle	8
	Others	1
Electrical and Pneumatic Parts Repair Shop	Jib crane (0.5ton)	1
	Jib crane (0.2ton)	1
	Relay tester	1
	Battery charging device tester	1
	DC power source equipement	1
	Starting motor tester	1
	Solenoid valve tester	1
	Electric coupler tester	1
	Speed meter tester	1
	Circuit breaker tester	1
	Tester for operation safty device	1
	Washing facilities	1
	Dust collector, air blowing facility	1
	Brake valve tester	1
	Ultra-sonic washer	1
	Others	1
Bogie Repair Shop	Overhead crane (5ton/span-15m)	1
	Overhead crane (5ton/span-10m)	2
	Bogie frame washing facilities	1
	Reverser washing facilities	1
	Oil flushing facility (Reverser/Transmission)	1
	Fluorescent flaw detector (bogie frame/reverser)	1
	Magnetic flaw detector (bogie frame/reverser)	1
	Uplight drilling machine	1
	Grinder	1
	Hydraulic press (50 ton)	1
	Electric welder	2
	Painting equipment	1
	Bogie frame transporting device	1
	Others	1

Table 2 List of Plant and Machinery for POH and IOH, installed in the Workshop

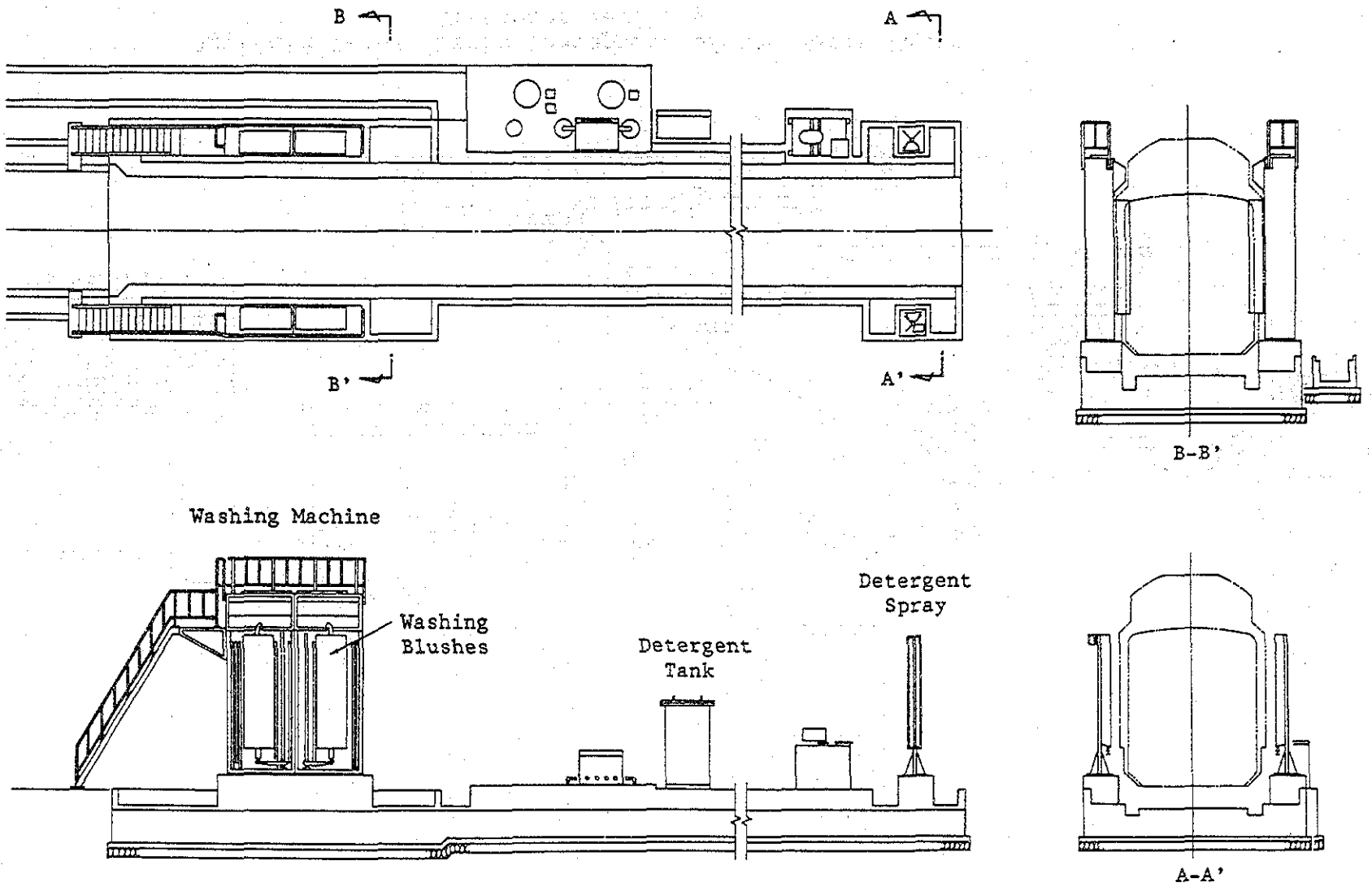
Wheel and Axle Repair Shop	Overhead crane (2ton/span-6m)	1
	Wheel lathe (Pass-through type)	1
	Wheel stocker (3 stories)[with stacker crane]	1
	Wheel and axle press (200 ton)	1
	Wheel boring machine	1
	Axle lathe	1
	Wheelset washing machine	1
	Bearing washing facility	1
	Axle box washing machine	1
	Magnetic flaw detecting facilities	1
	Ultra-sonic flaw detecting facilities	1
	Oil dumper testing machine	1
	Wheel turning-table	3
	Jib crane (2 ton)	2
	Jib crane (0.5 ton)	1
	Painting equipment	2
	Others	1
Engine Repir Shop	Overhead crane (3ton/span-10m)	2
	Overhead crane (3ton/span-8m)	1
	Jib crane (3 ton) [for transmission]	2
	Engine washing machine	1
	Engine parts washing machine	1
	Flaw detector (Magnetic)	1
	Flaw detector (Fluorescent)	1
	Flaw detector (Ultra-sonic)	1
	Soft blast	1
	Precision boring machine	1
	Cylinder boring machine	1
	Engine stand	3
	Valve seat grinder	1
	Lapping machine	1
	Engine performance testing machine	1
	Oil flushing facility	1
	Engine governer tester	1
	Injection pump tester	1
	Dynamic balancing machine	1
	Stocker for complete engines (4 stories)	1
	Forklift (3ton)	1
	Transporting car	2
	Painting equipment	1
	Others	1
Other Items Repair Shop	Pipe bending and threading machine	1
	Cushion cleaning machine	1
	Vacuum cleaner	1
	Industrial sewing machine	1
	High-presser washing machine for air-con. element	2
	Air-conditioning unit tester	1
	Air compressor tester	1
	Radiator tester	1
	Air-filter cleaner	1
	Transporting car	2
	Others	1

Table 3 List of Plant and Machinery for POH and IOH, installed in the Workshop

Facilities for Anti-water-pollution & General use	Waste water treatment facilities (240 ton/day)	1
	Waste oil collecting facility	1
	Air-conditioning (500 sq.m)	1
	Roof ventilater (Electric: 160 Cub.m/min)	14
	Compressor for hi-press air supplying	1
	Electrical facilities for power and lighting etc.	1
	Water supplying and drinage	1
	Cago Elevetor (2 stories / 3 ton)	2
Building	DMU Repair Shop (Main Bay 1,210 sq.m) [Steel Structure Hi-roof]	1
	DMU Repair Shop (Main Bay 1,800 sq.m) [Steel Structure Low-roof]	1
	Office & small shops (Sub Bay 1,160 sq.m) [Concrete Block 2 stories]	1
	Incoming Inspection (Steel Structure 205 sq.m)	1
	Battery Maintenance Shop (Demolishing & Built) (Steel Structure 450 sq.m)	1

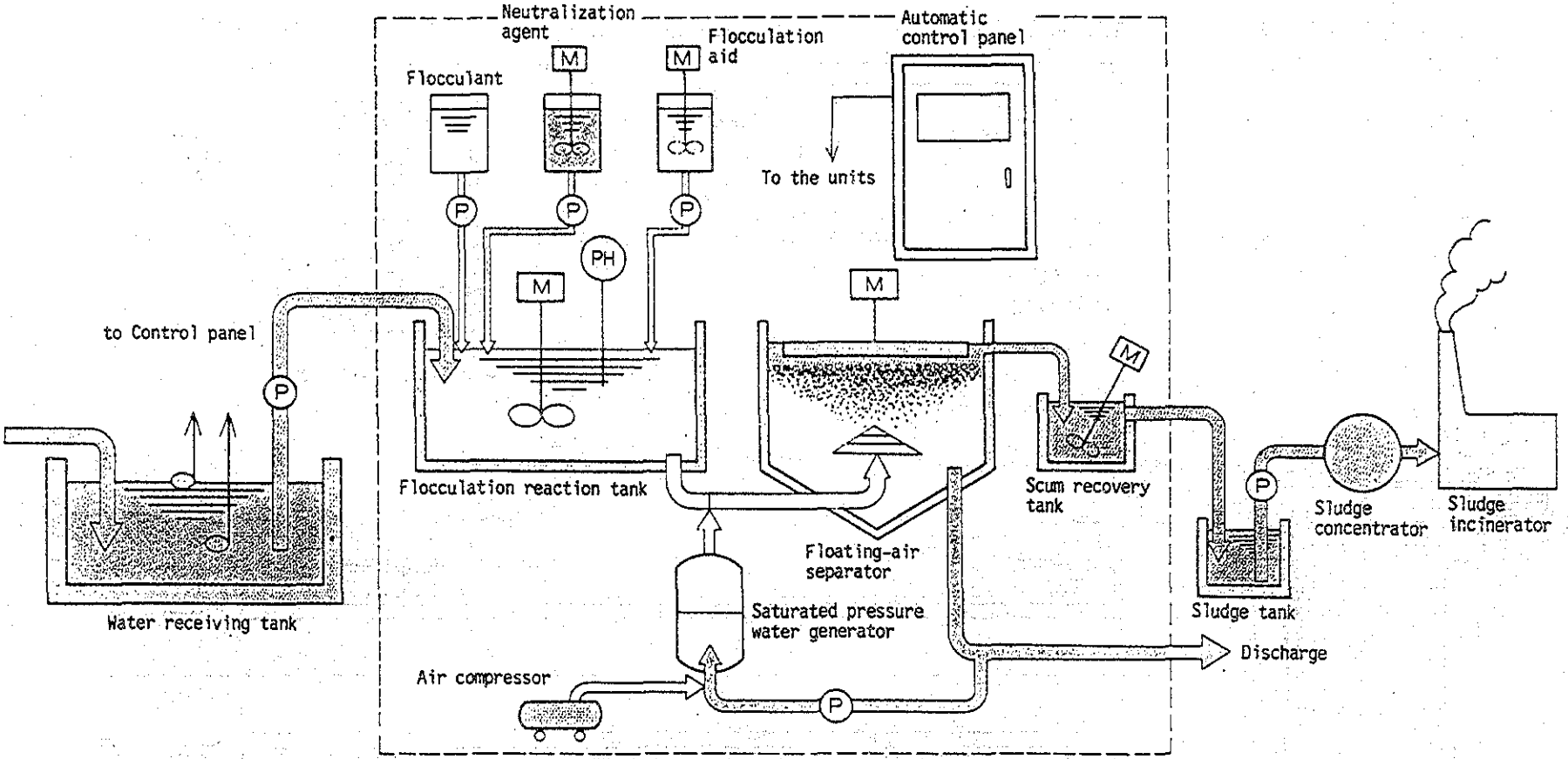
Appendix 7-4-5 List of Equipment for Daily Maintenance at the DMU Depot

Daily Maintenance Facilities for DMU's Depots	Number of Machines
(1) Rawang DMU's Depot	
1)Re-fueling & water supply facility	150 m
2)Waste water treatment facility	1
3)2ton-crane (for air-con. unit)	1
4)Inspection shed and pit-line (for 1 car)	25 m
5)Un-scheduled repair shed (600sq.m)	1
6)Buildings (for maintenance staffs)	1
(2) K.L. DMU's Depot	
1)Automatic car washing machine (with chemical washing)	1
2)Buildings (for maintenance staffs)	1
(3) Sentul DMU's Depot	
1)Re-fueling & water supply facility (Small scale/ 2 positions)	50 m
2)Inspection shed (extention 120 m) (from 1-car train to 7-car train)	1
3)Lifting jacks (1set for 40ton)	1
4)2ton-crane (for air-con. unit)	2
5)Air-compressor	1
6)Buildings (for maintenance staffs)	1
(4) Bangi DMU's Depot	
1)Water supply facility	150 m
2)Automatic car washing machine (water washing only)	1
3)Buildings (for maintenance staffs)	1
(5) Seremban DMU's Depot	
1)Re-fueling & water supply facility	150 m
2)Waste water treatment facility	1
3)2ton-crane (for air-con. unit)	1
4)Inspection shed and pit-line (for 1 car)	25 m
5)Buildings (for maintenance staffs)	1

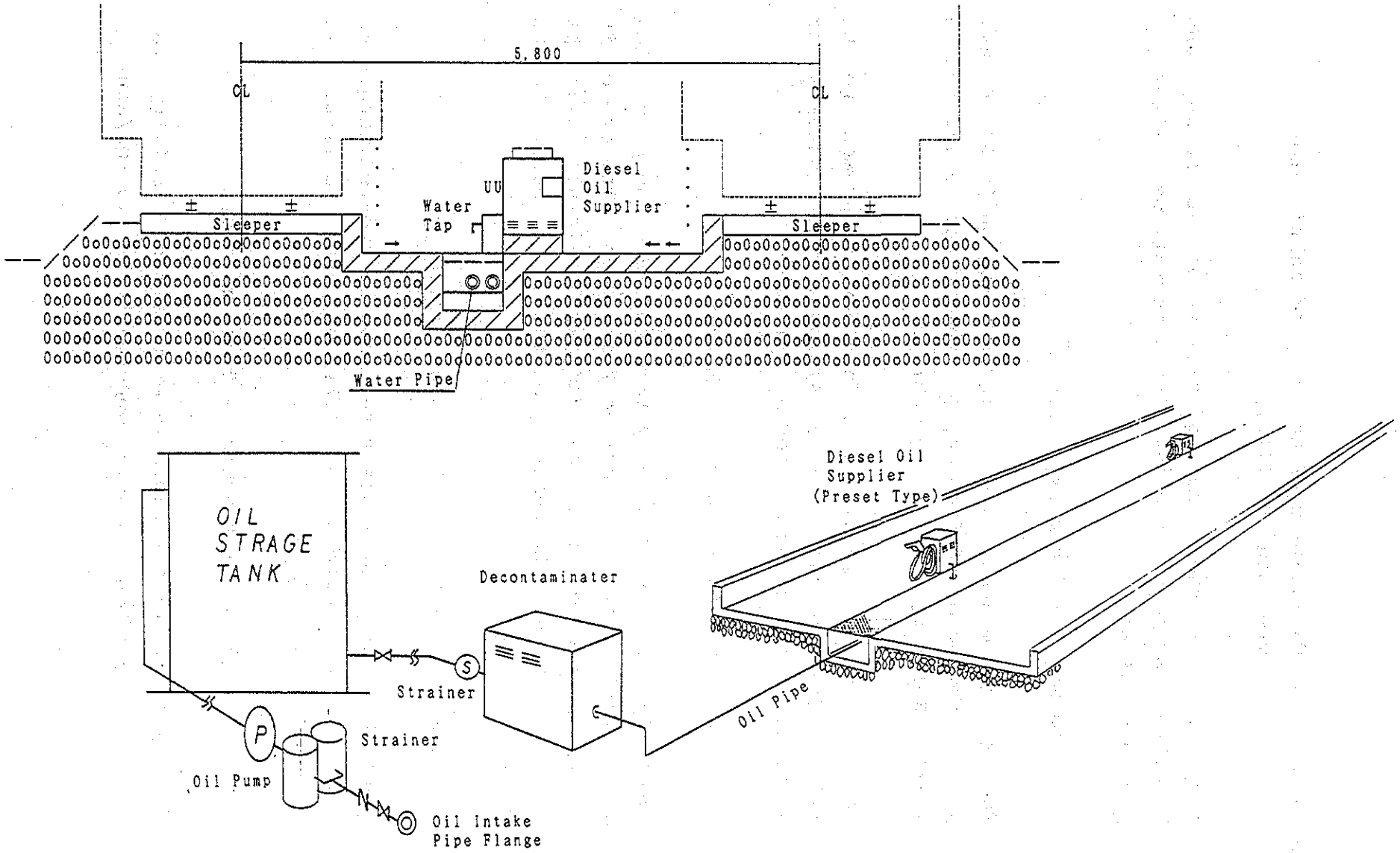


Appendix 7-4-6 Outline of the Automatic Car Washing Machine

Conception (flow sheet) for the floating-air separating waste water treatment facilities.



Appendix 7-4-7 Basic Conception of the Waste Water Treatment Facility



Appendix 7-4-8 Refueling Equipment and Piping System for the Stabling Lines

Appendix 7-4-9 Calculation of Capacity of Waste Water Treatment Facilities

1. The areas of the refueling facilities at Rawang and Seremban DMU depots are calculated as follows (Refer to Appendix 7-4-8):

   150 m (l) x 3.8 m (w) = 570 m^2

2. The maximum monthly rainfall in this region is 635.4 mm, or an average of 26.5 mm/day of rain (Nov.1984/Petaling Jaya). Refer to table 1 and Table 2.

   If the maximum rainfall for a rain day is assumed to be 200 % greater than the above average, the quantity of waste water can be calculated as follows.

   570 m^2 x 0.0265 x 2.0 = 30.2 m^3/day

   Generally, it is extremely rare to have such a high concentration rainfall continue for 2 days. Therefore, it is reasonable to assume that 2nd day's rainfall will be average. Thus, the quantity of the waste water to be treated is:

   570 m^2 x 0.0265 x (2+1) = 45.32 m^3/2 days.

   Since this volume of waste water must be treated within 48 hours, the treatment capacity of the facility is calculated as follows:

   45.32 m^3/2 days (48 hours) = 0.944 m^3/hours

   The capacity of the waste water treatment facility for refueling equipment is then computed to be 1.0 ton/hour.

As for the size of the water receiving tank for temporary storage of rain, its volume is calculated to be:

$50\ m^3 = 5\ m(l) \times 5\ m(w) \times 2\ m(h)$.

Table 1 Data of Rainfall (1)

PERKHIDMATAN KAJICUACA MALAYSIA

Station : PETALING JAYA
Lat. : 3° 06' N
Long. : 101° 39' E
Ht. above M.S.L. : 45.7 m.

Records of Monthly Rainfall Amount
Unit : mm.

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1969	168.9	53.8	140.2	99.3	380.5	221.0	81.3	480.6	98.5	402.3	220.0	198.1	2544.5
1970	232.7	29.7	235.7	257.5	245.1	52.1	126.0	40.6	196.6	158.0	188.5	262.4	2024.9
1971	466.3	174.7	194.3	253.5	149.1	103.4	269.2	223.3	248.4	160.5	213.4	368.8	2824.9
1972	96.3	173.5	35.1	221.0	77.7	161.3	60.2	56.9	185.2	257.3	310.6	289.1	1924.2
1973	137.9	225.3	151.4	405.4	565.9	101.1	68.8	266.5	123.7	322.3	241.8	316.0	2946.1
1974	86.4	106.4	191.0	306.6	161.5	50.8	120.9	17.3	237.5	125.2	249.4	176.8	1829.8
1975	78.7	179.0	193.1	281.6	154.1	70.8	235.3	172.2	210.2	228.3	192.0	115.2	2110.5
1976	188.4	117.2	413.8	281.9	67.4	146.7	66.1	287.8	53.4	304.7	274.9	225.1	2427.4
1977	144.8	127.6	210.5	201.2	320.0	152.2	85.8	110.0	147.7	392.2	251.1	160.0	2303.1
1978	187.8	162.4	283.0	170.5	213.3	11.8	78.0	114.5	193.6	252.4	178.2	195.0	2040.5
1979	78.4	136.3	217.2	302.3	75.9	200.2	183.5	102.3	189.7	297.9	460.5	157.9	2402.1
1980	91.4	178.8	297.7	264.6	133.0	180.9	134.2	238.8	137.5	159.6	440.7	238.6	2495.8
1981	151.6	267.8	183.1	451.0	457.2	19.3	156.0	112.8	210.8	308.4	281.3	143.0	2742.3
1982	60.8	325.9	402.3	545.6	151.2	250.5	83.7	221.8	209.8	316.3	439.7	248.4	3256.0
1983	206.3	177.4	148.6	157.1	378.5	132.3	151.5	117.7	232.6	376.4	261.3	216.3	2556.0
1984	202.9	498.1	146.3	240.8	236.5	119.6	183.7	124.0	198.1	125.1	635.4	307.5	3018.0
1985	94.8	185.2	297.7	174.4	423.4	11.7	105.4	124.9	172.9	283.0	257.2	288.0	2418.6
1986	206.7	107.2	228.2	384.6	205.8	107.2	290.9	55.1	127.8	198.4	205.6	182.6	2300.1
1987	231.8	140.2	250.7	526.3	272.2	165.1	66.1	158.3	203.9	602.3	215.7	343.2	2975.8
1988	272.9	331.5	234.4	444.4	216.5	228.4	191.1	322.2	363.9	107.8	323.3	118.3	3154.7
1989	203.0	105.7	351.0	166.6	82.2	157.4	97.4	171.1	296.3	269.1	375.1	434.2	2709.1
													2524 (Ave.)
1990	195.1	146.2	304.8	270.2	235.6	83.2	59.2						

Records of Number of Raindays

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1971	14	11	15	17	11	12	14	18	16	16	17	23	184
1972	9	14	8	20	13	15	8	9	14	19	24	24	177
1973	12	11	21	27	26	15	11	16	17	25	20	21	222
1974	15	14	13	20	15	9	15	6	22	15	18	17	179
1975	15	22	20	19	12	11	22	14	23	15	24	23	220
1976	12	14	22	22	10	16	13	12	14	26	21	15	197
1977	13	13	12	14	17	11	12	14	15	25	20	18	184
1978	15	17	23	16	19	7	16	9	12	21	19	16	190
1979	14	13	19	17	11	14	14	15	19	25	26	14	201
1980	13	16	23	19	14	13	18	17	17	18	25	22	215
1981	8	14	16	26	23	4	9	9	20	19	27	18	193
1982	7	17	24	25	17	12	13	16	11	22	25	18	207
1983	12	9	15	16	23	11	15	15	19	14	15	12	176
1984	23	21	22	18	17	11	15	10	17	19	26.5*	19	216
1985	10	17	24	12	19	3	11	7	20	22	29	17	191
1986	17	10	19	26	16	9	9	8	15	22	22	15	188
1987	14	9	16	21	11	15	16	15	18	25.1	20	22	201
1988	22	19	24	19	15	13	17	20	20	16	22	11	218
1989	18	13	21	14	16	13	10	16	23	19	24	16	203
													198 (Ave.)
1990	11	10	15	21	14	10	8						

2524 ÷ 198 = 12.75mm/day

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Table 2 Data of Rainfall (2)

Station: Petaling Jaya
Lat.: 3° 06'N
Long.: 101° 39'E
Ht. above M.S.L.: 45.7 m.

PERKHIDMATAN KAJICUACA MALAYSIA

Records of Mean, Highest, Lowest of Monthly and Annual Rainfall and Raindays

Period	Rainfall (mm.)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1969-1989	Mean	170.9	181.1	228.8	282.7	236.5	125.9	135.0	168.5	192.3	268.9	296.0	237.3	2523.9
	Highest	466.3	498.1	413.8	545.6	565.9	250.5	290.9	480.6	363.9	602.3	635.4	434.2	3256.0
	Year of Highest	1971	1984	1976	1982	1973	1982	1986	1969	1988	1987	1984	1989	1982
	Lowest	60.8	29.7	35.1	99.3	67.4	11.7	60.2	17.3	53.4	107.8	178.2	115.2	1829.8
	Year of Lowest	1982	1970	1972	1969	1976	1985	1972	1974	1976	1988	1978	1975	1974
	Number of Raindays													
1971-1989	Mean	14	14	19	19	16	11	13	13	17	20	22	18	196
	Highest	23	22	24	27	26	16	22	20	23	26	29	24	222
	Year of Highest	1984	1975	SEV.	1973	1973	1976	1975	1988	1975, 1989	1976	1985	1972	1973
	Lowest	7	9	8	12	10	3	8	6	11	14	15	11	176
	Year of Lowest	1982	1983, 1987	1972	1985	1976	1985	1972	1974	1982	1983	1983	1988	1983

Note : SEV. - Several Occasions

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Appendix 7-5-1 Existing Roof Ventilation of K.L. Station

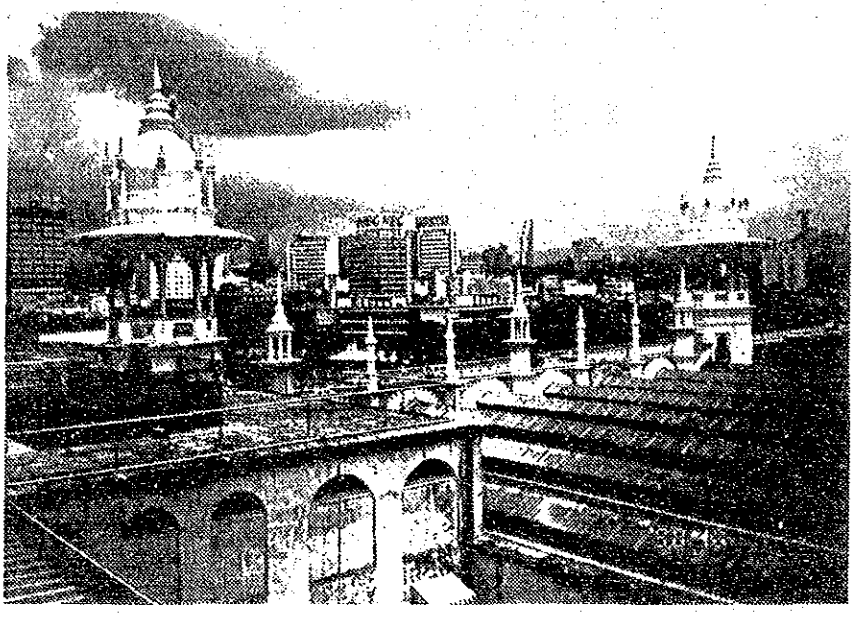

Photo 1 Natural Type Ventilators of K.L. Station Roof

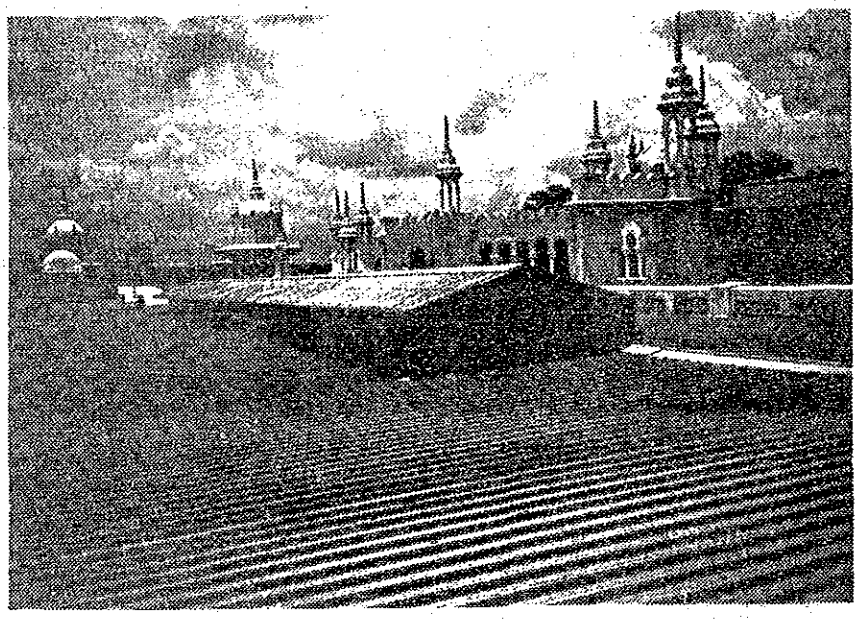

Photo 2 Proposed Site for Instration of Cooling Tower

Table 1 Records of Temperature and Relative Humidity in Petaling Jaya

PERKHIDMATAN KAJICUACA MALAYSIA

Station : PETALING JAYA
Lat.: 3° 06'N
Long.: 101° 39'E
Ht. above M.S.L.: 45.7 m.

Period	No. of years	Temperature (°C)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1971-1989	19	24 Hr. mean	26.7	27.0	27.3	27.4*	27.7	27.6	27.2	27.2	26.9	26.9	26.5	26.5	27.1
		Mean Daily max.	32.5	33.2	33.5	33.5	33.3	33.1	32.6	32.7	32.5	32.6	32.1	32.1	32.8
		Mean Daily min.	22.9	23.2	23.7	24.0	24.2	23.9	23.4	23.5	23.4	23.5	23.4	23.1	23.5
		Highest max.	35.7	36.5	36.8	37.0	36.8	36.3	36.4	35.8	35.9	36.6	34.9	35.2	37.0
		Year of Highest max.	1972, 1980	1983	1983	1979	1979	1978	1981	1981	1979	1979	SEV	1971	1979
		Lowest min.	20.4	19.9	21.2	21.1	21.9	21.1	20.9	20.6	21.5	21.1	21.1	21.0	19.9
		Year of Lowest min.	1985	1977	1971	1974	1972	1985	1982	1973	1984	1973	1976	1979, 1984	1977
		Relative Humidity (%)													
1971-1989	19	24 Hr. mean	78.5	78.5	79.5	81.9	80.9	78.8	79.2	78.5	81.1	82.0	83.9	81.8	80.4
1975-1989	15	Mean Daily Max.	95.5	95.3	95.7	96.2	95.4	94.4	94.8	94.0	95.3	95.8	96.7	96.0	95.4
		Mean Daily Min.	50.8	49.7	51.9	55.1	56.1	54.1	54.7	53.7	55.8	56.3	58.7	54.9	54.3
		Lowest Min.	32	31	33	38	39	26	38	32	36	39	43	36	26
		Year of Lowest Min.	SEV	1976, 1980	1983	1983	1979	1985	1981, 1985	1976	1987	1979	1976	1981	1985

Note: *mean for 18 years only
SEV - several occasions

/za.

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Table 2 Records of Temperature and Relative Humidity in Subang

PERKHIDMATAN KAJICUACA MALAYSIA

Station : Kuala Lumpur International Airport (Subang)
Lat.: 3° 07'N
Long.: 101° 33'E
Ht. above M.S.L.: 16.5m.

Period	No. of years	Temperature (°C)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1968-1989	22	24 Hr. mean	26.1	26.5	26.7	26.9	27.1	27.0	26.6	26.6	26.4	26.4	26.1	26.0	26.5
		Mean Daily max.	31.9	32.7	33.0	32.9	32.7	32.5	32.0	32.2	31.8	31.8	31.3	31.4	32.2
		Mean Daily min.	22.1	22.3	22.7	23.3	23.5	23.1	22.7	22.7	22.8	22.9	22.9	22.5	22.8
		Highest max.	34.7	35.7	36.8	35.8	35.2	36.8	35.4	35.9	35.4	34.7	34.8	34.7	36.8
		Year of Highest max.	1979	1983	1987	1987	1988, 1989	1985	1986	1981	1986	1988	1988, 1989	1989	1985, 1987
		Lowest min.	18.6	18.1	18.7	21.2	21.0	18.9	20.0	20.0	20.3	20.2	20.6	20.0	18.1
		Year of Lowest min.	1979, 1985	1968, 1977	1968	1971	1976	1985	1976	1976	1986	1978	SEV.	1975	1968, 1977
		Relative Humidity (%)													
1968-1989	22	24 Hr. mean	82.4	81.5	82.6	84.7	84.2	82.9	82.6	82.3	84.1	85.0	86.5	85.0	83.7
		Mean Daily Max.	98.5	98.2	98.3	98.4	98.1	97.9	97.7	97.6	98.1	98.4	98.7	98.7	98.2
		Mean Daily Min.	52.6	50.3	52.3	56.4	57.7	56.1	56.2	55.0	57.2	57.8	60.1	57.7	55.8
		Lowest Min.	30	26	28	36	37	25	34	31	35	38	44	38	25
		Year of Lowest Min.	1979	1968	1974	1978	1979	1985	1989	1981	1971	1988	1989	1979, 1989	1985

Note : Sev. - Several occasions

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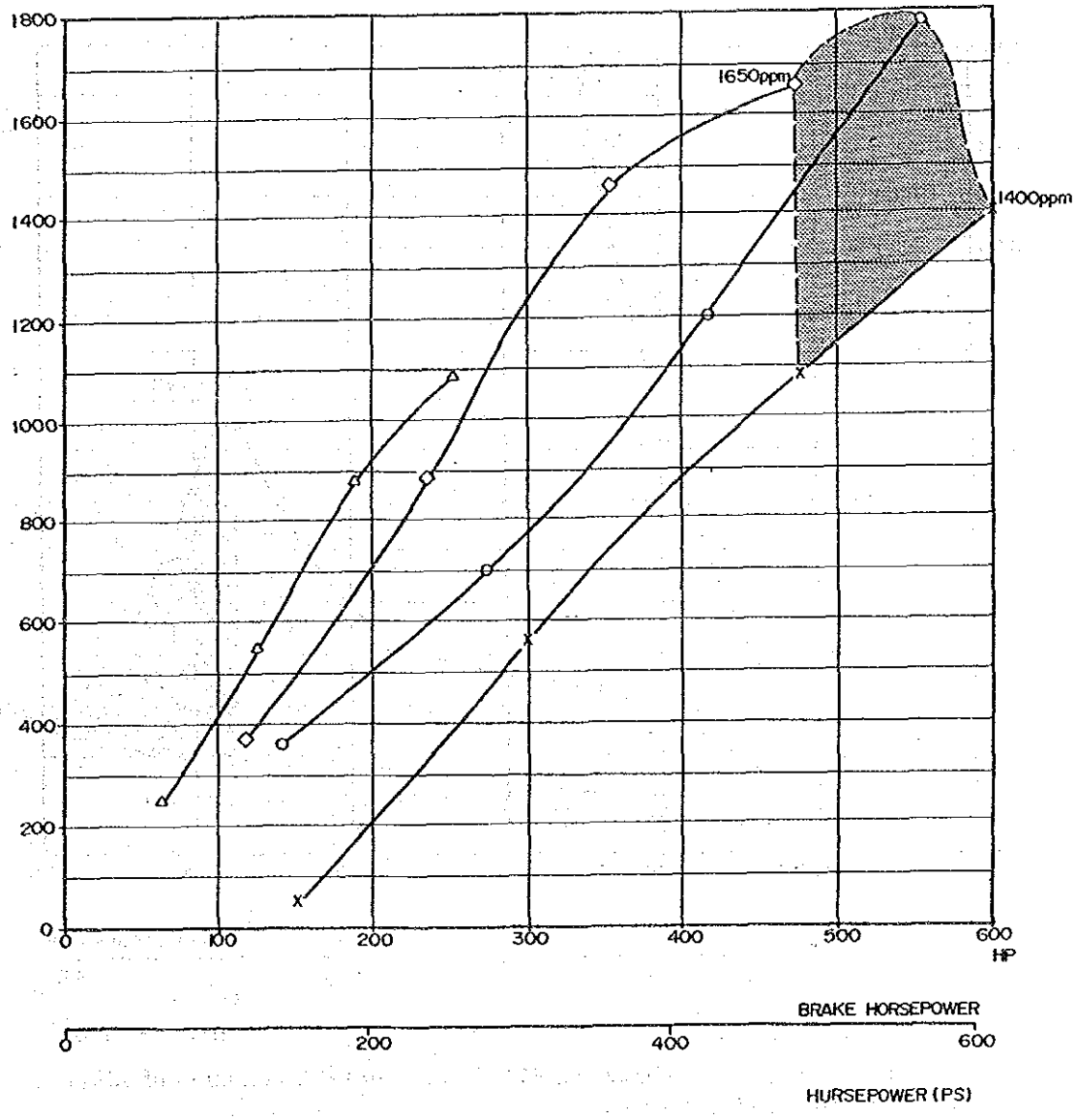
Appendix 7-5-3 NOx Emission Data of Diesel Engine (600 PS)

DLESEL ENGINE (600PS) EMISSIONS DATA

NITROUS OXIDE VS POWER

× 2100 rpm (Max. PS)
○ 1800 rpm
□ 1500 rpm (Max. Torgue)
△ 1200 rpm

Nitrous Oxide (NOx) PPM



Note: In case of using engine between 475 PS and 600 PS, emission of exhaust gas (NOx) will be in the dark area.

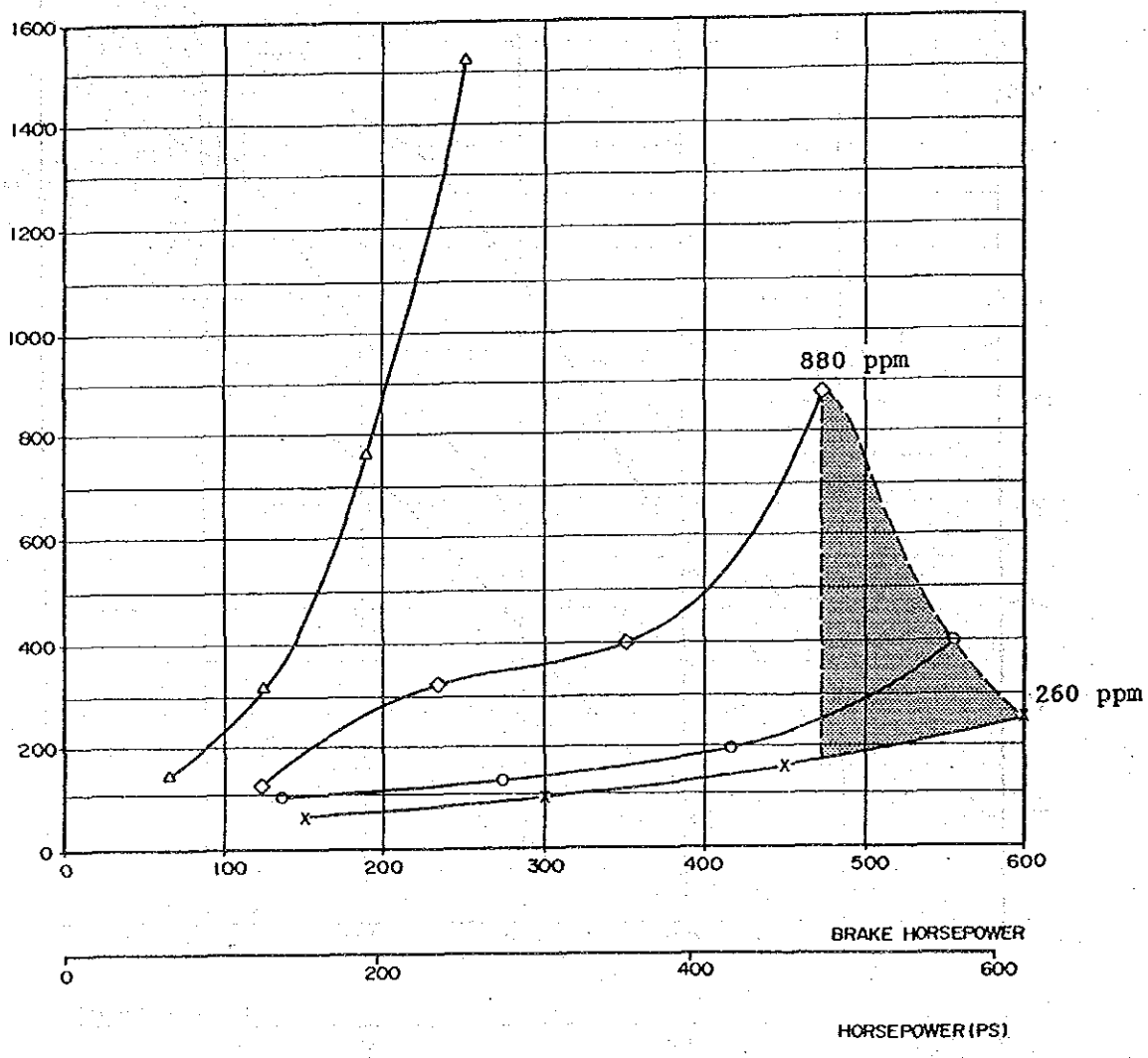
Source: KTA-19 diesel engine emission data, Cummins Engine (Japan) Ltd.

Appendix 7-5-4 CO Emission Data of Diesel Engine (600 PS)

DLESEL ENGINE (600PS) EMISSIONS DATA

CARBON MONOXIDE VS POWER

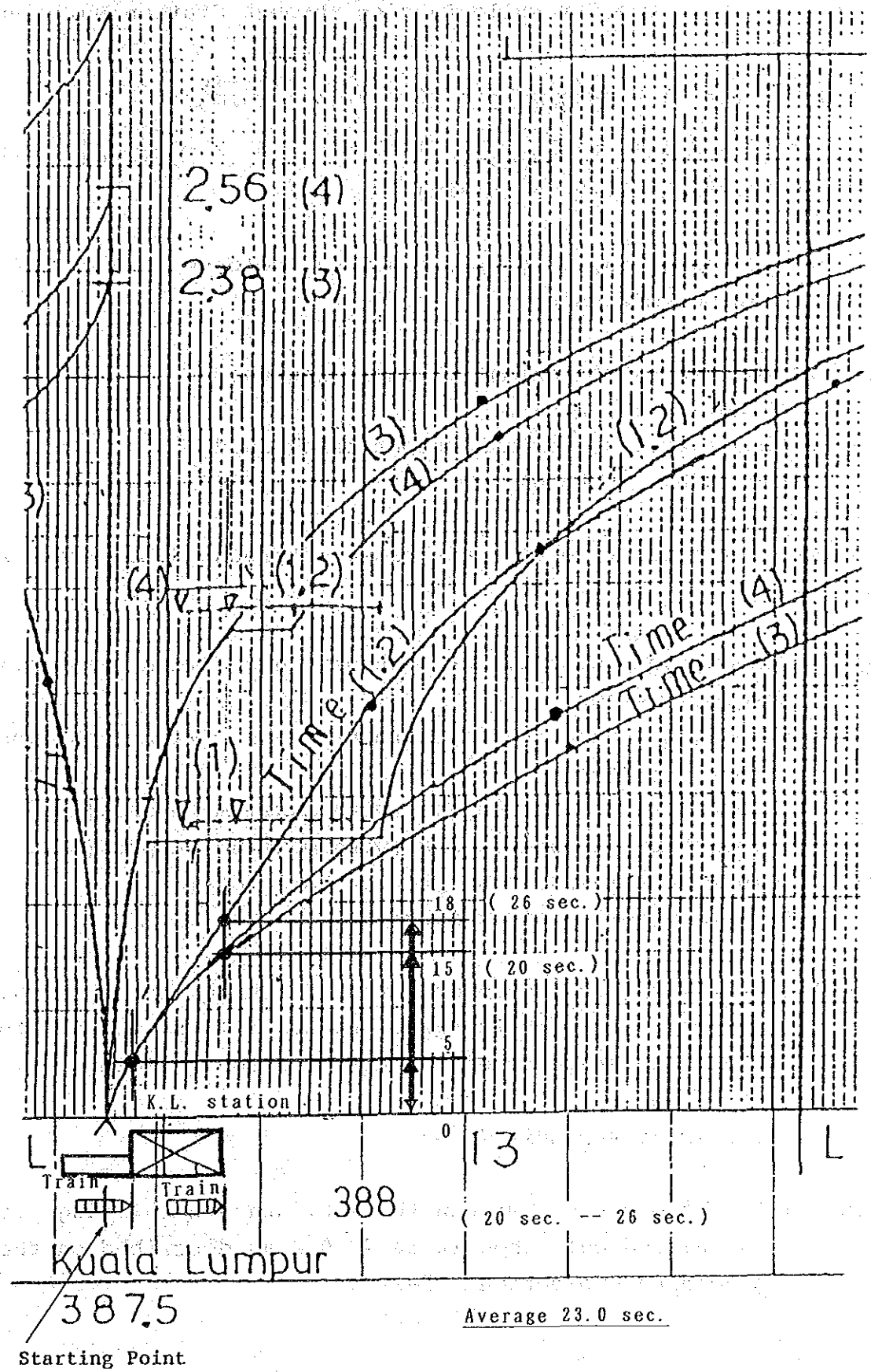
× 2100 rpm (Max. PS)
○ 1800 rpm
□ 1500 rpm (Max. Torgue)
△ 1200 rpm



Note: I n case of using engine between 475 PS and 600 PS, emission of exhaust gas (CO) will be in the dark area.

Source: KTA-19 diesel engine emission data, Cummins Engine (Japan) Ltd.

Appendix 7-5-5 Detailed Run Curres of the DMU Train at K.L. Station



Appendix 7-5-6 Calculation of Exhaust Gas Discharged by One Car While Passing Through Station Building

$$Q = (t1 \times q1 \times \frac{273+T_{KL}}{273+T1} + t2 \times q2 \times \frac{273+T_{KL}}{273+T2}) \times n$$

$$= (2.5 \times 1.17 \times \frac{273+33}{273+554} + 17.5 \times 1.77 \times \frac{273+33}{273+493}) \times 5$$

$$= 67.281 \fallingdotseq \underline{67.28} \ (m^3/train)$$

Q: Per-train quantity of exhaust gas released into K.L. Station (m^3/train)

t_1 : Time (sec.) of maximum torque being used (0 km/h - 30 km/h)

t_2 : Time (sec.) of maximum output being used (30 km/h - 50 km/h)

However, $t_1 + t_2$: time of train passage through K.L. Station (sec)

q_1 : Per-engine quantity of exhaust gas (with maximum torque) (m^3/sec)

q_2 : Per-engine quantity of exhaust gas (with maximum output) (m^3/sec)

T_1 : Temperature of exhaust gas (with maximum torque)(°C)

T_2 : Temperature of exhaust gas (with maximum output)(°C)

T_{KL} : Temperature inside K.L. Station Building (°C)

n : Per-train number of engines

Note 1 : It takes 16.0 seconds from 0 km/h to 30 km/h. However, because it takes the train 13.5 seconds to reach the entrance of the K.L. station building:
t_1 = 2.5 sec, t_2 = 17.5 sec
(Refer to Appendix 7-5-5)

Note 2 : The temperature within the K.L. station building is calculated only when it is 33.0°C as described on the preceding subsection 7-5-1(2).

Appendix 7-5-7 Computed Quantity of Harmful Exhaust Gas Discharged by One Train While It Passes Through Station Building

1) NOx Gas

$$QN = (t1 \times q1 \times PN1 \times \frac{273+T_{KL}}{273+T1} + t_2 \times q2 \times P_{N2} \times \frac{273+T_{KL}}{273+T_2}) \times n \times \varphi \times \rho$$

$$= (2.5 \times 1.17 \times \frac{1650}{10^6} \times \frac{273+33}{273+554} + 17.5 \times 1.77 \times \frac{1400}{10^6} \times \frac{273+33}{273+493}) \times 5 \times 0.9 \times 0.5$$

$$= \underline{0.04299} \ (m^3/train)$$

Q_N : Per-train quantity of NOx gas released into K.L. station Building (m^3/train)

P_{N1} : NOX concentration in exhaust gas (with maximum torque)

P_{N2} : NOx concentration in exhaust gas (with maximum output)

φ : Discount rate (600 PS: 550 PS)

ρ : Coasting rate (due to speed restriction in K.L. station yard.)

The preceding subsection applies to other matters.

2) CO Gas

$$Qc = (t1 \times q1 \times Pc1 \times \frac{273+T_{KL}}{273+T1} + t_2 \times q2 \times P_{c2} \times \frac{273+T_{KL}}{273+T_2}) \times n \times \varphi \times \rho$$

$$= (2.5 \times 1.17 \times \frac{880}{10^6} \times \frac{273+33}{273+554} + 17.5 \times 1.77 \times \frac{260}{10^6} \times \frac{273+33}{273+493}) \times 5 \times 0.9 \times 0.5$$

$$= \underline{0.009383} \ (m^3/train)$$

Qc : Per-train quantity of CO gas released into K.L. station Building (m^3/train)

Pc1 : CO concentration in exhaust gas (with maximum torque)

Pc2 : CO concentration in exhaust gas (with maximum output)

The preceding subsection applies to other matters.

Appendix 7-5-8 Air-Conditioning for K.L. Station

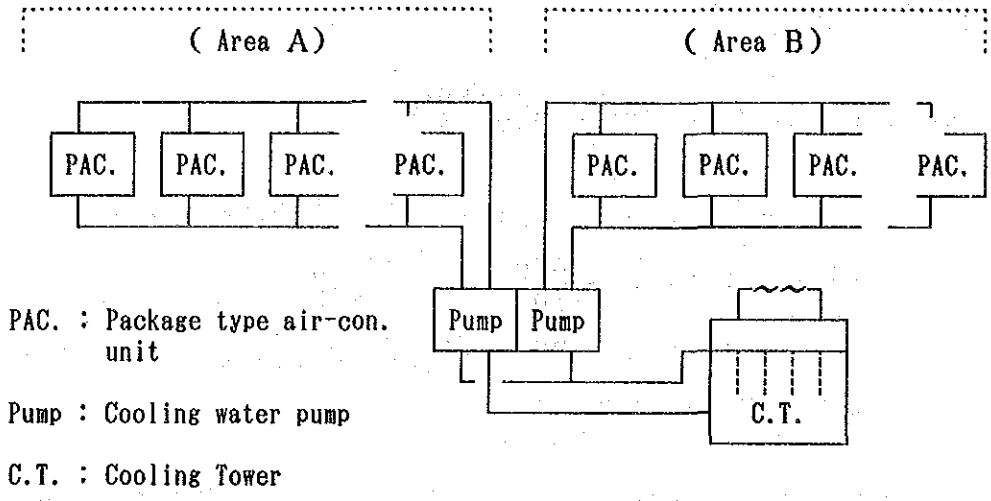


Fig. 1 Piping Diagram for Water Cooled System

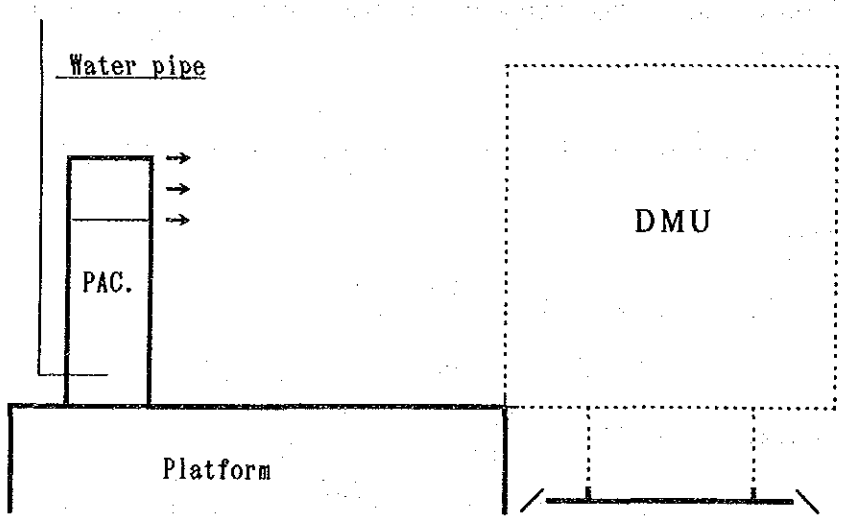


Fig. 2 Direct Blow Cooling System on a Platform

Chapter 8

FEEDER-BUS COMMUTER TRANSPORT

Appendix 8-5-1 Investment Cost and Operation/Maintenance Cost

Table 1: Feeder-Bus Unit Price

Item	Breakdown	Unit	Amount (Rgt)	Source)
1. Bus Procurement	Bus (60 seats)	Rgt/car	130,000	△
	. Import portion	"	80,000	
	. Local portion	"	50,000	
	Mini Bus (25+10)	"	70,000	△●
	. Import portion	"	50,000	●
	. Local portion	"	20,000	●
2. Bus stop at railway station		Rgt/unit	25,000	*
Facility	Labour (20%)	"	5,000	
	Material (80%)	"	20,000	
Bus stop on feeder		"	12,000	
road	Labour (20%)	"	2,400	
	Material (80%)	"	9,600	
3. Feeder Road		Rgt/km	180,000	*
Construction	Labour (20%)	"	36,000	
	Material (80%)	"	144,000	
4. Land Acquisition		Rgt/ha	50,000-130,000	□
5. Bus Maintenance	Bus	Rgt/car.km	0.18	○
	Mini Bus	"	0.09	●
6. Labour Wage	Bus	Rgt/car.year	41,000	○
	Mini Bus	"	34,000	●
7. Fuel	Bus	Rgt/car.km	0.14	○
	Mini Bus	"	0.07	●
8. Bus stop at railway station Maintenance		Rgt/Unit year		*
Bus stop on feeder road		"	840	*
9. Feederbus Road Maintenance		Rgt/km.year	9,600	*

Note:

- ○ Bus Company
- * City Hall
- △ License Board (Ministry of Transport)
- ● Atur
- □ KVPS (Property Market Report 1989)

Table 2: Investment Cost and Operation/Maintenance Cost

				1993 WT	1997 WT	2005 WT
Investment Cost	Bus Procurement	Bus	Import	12240	20187	36080
	Bus Procurement		Local	7650	12616	22550
	Bus Procurement	Mini Bus	Import	19550	19867	20500
	Bus Procurement		Local	7820	7946	8200
	Bus Station Facilities		Labor	6170	6563	7351
	Bus Station Facilities		Material	24681	26255	29404
	Road Construction		Labor	140	167	220
	Road Construction		Material	550	667	900
	Land Acquisition			439	526	700
Operation/ Maintenance Cost	Bus Operation/Maintenance		Bus	1471	2317	4010
	Bus Operation/Maintenance		Mini Bus	1828	1938	2160
	Wage		Bus	6273	10345	18491
	Wage		Mini Bus	13294	13509	13940
	Fuel		Bus	1144	1802	3119
	Fuel		Mini Bus	1421	1507	1680
	Bus Station Facilities			2159	2297	2573
	Road Pavement			1645	1763	2000
General I	No. of Feeder Passengers			105725	132085	184805
	No. of Passenger km			329231	417501	594042
	No. of Car km		Bus	8175	12877	22282
	No. of Car km		Mini Bus	20312	21542	24003
	Average Occupancy Ratio			0.75	0.75	0.75
	Average Running km/year/car		Bus	49	48	45
	Average Running km/year/car		Mini Bus	48	50	54
	Average Passenger km/year/car			392	411	450
	Average Passenger km/day/person			3.1	3.1	3.1
	Average Fare/day person (25-26 sen)			0.35	0.35	0.35

Chapter 9

POLLUTION CONTROL MEASURES

Appendix 9-4-1 Annual Reduction of Exhaust Gas in RBCS Project

Table 1 Emission Data for Diesel Engine (19,000cc)

Status of engine use	Number of revolutions (rpm)	Amount of Exhaust Gas (m^3/sec)	Temperature of Exhaust Gas (°C)
Maximum Output	2,100	1.77	493
Maximum torque	1,500	1.177	554
Idling	625	0.206	150

2. The quantity of exhaust gas under standard conditions (0°C, 1 atm.) is calculated from the figures in Table 1 as follows:

1) 2,100 rpm --- $1.700 \times \frac{273}{273 + 493} = \underline{0.6308}$ Nm^3/sec

2) 1,500 rpm --- $1.177 \times \frac{273}{273 + 554} = \underline{0.3885}$ Nm^3/sec

3) 625 rpm --- $0.206 \times \frac{273}{273 + 150} = \underline{0.1329}$ Nm^3/sec

3. Considering that the running pattern of train, the same method of calculation used in section 6-6 (Calculation of Fuel Consumption) is applied. To estimate the quantity of exhaust gas produced by the different types of train operation listed below, computed as follows:

a) Power running
$(0.6308 + 0.3885)/2 = \underline{0.5097}$ Nm^3/sec

b) Coasting
$0.6308 \times 0.1 + 0.1329 \times 0.9 = \underline{0.1827}$ Nm^3/sec

c) Idling $\underline{0.1329}$ Nm^3/sec

The amount of annual exhaust gas from DMUs is calculated using these data (see Tables 2 and 3).

Table 2 Emission per Engine

Table 2 Emission per Engine

Area	Route Section	Sheduled Operation Time (Sec.)	Acceleration Period (Sec.) Local	Acceleration Period (Sec.) Rappid	Acceleration Ratio (%)	Cruising, Coastering and Braking Ratio (%)	Stopping Time at Station (1 min)	K.L. Station (2.5min)	Emission of Exhaust Gas (Nm3) Acceler-ation 0.510 (Nm3/sec)	Coaster-ing etc. 0.183 (Nm3/sec)	Idling 0.133 (Nm3/sec)	Total Estimation (Nm3)
Northern Part	Rawang -->> K.L. (Local)	2,160	1,102		50.00	50.00	9.0	2.5	493 deg/c	554 deg/c	150 deg/c	262.316
	Rawang <<-- K.L. (Local) (KL 1/2)		1,046						196.180	65.149	0.987	
	(KL 3/4)		1,070									
	Average	2,160	1,058									
	Round Trip Time	4,320	2,160						(one way/one engine) Total 262.316 Nm3			
Southern Part	K.L. -->> Bangi (Local) (KL 1/2)		1,178		47.35	52.65	7.0	2.5	206.443	76.218	0.815	283.477
	(KL 3)		1,112									
	(KL 4)		1,128									
	Average	2,400	1,149									
	K.L. <<-- Bangi (Local)	2,400	1,124									
	Round Trip Time	4,800	2,273						(one way/one engine) Total 283.477 Nm3			
	K.L. -->> Seremban (Rapid) (KL 1/2)			1,682	46.43	53.57	2.0	2.5	288.458	110.512	0.386	419.324
	(KL 3)			1,782								
	(KL 4)			1,798								
	Average	3,420		1,736								
	K.L. <<-- Seremban (Rapid)	3,420		1,440								
	Round Trip Time	6,840		3,176					(one way/one engine) Total 399.356 Nm3			
	Bangi -->> Seremban (Shuttle)	1,950	1,124		87.74	12.26	6.0	0.0	166.589	7.728	0.276	183.322
	Bangi <<-- Seremban (Shuttle)	1,950	2,298									
	Round Trip Time	3,900	3,422						(one way/one engine) Total 174.593 Nm3			

Table 3 Emission per Year

Area	Route Section	Emission of Exhaust Gas (Nm3) one way and one engine)	Year 1997			Year 2001			Year 2005		
			Number of Trains / Day	Number of Engines / Train	Sectional Emission of Exhaust Gas per Day	Number of Trains / Day	Number of Engines / Train	Sectional Emission of Exhaust Gas per Day	Number of Trains / Day	Number of Engines / Train	Sectional Emission of Exhaust Gas per Day
Northern Part	Rawang -->> K.L. (Local) Rawang <<-- K.L. (Local)	262.316	88	Ave. 3.6842	85,045	88	4	92,335	102	5	133,781
Southern Part	K.L. -->> Bangi (Local) K.L. <<-- Bangi (Local)	283.477	69	3.6842	72,063	69	4	78,240	72	5	102,052
	K.L. -->> Seremban (Rapid) K.L. <<-- Seremban (Rapid)	419.324	34	3.6842	52,526	34	4	57,028	34	5	71,285
(m3)	Bangi -->> Seremban (Shuttle) Bangi <<-- Seremban (Shuttle)	183.322	22	1	4,033	22	1	4,033	22	1	4,033
Grand Total				Nm3/Year	77,988,408		Nm3/Year	84,547,188		Nm3/Year	113,570,182

Appendix 9-5-1 Waste Water Treatment Conducted by JR Group

(Oil and grease - SS: unit mg/l)

Type of waste water	Type	PH	Oil and grease	COD	BOD	SS
Waste water from workshop	A	10.2	150	68	70	135
	B	7.1	3.5	16	14	10
Waste water from cleaning car bodies and parts	A	6.0	35	34	40	70
	B	7.0	2.2	8	5	9
Waste water containing grease and emulsion for metal shaping	A	8.4	120	26	10	40
	B	7.0	2.8	5	3	3
Waste water from cleaning, paining and other operations	A	9.2	25	30	36	190
	B	7.2	1.0	4	6	8

(Note) Type A : Before treatment
B : After treatment

PH : PH Value
BOD : Biochemical Oxygen Demand
COD : Chemical Oxygen Demand
SS : Suspended Solid
JR : Japanese Railway

Chapter 11

ECONOMIC ANALYSIS

Appendix 11-2-1 Units Cost for Time Value

(1) Growth Rate of Consumer Index

	1985*-1	1990*-2	1990/1985
Consumer Index	125.1	136.8	1.09

*-1 : Department of Statistic (June, 1987)

*-2 : Department of Statistic (June, 1990)
Average index from January to June

(2) Time Value for Vehicle Type (M$/hour/vehicle)

	Occupancy (Per Person)*-1	Time Value	
		1985*-1	1990
Passenger Car	1.8	4.57	4.98
Buses	30.0	32.10	34.99
Motorcycle	1.2	1.28	1.40

*-1 : Klang Valley Transportation Study, 1987

(3) Time Value for Driver/Conductor (M$/year/vehicle)

	1985*-1	1990
Taxi	7390	8055
Bus	28420	30978
Van/Pick-Up	7390	8055
Medium Lorry	14200	15478

*-1 : Klang Valley Transportation Study, 1987

(4) Time Value for Railway User(M$/hour/person)

	1985*-1	1990
Non Vehicle Owner	1.07	1.17

*-1 : Klang Valley Transportation Study, 1987

Appendix 11-2-2 Running Cost and Fixed Cost

	Motor-Cycle	Moter car	Taxi	Bus-Stage	Van/Pick-up	Medium Lorry
1.Fuel consumption(Km/l)	28	9	10	5	9	5
2.Fuel cost($/l)	0.73	0.73	0.73	0.65	0.65	0.65
3.Oil consumption(l/1000km)	0.560	1.410	2.120	2.820	2.120	2.820
4.Oil cost($/l)	4.130	6.270	6.270	3.880	3.880	3.880
5.Tyre cost($)	49	424	405	2545	558	2545
6.Tyre usefull life(1000km)	60	50	50	60	20	20
7.Vehicle cost less tax($)	3217	21897	18877	104000	25481	66474
8.Vehicle cost less tax and tyre($)	3168	21473	18472	101455	24923	63929
9.Maintenance and repair rate(%/year)	7	8	19	19	8	15
10.Annual maintenace cost($)	222	1718	3510	19276	1994	9589
11.Annual running Km	11200	19200	96000	104000	24000	48000
12.Vehicle average life(year)	7	10	5	12	10	10
13.Residual value($)	475	4295	4618	15218	2492	9589
14.Capital recovery factor at 12%	0.2191	0.1770	0.2774	0.1770	0.1770	0.1770
15.Sinking fund factor at 12%	0.0991	0.0579	0.1574	0.0579	0.0579	0.0579
16.Annual depreciation and interest	647	3552	4397	17076	4267	10760
a.Interest($)	262	1834	1626	9890	2024	5326
b.Depreciation($)	385	1718	2771	7186	2243	5434
17.Time related depreciation						
a.Percent(%)	70	70	15	30	40	30
b.Annually($)	269	1202	416	2156	897	1630
18.Distance related depreciation						
a.Annually($)	115	515	2355	5030	1346	3804
b.Per km(Cent)	1.03	2.68	2.45	4.84	5.61	7.92
19.Time Related Cost($ per annual)						
a.Depreciation	269	1202	416	2156	897	1630
b.Interest	262	1834	1626	9890	2024	5326
c.Crew cost	0	0	8055	30978	8055	15478
d.Overhead	0	0	5236	17657	3383	10835
Total	532	3037	15333	60681	14359	33269
e.Operation hours per annual	1000	1750	3000	3500	2500	3500
f.Time cost per hour($ per hour)	0.53	1.74	5.11	17.34	5.74	9.51
g.Fleet factor	0.000	0.000	1.000	0.700	0.500	0.700
g.Effective value($ per hour)	0.000	0.000	5.111	12.136	2.872	6.654
20.Distance related cost						
a.Depreciation	115	515	2355	5030	1346	3804
b.Maintenance	222	1718	3510	19276	1994	9589
c.Fuel cost	292	1557	7008	13520	1733	6240
d.Engin oil cost	26	170	1276	1138	197	525
e.Tyre cost	9	163	778	4411	670	6108
f.Total	664	4123	14927	43376	5940	26266
g.Annual km	11200	19200	96000	104000	24000	48000
h.Running cost(cent per km)	5.93	21.47	15.55	41.71	24.75	54.72
a.Fuel and oil cost	2.84	9.00	8.63	14.09	8.04	14.09
b.others	3.09	12.48	6.92	27.61	16.71	40.63

Appendix 11-2-3 Vehicle Running Cost by Travel Speed

Unit:100 Vehicle-Km(M$)

Speed Km/h	Motercycle	Motercar	Bus	Truck
5	8.70	28.20	140.77	184.43
10	8.17	26.91	112.10	147.05
15	7.35	25.91	88.63	116.24
20	6.98	24.62	72.99	95.73
25	6.72	23.76	62.57	82.14
30	6.33	23.33	54.74	71.83
35	6.06	22.33	50.89	66.67
40	5.93	21.90	48.28	63.39
45	5.93	21.47	45.68	59.88
50	6.06	21.47	42.96	56.36
55	6.06	21.90	41.71	54.72
60	6.19	22.33	43.07	56.48
65	6.33	23.33	44.32	58.12
70	6.59	24.19	45.68	59.88
75	6.85	25.05	46.92	61.52
80	7.25	25.91	48.28	63.39

Appendix 11-3-1 Economic Analysis for Base Case

Discount Rate = 12%

Benefit-Cos	382657
Benefit/Cos	1.55
EIRR	28.81%
Unit:1000M$	

Year	Initial Investment Cost								
	D/D	Station & Civil	Signal & Telecom	DMU & Workhop	Bus Procurement	Bus Stop Facility	Access Road	Land Purchase	Sub Total
1993	3131	1760	0	0	0	0	0	0	4891
1994	2795	1571	0	0	0	0	0	0	4367
1995	0	26766	18236	0	0	0	0	0	45002
1996	0	23197	22805	147130	0	18921	487	330	212868
1997	0	0	0	0	32727	253	18	12	33011
1998	0	1695	0	0	1547	226	16	11	3495
1999	0	0	0	7373	1382	202	15	10	8981
2000	0	0	0	19342	1234	180	13	9	20777
2001	0	1370	0	0	1101	161	12	8	2651
2002	0	0	0	0	983	144	10	7	1144
2003	0	0	0	0	9000	128	9	6	9144
2004	0	262	2142	23218	802	114	8	5	26552
2005	0	0	2501	0	690	102	7	5	3305
2006	0	901	0	0	29	0	0	0	930
2007	0	0	0	0	26	0	0	0	26
2008	0	0	0	0	23	0	0	0	23
2009	0	0	0	0	8411	0	0	0	8411
2010	0	0	0	0	406	0	0	0	406
2011	0	118	0	0	363	0	0	0	481
2012	0	0	0	0	317	0	0	0	317
2013	0	0	0	0	283	0	0	0	283
2014	0	73	690	0	239	0	0	0	1002
2015	0	248	805	0	2310	0	0	0	3363
2016	0	546	0	113	206	0	0	0	865
2017	0	0	0	0	177	0	0	0	177
2018	0	0	0	0	7	0	0	0	7
2019	0	0	0	764	7	0	0	0	771
2020	0	0	321	0	6	0	0	0	327
2021	0	38	398	8566	2159	0	0	0	11161
2022	0	-791	-1238	-8883	-1612	0	0	0	-12524
Total	5926	57754	46659	197623	62823	20430	597	402	392213

Year	Operation and Maintenance						Total	Benefit Items		
	Fuel & Personnel	Station & Civil	Signal & Telecom	DMU & Workshop	Feeder	Sub Total		Time Saving	VOC	Total
1993	0	0	0	0	0	0	4891	0	0	0
1994	0	0	0	0	0	0	4367	0	0	0
1995	0	0	0	0	0	0	45002	0	0	0
1996	0	0	0	0	0	0	212868	0	0	0
1997	2535	961	1817	7374	18487	31174	64184	40152	90169	130321
1998	2283	910	1622	6584	17232	28633	32128	38138	64886	103024
1999	2057	813	1449	6247	16035	26600	35581	36094	56588	92682
2000	1852	726	1293	5578	14896	24345	45122	34050	49323	83373
2001	1836	690	1155	1307	13817	18806	21457	32030	42965	74995
2002	1664	616	1031	1167	12799	17277	18422	30052	37403	67455
2003	1495	550	921	1042	11840	15848	24992	28130	36682	64812
2004	1344	499	822	931	10939	14535	41087	26275	28299	54574
2005	1680	446	734	1996	10096	14952	18256	24494	24571	49066
2006	1504	398	655	1782	9014	13354	14284	21870	21587	43457
2007	1343	355	585	1591	8049	11923	11949	19527	19274	38801
2008	1199	317	522	1421	7186	10645	10669	17435	17209	34644
2009	1070	283	466	1268	6416	9505	17915	15567	19644	35211
2010	956	253	416	1133	5729	8486	8893	13899	13917	27816
2011	853	226	372	1011	5115	7577	8058	12410	12426	24835
2012	762	202	332	903	4567	6765	7082	11080	11091	22171
2013	680	180	296	806	4078	6040	6323	9893	9902	19795
2014	607	161	265	720	3641	5393	6395	8833	8835	17667
2015	542	144	236	643	3251	4815	8179	7887	8957	16844
2016	484	128	211	574	2902	4299	5164	7042	7051	14092
2017	432	114	188	512	2591	3839	4016	6287	6292	12579
2018	386	102	168	457	2314	3428	3435	5613	5541	11154
2019	345	91	150	408	2066	3060	3831	5012	4947	9959
2020	308	81	134	365	1845	2732	3059	4475	4417	8892
2021	275	73	120	326	1647	2440	13600	3996	5042	9038
2022	245	65	107	291	1470	2178	-10346	3567	2697	6264
Total	28737	9386	16069	46437	198021	298650	690864	463806	609715	1073521

Chapter 12

FINANCIAL ANALYSIS

Appendix 12-7-1 Financial Analysis for Railway Service (Unit: 1000 M$)

Income Statement

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	1,774	4,704	7,447	8,695	6,623	9,377	12,313	15,113	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677
Operating Revenue	0	0	0	0	39,379	42,352	45,325	48,298	51,272	54,245	57,218	60,191	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164
Operating Expense	0	0	0	0	37,605	37,648	37,878	39,604	44,648	44,868	44,904	45,077	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487
Maintenance Cost	0	0	0	0	18,625	18,625	18,738	19,579	22,035	22,119	22,119	22,164	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708
Personnel Cost	0	0	0	0	2,095	2,138	2,181	2,225	2,268	2,352	2,389	2,425	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462
Fuel Cost	0	0	0	0	2,605	2,605	2,605	2,605	3,079	3,079	3,079	3,079	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190
Depreciation Cost	0	0	0	0	14,280	14,280	14,353	15,195	17,267	17,318	17,318	17,409	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127

Investment

Investment Total	3,596	3,596	47,124	306,684	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	24,146	0	0	0	1,049	0	0	908	0	0	31,433	0	0	16,825	1,049	238,994
Local Currency Total	0	0	26,659	70,246	0	3,473	3,862	6,414	2,693	0	0	12,419	0	0	7,004	0	0	0	177	0	0	153	0	0	7,949	0	0	3,862	177	31,506
Foreign Currency Total	3,596	3,596	20,465	236,438	0	180	12,963	42,758	872	0	0	81,520	0	0	17,142	0	0	0	872	0	0	755	0	0	23,484	0	0	12,963	872	207,488
Civil Work	0	0	21,376	32,983	0	3,653	0	0	3,765	0	0	1,059	0	0	4,555	0	0	0	1,049	0	0	908	0	0	10,060	0	0	0	1,049	0
Local Currency	0	0	18,461	24,135	0	3,473	0	0	2,893	0	0	304	0	0	1,026	0	0	0	177	0	0	153	0	0	1,301	0	0	0	177	0
Foreign Currency	0	0	2,915	8,848	0	180	0	0	872	0	0	755	0	0	3,529	0	0	0	872	0	0	755	0	0	8,759	0	0	0	872	0
Signal & Telecom	0	0	25,748	35,854	0	0	0	0	0	0	0	0	0	0	19,591	0	0	0	0	0	0	0	0	0	19,591	0	0	0	0	3,724
Local Currency	0	0	8,198	14,504	0	0	0	0	0	0	0	0	0	0	5,978	0	0	0	0	0	0	0	0	0	5,978	0	0	0	0	819
Foreign Currency	0	0	17,550	21,450	0	0	0	0	0	0	0	0	0	0	13,613	0	0	0	0	0	0	0	0	0	13,613	0	0	0	0	2,905
Rolling Stock	0	0	0	235,270	0	0	0	49,172	0	0	0	92,880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	235,270
Local Currency	0	0	0	30,687	0	0	0	6,414	0	0	0	12,115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,687
Foreign Currency	0	0	0	204,583	0	0	0	42,758	0	0	0	80,765	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204,583
Machinery at Depot	0	0	0	2,477	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,782	0	0	0	0	0
Local Currency	0	0	0	920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	670	0	0	0	0	0
Foreign Currency	0	0	0	1,557	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,112	0	0	0	0	0
Machinery at Workshop	0	0	0	0	0	0	16,825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,825	0	0
Local Currency	0	0	0	0	0	0	3,862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,862	0	0
Foreign Currency	0	0	0	0	0	0	12,963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,963	0	0
Engineering & Consul (Foreign c	3,596	3,596	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-Salvage Value																														327,864
Int. During Construction	216	521	3,462	23,082																										

Finance Program

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance																														
Borrowing	3,812	4,117	50,586	329,766	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	10,488	23,908	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	55,469	55,469	55,990	58,394	65,419	65,956	65,956	65,956	10,488	23,908	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0
Balance	3,812	7,928	58,514	388,280	388,280	391,933	408,758	402,462	350,758	294,768	236,374	264,894	198,937	132,981	122,493	98,585	75,280	54,217	40,260	26,840	13,420	0	0	0	0	0	0	0	0	0
Interest	216	521	3,462	23,082	31,062	31,355	32,701	36,634	32,498	28,061	23,581	26,425	21,192	15,915	10,638	9,799	7,887	6,016	4,337	3,221	2,147	1,074	0	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	-15,008	-12,370	-10,900	-68,214	-64,077	-57,356	-52,344	-59,322	-58,344	-53,068	-16,469	-4,904	-2,469	1,805	9,460	12,163	13,237	13,402	28,804	28,804	-2,629	28,804	28,804	11,979	27,755	117,673
Cumulative Net Cash Flow	0	0	0	0	-15,008	-27,378	-38,278	-106,492	-170,569	-227,925	-280,269	-339,591	-397,935	-451,003	-467,472	-472,375	-474,844	-473,039	-463,579	-451,416	-438,180	-424,778	-395,974	-367,170	-369,800	-340,996	-312,192	-300,214	-272,459	-154,786

Cash Flow Statement

Cash In	3,812	4,117	50,586	329,766	16,055	22,637	38,628	73,061	27,655	26,695	29,631	126,461	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804
Operating Profit	0	0	0	0	1,774	4,704	7,447	8,695	6,623	9,377	12,313	15,113	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677
Depreciation	0	0	0	0	14,280	14,280	14,353	15,195	17,267	17,318	17,318	17,409	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127
Borrowing	3,812	4,117	50,586	329,766	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	3,812	4,117	50,586	329,766	31,062	35,008	49,526	141,275	91,732	84,051	81,975	185,783	87,148	81,871	45,272	33,707	31,273	26,998	19,344	16,641	15,567	15,401	0	0	31,433	0	0	16,825	1,049	-88,870
Investment	3,596	3,596	47,124	306,684	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	24,146	0	0	0	1,049	0	0	908	0	0	31,433	0	0	16,825	1,049	-88,870
Int. During Construction	216	521	3,462	23,082	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	55,469	55,469	55,990	58,394	65,419	65,956	65,956	10,488	23,908	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0	0
Interest	0	0	0	0	31,062	31,355	32,701	36,634	32,498	28,061	23,581	26,425	21,192	15,915	10,638	9,799	7,887	6,016	4,337	3,221	2,147	1,074	0	0	0	0	0	0	0	0
Cash Flow for FIRR	-3,596	-3,596	-47,124	-306,684	16,055	15,331	4,976	-25,283	20,125	26,695	29,631	-61,417	28,804	28,804	4,658	28,804	28,804	28,804	27,755	28,804	28,804	27,896	28,804	28,804	-2,629	28,804	28,804	11,979	27,755	117,673

FIRR 2.54%

Appendix 12-7-2 Financial Analysis for Feeder Bus Service (Unit: 1000 M$)

Income Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	866	1,031	1,185	1,360	1,524	1,689	1,899	2,109	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371
Operating Revenue	0	0	0	0	39,626	41,603	43,560	45,557	47,534	49,511	51,488	53,465	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442
Operating Expense	0	0	0	0	38,759	40,572	42,384	44,197	46,009	47,822	49,589	51,356	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071
Bus	0	0	0	0	17,183	18,855	20,527	22,199	23,871	25,543	27,215	28,887	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507
Mini Bus	0	0	0	0	21,576	21,717	21,857	21,998	22,139	22,279	22,374	22,469	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564
Maintenance Cost	0	0	0	0	4,257	4,496	4,735	4,975	5,214	5,453	5,692	5,932	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171
Bus	0	0	0	0	2,318	2,529	2,741	2,953	3,164	3,376	3,588	3,799	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011
Mini bus	0	0	0	0	1,939	1,966	1,994	2,022	2,050	2,077	2,105	2,133	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160
Personnel Cost	0	0	0	0	23,830	24,923	26,016	27,109	28,202	29,295	30,354	31,413	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431
Bus	0	0	0	0	10,332	11,357	12,382	13,407	14,432	15,457	16,482	17,507	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491
Mini Bus	0	0	0	0	13,498	13,566	13,634	13,702	13,770	13,838	13,872	13,906	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940
Fuel Cost	0	0	0	0	3,311	3,497	3,683	3,869	4,055	4,241	4,427	4,614	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
Bus	0	0	0	0	1,803	1,967	2,132	2,297	2,461	2,626	2,790	2,955	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119
Mini Bus	0	0	0	0	1,508	1,529	1,551	1,573	1,594	1,616	1,637	1,659	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680
Depreciation Cost	0	0	0	0	7,362	7,656	7,950	8,244	8,538	8,833	9,115	9,398	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669
Bus	0	0	0	0	2,730	3,001	3,272	3,543	3,813	4,084	4,355	4,626	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886
Mini Bus	0	0	0	0	4,632	4,655	4,678	4,702	4,725	4,748	4,760	4,772	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783
Investment																														
Investment Total	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460	3,460	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460
Local Currency Total	0	0	0	0	20,540	1,290	1,290	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310	1,310	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310
Foreign Currency Total	0	0	0	0	40,010	2,100	2,100	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150	2,150	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150
Bus	0	0	0	0	32,760	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,120	0	0	0	32,760	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,120	0	0	0	32,760	3,250
Local Currency	0	0	0	0	12,600	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,200	0	0	0	12,600	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,200	0	0	0	12,600	1,250
Foreign Currency	0	0	0	0	20,160	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1,920	0	0	0	20,160	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1,920	0	0	0	20,160	2,000
Mini Bus	0	0	0	0	27,790	140	140	140	140	140	27,860	210	210	140	140	140	27,860	210	210	140	140	140	27,860	210	210	140	140	140	27,860	210
Local Currency	0	0	0	0	7,940	40	40	40	40	40	7,960	60	60	40	40	40	7,960	60	60	40	40	40	7,960	60	60	40	40	40	7,960	60
Foreign Currency	0	0	0	0	19,850	100	100	100	100	100	19,900	150	150	100	100	100	19,900	150	150	100	100	100	19,900	150	150	100	100	100	19,900	150
-Salvage Value																														54,790
Int. During Construction	0	0	0	0																										

Finance Program	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance																														
Borrowing	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	3,320	3,320	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	8,650	9,134	9,619	10,103	10,587	11,071	11,546	3,370	3,341	2,857	2,373	1,889	1,404	930	456	0	0	0	0	0	0	0
Balance	0	0	0	0	60,550	63,940	67,330	70,720	65,460	59,716	53,417	46,634	39,237	28,166	16,620	13,250	9,909	7,051	4,679	2,790	1,386	456	0	0	0	0	0	0	0	0
Interest	0	0	0	0	4,844	5,115	5,386	5,658	5,929	5,508	5,043	4,539	3,986	3,139	2,253	1,330	1,060	793	564	374	223	111	36	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	3,384	3,572	3,759	3,946	-4,516	-4,121	-31,438	-3,276	-2,673	-2,311	-1,899	7,200	-52,982	4,930	5,643	6,387	7,022	7,609	-19,562	8,580	8,710	11,900	11,900	11,900	-48,580	63,370
Cumulative Net Cash Flow	0	0	0	0	3,384	6,956	10,715	14,661	10,144	6,023	-25,415	-28,690	-31,363	-33,674	-35,573	-28,373	-81,355	-76,425	-70,782	-64,395	-57,373	-49,764	-69,326	-60,746	-52,037	-40,137	-28,237	-16,337	-64,918	-1,548

Cash Flow Statement																														
Cash In	0	0	0	0	68,778	12,077	12,535	12,994	13,452	13,911	14,334	14,826	15,230	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040	12,040
Operating Profit	0	0	0	0	866	1,031	1,185	1,360	1,524	1,689	1,899	2,109	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371
Depreciation	0	0	0	0	7,362	7,656	7,950	8,244	8,538	8,833	9,115	9,398	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669
Borrowing	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	3,320	3,320	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	0	0	0	0	65,394	8,505	8,776	9,048	17,969	18,032	45,771	18,102	17,903	14,350	13,939	4,840	65,021	7,110	6,397	5,653	5,017	4,431	31,602	3,460	3,330	140	140	140	60,620	-51,330
Investment	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460	3,460	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	-51,330
Int. During Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	8,650	9,134	9,619	10,103	10,587	11,071	11,546	3,370	3,341	2,857	2,373	1,889	1,404	930	456	0	0	0	0	0	0	0
Interest					4,844	5,115	5,386	5,658	5,929	5,508	5,043	4,539	3,986	3,139	2,253	1,330	1,060	793	564	374	223	111	36	0	0	0	0	0	0	0
Cash Flow for FIRR	0	0	0	0	-52,322	5,297	5,755	6,214	6,672	7,131	-20,096	8,046	8,710	11,900	11,900	11,900	-48,580	8,580	8,580	8,650	8,650	8,650	-19,070	8,580	8,710	11,900	11,900	11,900	-48,580	63,370

FIRR% 5.21%

Appendix 12-7-3 Financial Analysis for Railway Service & Feeder Bus Service
(Unit: 1000 M$)

Income Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	2,641	5,735	8,643	10,054	8,147	11,066	14,212	17,222	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047
Railway	0	0	0	0	1,774	4,704	7,447	8,695	6,623	9,377	12,313	15,113	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677	7,677
Feeder Bus	0	0	0	0	866	1,031	1,195	1,360	1,524	1,689	1,899	2,109	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371
Operating Revenue	0	0	0	0	79,005	83,955	88,905	93,855	98,805	103,755	108,705	113,655	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605
Railway	0	0	0	0	39,379	42,352	45,325	48,298	51,272	54,245	57,218	60,191	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164
Feeder Bus	0	0	0	0	39,626	41,603	43,580	45,557	47,534	49,511	51,488	53,465	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442
Operating Expense	0	0	0	0	76,364	78,220	80,262	83,801	90,658	92,690	94,493	96,433	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558
Railway	0	0	0	0	37,605	37,648	37,878	39,604	44,648	44,868	44,904	45,077	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487
Feeder Bus	0	0	0	0	38,759	40,572	42,384	44,197	46,009	47,822	49,589	51,356	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071
Investment																														
Investment Total	3,596	3,596	47,124	306,684	60,550	7,043	20,215	52,562	7,155	3,390	31,110	97,399	3,330	140	24,286	140	60,620	3,460	4,509	3,390	3,390	4,298	31,110	3,460	34,763	140	140	16,965	61,669	242,454
Railway Total	3,596	3,596	47,124	306,684	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	24,146	0	0	0	1,049	0	0	908	0	0	31,433	0	0	16,825	1,049	238,994
Local Currency Total	0	0	26,659	70,246	0	3,473	3,862	6,414	2,893	0	0	12,419	0	0	7,004	0	0	0	177	0	0	153	0	0	7,949	0	0	3,862	177	31,506
Foreign Currency Total	3,596	3,596	20,465	236,438	0	180	12,963	42,758	872	0	0	81,520	0	0	17,142	0	0	0	872	0	0	755	0	0	23,484	0	0	12,963	872	207,488
Feeder Bus Total	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460	3,460	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460
Local Currency Total	0	0	0	0	20,540	1,290	1,290	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310	1,310	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310
Foreign Currency Total	0	0	0	0	40,010	2,100	2,100	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150	2,150	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150
-Salvage Value																														
Int. During Construction																														

Finance Progress	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance Total																														
Railway																														
Borrowing	3,812	4,117	50,586	329,766	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	55,469	55,469	55,990	58,394	65,419	65,956	65,956	10,468	23,908	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0	0
Balance	3,812	7,928	58,514	388,280	388,280	391,933	408,758	402,462	350,758	294,768	236,374	264,894	198,937	132,981	122,493	98,585	75,200	54,217	40,260	26,840	13,420	0	0	0	0	0	0	0	0	0
Interest	216	521	3,462	23,082	31,062	31,355	32,701	36,634	32,498	28,061	23,581	26,425	21,192	15,915	10,638	9,799	7,887	6,016	4,337	3,221	2,147	1,074	0	0	0	0	0	0	0	0
Feeder Bus																														
Borrowing	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	3,320	3,320	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	8,650	9,134	8,619	10,103	10,587	11,071	11,546	3,370	3,341	2,857	2,373	1,889	1,404	930	456	0	0	0	0	0	0	0
Balance	0	0	0	0	60,550	63,940	67,330	70,720	65,460	59,716	53,417	46,634	39,237	28,166	16,620	13,250	9,909	7,051	4,679	2,790	1,386	456	0	0	0	0	0	0	0	0
Interest	0	0	0	0	4,844	5,115	5,386	5,658	5,929	5,508	5,043	4,539	3,986	3,139	2,253	1,330	1,060	793	564	374	223	111	36	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	-11,624	-8,799	-7,141	-64,267	-68,593	-61,478	-83,762	-62,597	-61,018	-55,378	-18,368	2,297	-55,451	6,735	15,102	18,550	20,259	21,011	9,241	37,383	6,080	40,703	40,703	23,878	-20,826	181,043
Culumtive Net Cash Flow	0	0	0	0	-11,624	-20,422	-27,563	-91,831	-160,424	-221,902	-305,664	-368,281	-429,299	-484,677	-503,045	-500,748	-556,199	-549,464	-534,361	-515,811	-495,553	-474,541	-465,300	-427,917	-421,836	-381,133	-340,429	-316,551	-337,377	-156,333

Cash Flow Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cash In	3,812	4,117	50,586	329,766	84,833	34,714	51,161	86,055	41,107	40,606	43,965	141,287	44,033	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843
Operating Profit	0	0	0	0	2,641	5,735	8,643	10,054	8,147	11,066	14,212	17,222	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047	10,047
Depreciation	0	0	0	0	21,642	21,936	22,303	23,439	25,805	26,150	26,433	26,806	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796
Borrowing	3,812	4,117	50,586	329,766	60,550	7,043	20,215	52,562	7,155	3,390	3,320	97,259	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	3,812	4,117	50,586	329,766	96,456	43,513	58,302	150,323	109,701	102,083	127,747	203,884	105,051	96,222	59,211	38,547	86,294	34,108	25,741	22,293	20,585	19,832	31,602	3,460	34,763	140	140	16,965	61,669	-140,200
Investment	3,596	3,596	47,124	306,684	60,550	7,043	20,215	52,562	7,155	3,390	31,110	97,399	3,330	140	24,286	140	60,620	3,460	4,509	3,390	3,390	4,298	31,110	3,460	34,763	140	140	16,965	61,669	-140,200
Int. During Construction	216	521	3,462	23,082	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	55,469	64,119	65,125	68,013	75,521	76,544	77,028	22,014	27,278	26,727	23,839	16,331	15,308	14,824	14,350	456	0	0	0	0	0	0	0
Interest	0	0	0	0	35,906	36,470	38,087	42,292	38,427	33,569	28,624	30,964	25,177	19,054	12,892	11,129	8,947	6,609	4,901	3,595	2,370	1,184	36	0	0	0	0	0	0	0
Cash Flow for FIRR	-3,596	-3,596	-47,124	-306,684	-36,267	20,628	10,731	-19,069	26,797	33,826	9,535	-53,371	37,513	40,703	16,557	40,703	-19,777	37,383	36,334	37,453	37,453	36,545	9,733	37,383	6,080	40,703	40,703	23,878	-20,826	181,043

FIRR 2.84%

Appendix 12-9-1 Financial Analysis for Railway Service (Unit: 1000 M$)

Alternative 1

Income Statement

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	11,335	14,863	18,204	20,049	18,575	21,926	25,460	28,858	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019
Operating Revenue	0	0	0	0	48,940	52,511	56,082	59,652	63,223	66,794	70,364	73,935	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506
Operating Expense	0	0	0	0	37,605	37,648	37,878	39,604	44,648	44,868	44,904	45,077	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487
Maintenance Cost	0	0	0	0	18,625	18,625	18,738	19,579	22,035	22,119	22,119	22,164	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708
Personnel Cost	0	0	0	0	2,095	2,138	2,181	2,225	2,268	2,352	2,389	2,425	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462
Fuel Cost	0	0	0	0	2,605	2,605	2,605	2,605	3,079	3,079	3,079	3,079	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190
Depreciation Cost	0	0	0	0	14,280	14,280	14,353	15,195	17,267	17,318	17,318	17,409	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127

Investment

Investment Total	3,596	3,596	47,124	306,684	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	24,146	0	0	0	1,049	0	0	908	0	0	31,433	0	0	16,825	1,049	238,994
Local Currency Total	0	0	26,659	70,246	0	3,473	3,862	6,414	2,893	0	0	12,419	0	0	7,004	0	0	0	177	0	0	153	0	0	7,949	0	0	3,862	177	31,506
Foreign Currency Total	3,596	3,596	20,465	236,438	0	180	12,963	42,758	872	0	0	81,520	0	0	17,142	0	0	0	872	0	0	755	0	0	23,484	0	0	12,963	872	207,488
Civil Work	0	0	21,376	32,983	0	3,653	0	0	3,765	0	0	1,059	0	0	4,555	0	0	0	1,049	0	0	908	0	0	10,060	0	0	0	1,049	0
Local Currency	0	0	18,461	24,135	0	3,473	0	0	2,893	0	0	304	0	0	1,026	0	0	0	177	0	0	153	0	0	1,301	0	0	0	177	0
Foreign Currency	0	0	2,915	8,848	0	180	0	0	872	0	0	755	0	0	3,529	0	0	0	872	0	0	755	0	0	8,759	0	0	0	872	0
Signal & Telecom	0	0	25,748	35,954	0	0	0	0	0	0	0	0	0	0	19,591	0	0	0	0	0	0	0	0	0	19,591	0	0	0	0	3,724
Local Currency	0	0	8,198	14,504	0	0	0	0	0	0	0	0	0	0	5,978	0	0	0	0	0	0	0	0	0	5,978	0	0	0	0	819
Foreign Currency	0	0	17,550	21,450	0	0	0	0	0	0	0	0	0	0	13,613	0	0	0	0	0	0	0	0	0	13,613	0	0	0	0	2,905
Rolling Stock	0	0	0	235,270	0	0	0	49,172	0	0	0	92,880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	235,270
Local Currency	0	0	0	30,687	0	0	0	6,414	0	0	0	12,115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,687
Foreign Currency	0	0	0	204,583	0	0	0	42,758	0	0	0	80,765	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204,583
Mechinery at Depot	0	0	0	2,477	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,782	0	0	0	0	0
Local Currency	0	0	0	920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	670	0	0	0	0	0
Foreign Currency	0	0	0	1,557	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,112	0	0	0	0	0
Mechinery at Workshop	0	0	0	0	0	0	16,825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,825	0	0
Local Currency	0	0	0	0	0	0	3,862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,862	0	0
Foreign Currency	0	0	0	0	0	0	12,963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,963	0	0
Enginering & Consul (Foreign c	3,596	3,596	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	327,664
-Salvage Value																														
Int. During Construction	216	521	3,462	23,082																										

Finance Program

Finance	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Borrowing	3,812	4,117	50,586	329,766	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	55,469	55,469	55,990	58,394	65,419	65,956	65,956	10,468	23,908	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0	0
Balance	3,812	7,928	58,514	388,280	388,280	391,933	408,758	402,462	350,758	294,768	236,374	264,894	198,937	132,981	122,493	98,585	75,200	54,217	40,260	26,840	13,420	0	0	0	0	0	0	0	0	0
Interest	216	521	3,462	23,082	31,062	31,355	32,701	36,634	32,498	28,061	23,581	26,425	21,192	15,915	10,638	9,799	7,887	6,016	4,337	3,221	2,147	1,074	0	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	-5,447	-2,212	-143	-56,860	-52,126	-44,807	-39,198	-45,577	-44,003	-38,726	-2,127	9,438	11,873	16,147	23,801	26,505	27,578	27,744	43,145	43,145	11,712	43,145	43,145	26,320	42,096	132,015
Cumulative Net Cash Flow	0	0	0	0	-5,447	-7,658	-7,802	-64,661	-116,787	-161,594	-200,792	-246,369	-290,372	-329,098	-331,225	-321,786	-309,913	-293,766	-269,965	-243,460	-215,881	-188,137	-144,992	-101,846	-90,134	-46,988	-3,843	22,478	64,574	196,589

Cash Flow Statement

Cash In	3,812	4,117	50,586	329,766	25,616	32,796	49,382	84,415	39,606	39,244	42,778	140,205	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145
Operating Profit	0	0	0	0	11,335	14,863	18,204	20,049	18,575	21,926	25,460	28,858	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019
Depreciation	0	0	0	0	14,280	14,280	14,353	15,195	17,267	17,318	17,318	17,409	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127	21,127
Borrowing	3,812	4,117	50,586	329,766	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	3,812	4,117	50,586	329,766	31,062	35,008	49,526	141,275	91,732	84,051	81,975	185,783	87,148	81,871	45,272	33,707	31,273	26,998	19,344	16,641	15,567	15,401	0	0	31,433	0	0	16,825	1,049	-88,870
Investment	3,596	3,596	47,124	306,684	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	24,146	0	0	0	1,049	0	0	908	0	0	31,433	0	0	16,825	1,049	-88,870
Int. During Construction	216	521	3,462	23,082	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	55,469	55,469	55,990	58,394	65,419	65,956	65,956	10,468	23,908	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0	0
Interest	0	0	0	0	31,062	31,355	32,701	36,634	32,498	28,061	23,581	26,425	21,192	15,915	10,638	9,799	7,887	6,016	4,337	3,221	2,147	1,074	0	0	0	0	0	0	0	0
Cash Flow for FIRR	-3,596	-3,596	-47,124	-306,684	25,616	25,490	15,732	-13,929	32,076	39,244	42,778	-47,673	43,145	43,145	18,999	43,145	43,145	43,145	42,096	43,145	43,145	42,237	43,145	43,145	11,712	43,145	43,145	26,320	42,096	132,015

FIRR% 6.42%

Appendix 12-9-2 Financial Analysis for Feeder Bus Service (Unit: 1000 M$)

Alternative 1

Income Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	7,471	7,965	8,459	8,952	9,446	9,940	10,480	11,019	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611
Operating Revenue	0	0	0	0	46,230	48,536	50,843	53,149	55,456	57,762	60,069	62,375	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682
Operating Expense	0	0	0	0	38,759	40,572	42,384	44,197	46,009	47,822	49,589	51,356	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071
Bus	0	0	0	0	17,183	18,855	20,527	22,199	23,871	25,543	27,215	28,887	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507	30,507
Mini Bus	0	0	0	0	21,576	21,717	21,857	21,998	22,139	22,279	22,374	22,469	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564	22,564
Maintenance Cost	0	0	0	0	4,257	4,496	4,735	4,975	5,214	5,453	5,692	5,932	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171	6,171
Bus	0	0	0	0	2,318	2,529	2,741	2,953	3,164	3,376	3,588	3,799	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011	4,011
Mini bus	0	0	0	0	1,939	1,966	1,994	2,022	2,050	2,077	2,105	2,133	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160
Personnel Cost	0	0	0	0	23,830	24,923	26,016	27,109	28,202	29,295	30,354	31,413	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431	32,431
Bus	0	0	0	0	10,332	11,357	12,382	13,407	14,432	15,457	16,482	17,507	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491	18,491
Mini Bus	0	0	0	0	13,498	13,566	13,634	13,702	13,770	13,838	13,872	13,906	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940	13,940
Fuel Cost	0	0	0	0	3,311	3,497	3,683	3,869	4,055	4,241	4,427	4,614	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
Bus	0	0	0	0	1,803	1,967	2,132	2,297	2,461	2,626	2,790	2,955	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119	3,119
Mini Bus	0	0	0	0	1,508	1,529	1,551	1,573	1,594	1,616	1,637	1,659	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680
Depreciation Cost	0	0	0	0	7,362	7,656	7,950	8,244	8,538	8,833	9,115	9,398	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669
Bus	0	0	0	0	2,730	3,001	3,272	3,543	3,813	4,084	4,355	4,626	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886	4,886
Mini Bus	0	0	0	0	4,632	4,655	4,678	4,702	4,725	4,748	4,760	4,772	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783	4,783
Investment																														
Investment Total	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460	3,460	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460
Local Currency Total	0	0	0	0	20,540	1,290	1,290	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310	1,310	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310
Foreign Currency Total	0	0	0	0	40,010	2,100	2,100	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150	2,150	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150
Bus	0	0	0	0	32,760	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,120	0	0	0	32,760	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,120	0	0	0	32,760	3,250
Local Currency	0	0	0	0	12,600	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,200	0	0	0	12,600	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,200	0	0	0	12,600	1,250
Foreign Currency	0	0	0	0	20,160	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1,920	0	0	0	20,160	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1,920	0	0	0	20,160	2,000
Mini Bus	0	0	0	0	27,790	140	140	140	140	140	27,860	210	210	140	140	140	27,860	210	210	140	140	140	27,860	210	210	140	140	140	27,860	210
Local Currency	0	0	0	0	7,940	40	40	40	40	40	7,960	60	60	40	40	40	7,960	60	60	40	40	40	7,960	60	60	40	40	40	7,960	60
Foreign Currency	0	0	0	0	19,850	100	100	100	100	100	19,900	150	150	100	100	100	19,900	150	150	100	100	100	19,900	150	150	100	100	100	19,900	150
-Salvage Value																														54,790
Int. During Construction	0	0	0	0																										

Finance Program	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance																														
Borrowing	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	3,320	3,320	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	8,650	9,134	9,619	10,103	10,587	11,071	11,546	3,370	3,341	2,857	2,373	1,889	1,404	930	456	0	0	0	0	0	0	0
Balance	0	0	0	0	60,550	63,940	67,330	70,720	65,460	59,716	53,417	46,634	39,237	28,166	16,620	13,250	9,909	7,051	4,679	2,790	1,386	456	0	0	0	0	0	0	0	0
Interest	0	0	0	0	4,844	5,115	5,386	5,658	5,929	5,508	5,043	4,539	3,986	3,139	2,253	1,330	1,060	793	564	374	223	111	36	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	9,988	10,505	11,022	11,539	3,406	4,131	-22,857	5,635	6,567	6,930	7,341	16,440	-43,741	14,170	14,883	15,627	16,263	16,849	-10,322	17,820	17,950	21,140	21,140	21,140	-39,340	72,610
Cumulative Net Cash Flow	0	0	0	0	9,988	20,494	31,516	43,055	46,461	50,591	27,735	33,370	39,937	46,866	54,207	70,648	26,906	41,077	55,960	71,587	87,849	104,699	94,376	112,197	130,147	151,287	172,427	193,567	154,227	226,837

Cash Flow Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cash In	0	0	0	0	75,382	19,010	19,799	20,587	21,375	22,163	22,915	23,737	24,470	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280
Operating Profit	0	0	0	0	7,471	7,965	8,459	8,952	9,446	9,940	10,480	11,019	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611
Depreciation	0	0	0	0	7,362	7,656	7,950	8,244	8,538	8,833	9,115	9,398	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669	9,669
Borrowing	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	3,320	3,320	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	0	0	0	0	65,394	8,505	8,776	9,048	17,969	18,032	45,771	18,102	17,903	14,350	13,939	4,840	65,021	7,110	6,397	5,653	5,017	4,431	31,602	3,460	3,330	140	140	140	60,620	-51,330
Investment	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460	3,460	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	-51,330
Int. During Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	8,650	9,134	9,619	10,103	10,587	11,071	11,546	3,370	3,341	2,857	2,373	1,889	1,404	930	456	0	0	0	0	0	0	0
Interest					4,844	5,115	5,386	5,658	5,929	5,508	5,043	4,539	3,986	3,139	2,253	1,330	1,060	793	564	374	223	111	36	0	0	0	0	0	0	0
Cash Flow for FIRR	0	0	0	0	-45,718	12,230	13,019	13,807	14,595	15,383	-11,515	16,957	17,950	21,140	21,140	21,140	-39,340	17,820	17,820	17,890	17,890	17,890	-9,630	17,820	17,950	21,140	21,140	21,140	-39,340	72,610

FIRR% 26.38%

Appendix 12-9-3 Financial Analysis for Railway Service & Feeder Bus Service (Unit: 1000 M$)

Alternative 1

Income Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	16,696	22,827	26,662	29,001	28,021	31,866	35,940	39,877	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630
Railway	0	0	0	0	11,335	14,863	18,204	20,049	18,575	21,926	25,460	28,858	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019	22,019
Feeder Bus	0	0	0	0	7,471	7,965	8,459	8,952	9,446	9,940	10,480	11,019	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611
Operating Revenue	0	0	0	0	95,170	101,047	106,924	112,802	118,679	124,556	130,433	136,310	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188
Railway	0	0	0	0	48,940	52,511	56,082	59,652	63,223	66,794	70,364	73,935	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506
Feeder Bus	0	0	0	0	46,230	48,536	50,843	53,149	55,456	57,762	60,069	62,375	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682
Operating Expense	0	0	0	0	76,364	78,220	80,262	83,801	90,658	92,690	94,493	96,433	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558	108,558
Railway	0	0	0	0	37,605	37,648	37,878	39,604	44,648	44,868	44,904	45,077	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487	55,487
Feeder Bus	0	0	0	0	38,759	40,572	42,384	44,197	46,009	47,822	49,589	51,356	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071
Investment																														
Investment Total	3,596	3,596	47,124	306,684	60,550	7,043	20,215	52,562	7,155	3,390	31,110	97,399	3,330	140	24,286	140	60,620	3,460	4,509	3,390	3,390	4,298	31,110	3,460	34,763	140	140	16,965	61,669	242,454
Railway Total	3,596	3,596	47,124	306,684	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	24,146	0	0	0	1,049	0	0	906	0	0	31,433	0	0	16,825	1,049	238,994
Local Currency Total	0	0	26,659	70,246	0	3,473	3,862	6,414	2,893	0	0	12,419	0	0	7,004	0	0	0	177	0	0	153	0	0	7,949	0	0	3,862	177	31,506
Foreign Currency Total	3,596	3,596	20,465	236,438	0	180	12,963	42,758	872	0	0	81,520	0	0	17,142	0	0	0	872	0	0	755	0	0	23,484	0	0	12,963	872	207,488
Feeder Bus Total	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460	3,460	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460
Local Currency Total	0	0	0	0	20,540	1,290	1,290	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310	1,310	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310
Foreign Currency Total	0	0	0	0	40,010	2,100	2,100	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150	2,150	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150
-Salvage Value																														
Int, During Construction																														

Finance Program	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance Total																														
Railway																														
Borrowing	3,812	4,117	50,586	329,766	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	55,469	55,469	55,990	58,394	65,419	65,956	65,956	10,488	23,908	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0	0
Balance	3,812	7,928	58,514	388,280	388,280	391,933	408,758	402,462	350,758	294,768	236,374	264,894	198,937	132,981	122,493	99,585	75,200	54,217	40,260	26,840	13,420	0	0	0	0	0	0	0	0	0
Interest	216	521	3,462	23,082	31,062	31,355	32,701	36,634	32,498	28,061	23,581	26,425	21,192	15,915	10,638	9,799	7,887	6,016	4,337	3,221	2,147	1,074	0	0	0	0	0	0	0	0
Feeder Bus																														
Borrowing	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	3,320	3,320	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	8,650	9,134	9,619	10,103	10,587	11,071	11,546	3,370	3,341	2,857	2,373	1,889	1,404	930	456	0	0	0	0	0	0	0
Balance	0	0	0	0	60,550	63,940	67,330	70,720	65,460	59,716	53,417	46,634	39,237	28,166	16,620	13,250	9,909	7,051	4,679	2,790	1,386	456	0	0	0	0	0	0	0	0
Interest	0	0	0	0	4,844	5,115	5,386	5,658	5,929	5,508	5,043	4,539	3,966	3,139	2,253	1,330	1,060	793	564	374	223	111	36	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	4,542	8,294	10,879	-45,321	-48,720	-40,677	-62,054	-39,942	-37,436	-31,798	5,214	25,879	-31,869	30,317	38,684	42,132	43,841	44,593	32,823	60,966	29,663	64,286	64,286	47,461	2,757	204,625
Culumtive Net Cash Flow	0	0	0	0	4,542	12,835	23,714	-21,607	-70,326	-111,003	-173,057	-212,999	-250,435	-282,231	-277,017	-251,138	-283,007	-252,690	-214,005	-171,873	-128,032	-83,439	-50,615	10,350	40,013	104,298	168,584	216,044	218,801	423,426

Cash Flow Statement																														
Cash In	3,812	4,117	50,586	329,766	100,998	51,807	69,181	105,602	60,981	61,407	65,693	163,942	67,616	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426
Operating Profit	0	0	0	0	16,696	22,827	26,662	29,001	28,021	31,866	35,940	39,877	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630	33,630
Depreciation	0	0	0	0	21,642	21,936	22,303	23,439	25,805	26,150	26,433	26,806	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796	30,796
Borrowing	3,812	4,117	50,586	329,766	60,550	7,043	20,215	52,562	7,155	3,390	3,320	97,259	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	3,812	4,117	50,586	329,766	96,456	43,513	58,302	150,323	109,701	102,083	127,747	203,884	105,051	99,222	59,211	38,547	96,294	34,106	25,741	22,293	20,585	19,632	31,602	3,460	34,763	140	140	16,965	61,669	-140,200
Investment	3,596	3,596	47,124	306,684	60,550	7,043	20,215	52,562	7,155	3,390	31,110	97,399	3,330	140	24,286	140	60,620	3,460	4,509	3,390	3,390	4,298	31,110	3,460	34,763	140	140	16,965	61,669	-140,200
Int. During Construction	216	521	3,462	23,082	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	55,469	64,119	65,125	68,013	75,521	76,544	77,028	22,034	27,278	26,727	23,839	16,331	15,308	14,824	14,350	456	0	0	0	0	0	0	0
Interest	0	0	0	0	35,906	36,470	38,087	42,292	38,427	33,569	28,624	30,964	25,177	19,054	12,892	11,129	8,947	6,809	4,901	3,595	2,370	1,184	36	0	0	0	0	0	0	0
Cash Flow for FIRR	-3,596	-3,596	-47,124	-306,684	-20,102	37,721	28,751	-122	46,671	54,627	31,263	-30,716	61,096	64,286	40,140	64,286	3,806	60,966	59,917	61,036	61,036	60,128	33,316	60,966	29,663	64,286	64,286	47,461	2,757	204,625

FIRR 8.37%

Appendix 12-9-4 Financial Analysis for Railway Service (Unit: 1000 M$)

Alternative 2

Income Statement

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	10,326	13,256	15,999	17,247	15,175	17,929	20,865	23,666	16,229	16,229	14,136	14,136	14,136	14,136	14,136	14,136	14,136	14,136	14,136	14,136	13,771	13,771	13,771	13,771	13,771	13,622
Operating Revenue	0	0	0	0	39,379	42,352	45,325	48,298	51,272	54,245	57,218	60,191	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164
Operating Expense	0	0	0	0	29,053	29,096	29,326	31,052	36,096	36,316	36,352	36,525	46,935	46,935	49,028	49,028	49,028	49,028	49,028	49,028	49,028	49,028	49,028	49,028	49,393	49,393	49,393	49,393	49,393	49,542
Maintenance Cost	0	0	0	0	18,625	18,625	18,738	19,579	22,035	22,119	22,119	22,164	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708
Personnel Cost	0	0	0	0	2,095	2,138	2,181	2,225	2,268	2,352	2,389	2,425	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462
Fuel Cost	0	0	0	0	2,605	2,605	2,605	2,605	3,079	3,079	3,079	3,079	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190
Depreciation Cost	0	0	0	0	5,728	5,728	5,801	6,643	8,714	8,766	8,766	8,856	12,575	12,575	14,668	14,668	14,668	14,668	14,668	14,668	14,668	14,668	14,668	14,668	15,032	15,032	15,032	15,032	15,032	15,181

Investment

Investment Total	0	0	0	143,208	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	24,146	0	0	0	1,049	0	0	908	0	0	31,433	0	0	16,825	1,049	238,994
Local Currency Total	0	0	0	0	0	3,473	3,862	6,414	2,893	0	0	12,419	0	0	7,004	0	0	0	177	0	0	755	0	0	7,949	0	0	3,862	177	31,506
Foreign Currency Total	0	0	0	143,208	0	180	12,963	42,758	872	0	0	81,520	0	0	17,142	0	0	0	872	0	0	153	0	0	23,484	0	0	12,963	872	207,488
Civil Work	0	0	0	0	0	3,653	0	0	3,765	0	0	1,059	0	0	4,555	0	0	0	1,049	0	0	908	0	0	10,060	0	0	0	1,049	0
Local Currency	0	0	0	0	0	3,473	0	0	2,893	0	0	304	0	0	1,026	0	0	0	177	0	0	153	0	0	1,301	0	0	0	177	0
Foreign Currency	0	0	0	0	0	180	0	0	872	0	0	755	0	0	3,529	0	0	0	872	0	0	755	0	0	8,759	0	0	0	872	0
Signal & Telecom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19,591	0	0	0	0	0	0	0	0	0	19,591	0	0	0	0	3,724
Local Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,978	0	0	0	0	0	0	0	0	0	5,978	0	0	0	0	819
Foreign Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,613	0	0	0	0	0	0	0	0	0	13,613	0	0	0	0	2,905
Rolling Stock	0	0	0	143,208	0	0	0	49,172	0	0	0	92,880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	235,270
Local Currency	0	0	0	0	0	0	0	6,414	0	0	0	12,115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,687
Foreign Currency	0	0	0	143,208	0	0	0	42,758	0	0	0	80,765	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204,583
Mechinery at Depot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,782	0	0	0	0	0
Local Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	670	0	0	0	0	0
Foreign Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,112	0	0	0	0	0
Mechinery at Workshop	0	0	0	0	0	0	16,825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,825	0	0
Local Currency	0	0	0	0	0	0	3,862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,862	0	0
Foreign Currency	0	0	0	0	0	0	12,963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,963	0	0
Engineering & Consul (Foreign c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	303,792
-Salvage Value																														
Int. During Construction	0	0	0	8,592																										

Finance Program

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance																														
Borrowing	0	0	0	151,801	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	21,686	21,686	22,208	24,611	31,636	32,174	32,174	10,488	23,908	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0	0
Balance	0	0	0	151,801	151,801	155,454	172,279	199,765	181,844	159,636	135,025	197,328	165,155	132,981	122,493	98,585	75,200	54,217	40,260	26,840	13,420	0	0	0	0	0	0	0	0	0
Interest	0	0	0	8,592	12,144	12,436	13,782	17,716	16,282	14,548	12,771	18,317	15,786	13,212	10,638	9,799	7,887	6,016	4,337	3,221	2,147	1,074	0	0	0	0	0	0	0	
Net Cash Flow	0	0	0	0	3,911	6,548	8,019	-15,512	-14,079	-10,060	-7,751	-17,431	-19,156	-16,582	-16,469	-4,904	-2,469	1,805	9,460	12,163	13,237	13,402	28,804	28,804	-2,629	28,804	28,804	11,979	27,755	93,602
Cumulative Net Cash Flow	0	0	0	0	3,911	10,459	18,477	2,965	-11,114	-21,174	-28,925	-46,356	-65,512	-82,095	-98,563	-103,467	-105,936	-104,131	-94,671	-82,508	-69,271	-55,869	-27,065	1,738	-891	27,912	56,716	68,695	96,449	190,051

Cash Flow Statement

Cash In	0	0	0	151,801	16,055	22,637	38,626	73,061	27,655	26,695	29,631	126,461	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804	28,804
Operating Profit	0	0	0	0	10,326	13,256	15,999	17,247	15,175	17,929	20,865	23,666	16,229	16,229	14,136	14,136	14,136	14,136	14,136	14,136	14,136	14,136	14,136	14,136	13,771	13,771	13,771	13,771	13,771	13,622
Depreciation	0	0	0	0	5,728	5,728	5,801	6,643	8,714	8,766	8,766	8,856	12,575	12,575	14,668	14,668	14,668	14,668	14,668	14,668	14,668	14,668	14,668	14,668	15,032	15,032	15,032	15,032	15,032	15,181
Borrowing	0	0	0	151,801	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	0	0	0	151,801	12,144	16,089	30,607	88,574	41,733	36,755	37,382	143,892	47,960	45,386	45,272	33,707	31,273	26,998	19,344	16,641	15,567	15,401	0	0	31,433	0	0	16,825	1,049	-64,798
Investment	0	0	0	143,208	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	24,146	0	0	0	1,049	0	0	908	0	0	31,433	0	0	16,825	1,049	-64,798
Int. During Construction	0	0	0	8,592	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	21,686	21,686	22,208	24,611	31,636	32,174	32,174	10,488	23,908	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0	0
Interest	0	0	0	0	12,144	12,436	13,782	17,716	16,282	14,548	12,771	18,317	15,786	13,212	10,638	9,799	7,887	6,016	4,337	3,221	2,147	1,074	0	0	0	0	0	0	0	
Cash Flow for FIRR	0	0	0	-143,208	16,055	15,331	4,976	-25,283	20,125	26,695	29,631	-61,417	28,804	28,804	4,658	28,804	28,804	28,804	27,755	28,804	28,804	27,896	28,804	28,804	-2,629	28,804	28,804	11,979	27,755	93,602

FIRR% 9.06%

Appendix 12-9-5 Financial Analysis for Railway Service & Feeder Bus Service
Alternative 2

Income Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	11,193	14,287	17,195	18,606	16,699	19,618	22,764	25,774	18,600	18,600	16,506	16,506	16,506	16,506	16,506	16,506	16,506	16,506	16,506	16,506	16,142	16,142	16,142	16,142	16,142	15,993
Railway	0	0	0	0	10,326	13,256	15,999	17,247	15,175	17,929	20,865	23,666	16,229	16,229	14,136	14,136	14,136	14,136	14,136	14,136	14,136	14,136	14,136	14,136	13,771	13,771	13,771	13,771	13,771	13,622
Feeder Bus	0	0	0	0	866	1,031	1,195	1,360	1,524	1,689	1,899	2,109	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371	2,371
Operating Revenue	0	0	0	0	79,005	83,955	88,905	93,855	98,805	103,755	108,705	113,655	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605	118,605
Railway	0	0	0	0	39,379	42,352	45,325	48,298	51,272	54,245	57,218	60,191	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164	63,164
Feeder Bus	0	0	0	0	39,626	41,603	43,580	45,557	47,534	49,511	51,488	53,465	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442	55,442
Operating Expense	0	0	0	0	67,812	69,668	71,710	75,249	82,106	84,138	85,941	87,881	100,006	100,006	102,099	102,099	102,099	102,099	102,099	102,099	102,099	102,099	102,099	102,099	102,463	102,463	102,463	102,463	102,463	102,612
Railway	0	0	0	0	29,053	29,096	29,326	31,052	36,096	36,316	36,352	36,525	46,935	46,935	49,028	49,028	49,028	49,028	49,028	49,028	49,028	49,028	49,028	49,028	49,393	49,393	49,393	49,393	49,393	49,542
Feeder Bus	0	0	0	0	38,759	40,572	42,384	44,197	46,009	47,822	49,589	51,356	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071
Investment																														
Investment Total	0	0	0	143,208	60,550	7,043	20,215	52,562	7,155	3,390	31,110	97,399	3,330	140	24,286	140	60,620	3,460	4,509	3,390	3,390	4,298	31,110	3,460	34,763	140	140	16,965	61,669	242,454
Railway Total	0	0	0	143,208	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	24,146	0	0	0	1,049	0	0	908	0	0	31,433	0	0	16,825	1,049	238,994
Local Currency Total	0	0	0	0	0	3,473	3,862	6,414	2,893	0	0	12,419	0	0	7,004	0	0	0	177	0	0	153	0	0	7,949	0	0	3,862	177	31,506
Foreign Currency Total	0	0	0	143,208	0	180	12,963	42,758	872	0	0	81,520	0	0	17,142	0	0	0	872	0	0	755	0	0	23,484	0	0	12,963	872	207,488
Feeder Bus Total	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460	3,460	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460
Local Currency Total	0	0	0	0	20,540	1,290	1,290	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310	1,310	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310
Foreign Currency Total	0	0	0	0	40,010	2,100	2,100	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150	2,150	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150
-Salvage Value																														
Int, During Construction																														

Finance Program	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance Total																														
Railway																														
Borrowing	0	0	0	151,801	0	3,653	16,825	49,172	3,765	0	0	93,939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	21,686	21,686	22,208	24,611	31,636	32,174	32,174	10,488	23,808	23,386	20,982	13,958	13,420	13,420	13,420	0	0	0	0	0	0	0	0
Balance	0	0	0	151,801	151,801	155,454	172,279	199,765	181,844	159,636	135,025	197,328	165,155	132,981	122,493	98,585	75,200	54,217	40,260	26,840	13,420	0	0	0	0	0	0	0	0	0
Interest	0	0	0	8,592	12,144	12,436	13,762	17,716	16,282	14,548	12,771	18,317	15,786	13,212	10,638	9,799	7,887	6,016	4,337	3,221	2,147	1,074	0	0	0	0	0	0	0	0
Feeder Bus																														
Borrowing	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	3,320	3,320	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	8,650	9,134	9,619	10,103	10,587	11,071	11,546	3,370	3,341	2,857	2,373	1,869	1,404	930	456	0	0	0	0	0	0	0
Balance	0	0	0	0	60,550	63,940	67,330	70,720	65,460	59,716	53,417	46,634	39,237	28,166	16,620	13,250	9,909	7,051	4,679	2,790	1,386	456	0	0	0	0	0	0	0	0
Interest	0	0	0	0	4,844	5,115	5,386	5,658	5,929	5,508	5,043	4,539	3,986	3,139	2,253	1,330	1,060	793	564	374	223	111	36	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	7,295	10,120	11,777	-11,566	-18,595	-14,182	-39,189	-20,707	-21,830	-18,893	-18,368	2,297	-55,451	6,735	15,102	18,550	20,259	21,011	9,241	37,383	6,080	40,703	40,703	23,878	-20,826	156,971
Culumative Net Cash Flow	0	0	0	0	7,295	17,414	29,192	17,626	-969	-15,151	-54,340	-75,046	-96,876	-115,769	-134,137	-131,840	-187,291	-180,555	-165,453	-146,903	-126,644	-105,633	-96,392	-59,008	-52,928	-12,224	28,479	52,357	31,532	188,503

Cash Flow Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cash In	0	0	0	151,801	84,833	34,714	51,161	86,055	41,107	40,606	43,965	141,287	44,033	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843	40,843
Operating Profit	0	0	0	0	11,193	14,287	17,195	18,606	16,699	19,618	22,764	25,774	18,600	18,600	16,506	16,506	16,506	16,506	16,506	16,506	16,506	16,506	16,506	16,506	16,142	16,142	16,142	16,142	16,142	15,993
Depreciation	0	0	0	0	13,090	13,384	13,751	14,887	17,253	17,598	17,881	18,254	22,244	22,244	24,337	24,337	24,337	24,337	24,337	24,337	24,337	24,337	24,337	24,337	24,701	24,701	24,701	24,701	24,701	24,650
Borrowing	0	0	0	151,801	60,550	7,043	20,215	52,562	7,155	3,390	3,320	97,259	3,190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	0	0	0	151,801	77,538	24,594	39,384	97,621	59,702	54,787	83,154	161,994	65,863	59,736	59,211	38,547	96,294	34,108	25,741	22,293	20,585	19,832	31,602	3,460	34,763	140	140	16,965	61,669	-116,128
Investment	0	0	0	143,208	60,550	7,043	20,215	52,562	7,155	3,390	31,110	97,399	3,330	140	24,286	140	60,620	3,460	4,509	3,390	3,390	4,298	31,110	3,460	34,763	140	140	16,965	61,669	-116,128
Int. During Construction	0	0	0	8,592	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	21,686	30,336	31,342	34,230	41,739	42,761	43,245	22,034	27,278	26,727	23,839	16,331	15,308	14,624	14,350	456	0	0	0	0	0	0	0
Interest	0	0	0	0	16,988	17,551	19,169	23,374	22,211	20,056	17,814	22,856	19,772	16,351	12,892	11,129	8,947	6,809	4,901	3,595	2,370	1,184	36	0	0	0	0	0	0	0
Cash Flow for FIRR	0	0	0	-143,208	-36,267	20,628	10,731	-19,069	26,797	33,826	9,535	-53,371	37,513	40,703	16,557	40,703	-19,777	37,383	36,334	37,453	37,453	36,545	9,733	37,383	6,080	40,703	40,703	23,878	-20,826	156,971

FIRR 8.33%

Appendix 12-9-6 Financial Analysis for Railway Service (Unit: 1000 M$) Alternative 3-A

Income Statement

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	17,049	20,576	23,990	26,079	24,876	28,278	31,812	35,221	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870
Operating Revenue	0	0	0	0	48,940	52,511	56,082	59,652	63,223	66,794	70,364	73,935	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506
Operating Expense	0	0	0	0	31,891	31,935	32,091	33,573	38,347	38,515	38,552	38,714	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636
Maintenance Cost	0	0	0	0	18,625	18,625	18,738	19,579	22,035	22,119	22,119	22,164	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708
Personnel Cost	0	0	0	0	2,095	2,138	2,181	2,225	2,268	2,352	2,389	2,425	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462
Fuel Cost	0	0	0	0	2,605	2,605	2,605	2,605	3,079	3,079	3,079	3,079	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190
Depreciation Cost	0	0	0	0	8,567	8,567	8,567	9,164	10,966	10,966	10,966	11,045	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275
Investment																														
Investment Total	3,596	3,596	0	209,653	0	0	14,927	42,758	918	0	0	81,560	0	0	2,813	0	0	0	918	0	0	795	0	0	4,437	0	0	14,927	918	204,583
Local Currency Total	0	0	0	840	0	0	1,964	0	46	0	0	40	0	0	140	0	0	0	46	0	0	40	0	0	652	0	0	1,964	46	0
Foreign Currency Total	3,596	3,596	0	208,813	0	0	12,963	42,758	872	0	0	81,520	0	0	2,673	0	0	0	872	0	0	755	0	0	3,785	0	0	12,963	872	204,583
Civil Work	0	0	0	2,813	0	0	0	0	918	0	0	795	0	0	2,813	0	0	0	918	0	0	795	0	0	2,813	0	0	0	918	0
Local Currency	0	0	0	140	0	0	0	0	46	0	0	40	0	0	140	0	0	0	46	0	0	40	0	0	140	0	0	0	46	0
Foreign Currency	0	0	0	2,673	0	0	0	0	872	0	0	755	0	0	2,673	0	0	0	872	0	0	755	0	0	2,673	0	0	0	872	0
Signal & Telecom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Foreign Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rolling Stock	0	0	0	204,583	0	0	0	42,758	0	0	0	80,765	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204,583
Local Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Foreign Currency	0	0	0	204,583	0	0	0	42,758	0	0	0	80,765	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204,583
Mechinery at Depot	0	0	0	2,257	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,624	0	0	0	0	0
Local Currency	0	0	0	700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0
Foreign Currency	0	0	0	1,557	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,112	0	0	0	0	0
Mechinery at Workshop	0	0	0	0	0	0	14,927	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,927	0	0
Local Currency	0	0	0	0	0	0	1,964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,964	0	0
Foreign Currency	0	0	0	0	0	0	12,963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,963	0	0
Engineering & Consul (Foreign c	3,596	3,596	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-Salvage Value																														243,442
Int. During Construction	216	521	634	13,264																										

Finance Program

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance																														
Borrowing	3,812	4,117	634	222,917	0	0	14,927	42,758	918	0	0	81,560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	33,069	33,069	33,069	35,201	41,309	41,440	41,440	8,372	20,023	20,023	17,891	11,783	11,651	11,651	11,651	0	0	0	0	0	0	0	0
Balance	3,812	7,928	8,563	231,480	231,480	231,480	246,407	256,096	223,946	190,877	155,676	195,927	154,487	113,046	104,674	84,651	64,628	46,737	34,954	23,303	11,651	0	0	0	0	0	0	0	0	0
Interest	216	521	634	13,264	18,518	18,518	19,713	23,133	20,561	17,916	15,270	18,979	15,674	12,359	9,044	8,374	6,772	5,170	3,739	2,796	1,864	932	0	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	7,097	10,625	12,845	-20,958	-17,789	-11,740	-7,693	-14,022	-13,969	-10,654	22,917	14,748	16,350	20,084	26,706	28,698	29,630	29,767	43,145	43,145	38,708	43,145	43,145	28,218	42,227	82,004
Cumulative Net Cash Flow	0	0	0	0	7,097	17,722	30,567	9,608	-8,180	-19,921	-27,614	-41,636	-55,605	-66,259	-43,342	-28,594	-12,243	7,841	34,547	63,245	92,874	122,641	165,787	208,932	247,641	290,786	333,932	362,150	404,378	486,382

Cash Flow Statement

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cash In	3,812	4,117	634	222,917	25,616	29,143	47,484	78,001	36,759	39,244	42,778	127,826	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145	43,145
Operating Profit	0	0	0	0	17,049	20,576	23,990	26,079	24,876	28,278	31,812	35,221	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870
Depreciation	0	0	0	0	8,567	8,567	8,567	9,164	10,966	10,966	10,966	11,045	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275
Borrowing	3,812	4,117	634	222,917	0	0	14,927	42,758	918	0	0	81,560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	3,812	4,117	634	222,917	18,518	18,518	34,640	98,960	54,548	50,984	50,471	141,848	57,115	53,799	20,229	28,397	26,795	23,061	16,440	14,448	13,516	13,379	0	0	4,437	0	0	14,927	918	-38,859
Investment	3,596	3,596	0	209,653	0	0	14,927	42,758	918	0	0	81,560	0	0	2,813	0	0	0	918	0	0	795	0	0	4,437	0	0	14,927	918	-38,859
Int. During Construction	216	521	634	13,264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	33,069	33,069	33,069	35,201	41,309	41,440	41,440	8,372	20,023	20,023	17,891	11,783	11,651	11,651	11,651	0	0	0	0	0	0	0	0
Interest	0	0	0	0	18,518	18,518	19,713	23,133	20,561	17,916	15,270	18,979	15,674	12,359	9,044	8,374	6,772	5,170	3,739	2,796	1,864	932	0	0	0	0	0	0	0	0
Cash Flow for FIRR	-3,596	-3,596	0	-209,653	25,616	29,143	17,630	-7,515	34,923	39,244	42,778	-35,294	43,145	43,145	40,332	43,145	43,145	43,145	42,227	43,145	43,145	42,350	43,145	43,145	38,708	43,145	43,145	28,218	42,227	82,004

FIRR% 12.27%

Appendix 12-9-7 Financial Analysis for Railway Service & Feeder Bus Service (Unit: 1000 M$) Alternative 3-A

Income Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	24,520	28,541	32,449	35,032	34,322	38,219	42,292	46,241	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481
Railway	0	0	0	0	17,049	20,576	23,990	26,079	24,876	28,278	31,812	35,221	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870	28,870
Feeder Bus	0	0	0	0	7,471	7,965	8,459	8,952	9,446	9,940	10,480	11,019	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611
Operating Revenue	0	0	0	0	95,170	101,047	106,924	112,802	118,679	124,556	130,433	136,310	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188	142,188
Railway	0	0	0	0	48,940	52,511	56,082	59,652	63,223	66,794	70,364	73,935	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506	77,506
Feeder Bus	0	0	0	0	46,230	48,536	50,843	53,149	55,456	57,762	60,069	62,375	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682
Operating Expense	0	0	0	0	70,650	72,506	74,476	77,770	84,357	86,337	88,141	90,070	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707
Railway	0	0	0	0	31,891	31,935	32,091	33,573	38,347	38,515	38,552	38,714	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636
Feeder Bus	0	0	0	0	38,759	40,572	42,384	44,197	46,009	47,822	49,589	51,356	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071
Investment																														
Investment Total	3,596	3,596	0	209,653	60,550	3,390	18,317	46,148	4,308	3,390	31,110	85,020	3,330	140	2,953	140	60,620	3,460	4,378	3,390	3,390	4,185	31,110	3,460	7,767	140	140	15,067	61,538	208,043
Railway Total	3,596	3,596	0	209,653	0	0	14,927	42,758	918	0	0	81,560	0	0	2,813	0	0	0	918	0	0	795	0	0	4,437	0	0	14,927	918	204,583
Local Currency Total	0	0	0	840	0	0	1,964	0	46	0	0	40	0	0	140	0	6	0	46	0	0	40	0	0	652	0	0	1,964	46	0
Foreign Currency Total	3,596	3,596	0	208,813	0	0	12,963	42,758	872	0	0	81,520	0	0	2,673	0	0	0	872	0	0	755	0	0	3,785	0	0	12,963	872	204,583
Feeder Bus Total	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460	3,460	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460
Local Currency Total	0	0	0	0	20,540	1,290	1,290	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310	1,310	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310
Foreign Currency Total	0	0	0	0	40,010	2,100	2,100	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150	2,150	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150
-Salvage Value																														
Int, During Construction																														

Finance Program	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance Total																														
Railway																														
Borrowing	3,812	4,117	634	222,917	0	0	14,927	42,758	918	0	0	81,560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	33,069	33,069	33,069	35,201	41,309	41,440	41,440	8,372	20,023	20,023	17,891	11,783	11,651	11,651	11,651	0	0	0	0	0	0	0	0
Balance	3,812	7,928	8,563	231,480	231,480	231,480	246,407	256,096	223,946	190,877	155,676	195,927	154,487	113,046	104,674	84,651	64,628	46,737	34,954	23,303	11,651	0	0	0	0	0	0	0	0	0
Interest	216	521	634	13,264	18,518	18,518	19,713	23,133	20,561	17,916	15,270	18,979	15,674	12,359	9,044	6,374	6,772	5,170	3,739	2,796	1,864	932	0	0	0	0	0	0	0	0
Feeder Bus																														
Borrowing	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	8,650	9,134	9,619	10,103	10,587	11,071	15,516	7,360	7,351	6,867	6,383	5,899	5,414	970	476	0	0	0	0	0	0	0
Balance	0	0	0	0	60,550	63,940	67,330	70,720	65,460	59,716	81,207	74,564	67,307	56,236	40,720	33,360	26,009	19,141	12,759	6,860	1,446	476	0	0	0	0	0	0	0	0
Interest	0	0	0	0	4,844	5,115	5,386	5,658	5,929	5,508	7,266	6,773	6,232	5,385	4,499	3,258	2,669	2,081	1,531	1,021	549	116	38	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	17,086	21,130	23,867	-9,419	-14,383	-7,610	-4,983	-10,481	-9,508	-5,970	24,042	25,271	-33,010	28,957	36,612	39,668	41,557	46,571	32,802	60,966	56,659	64,286	64,286	49,359	2,888	154,614
Culumtive Net Cash Flow	0	0	0	0	17,086	38,216	62,083	52,663	38,280	30,671	25,688	15,206	5,699	-271	23,771	49,042	16,032	44,988	81,600	121,269	162,826	209,397	242,199	303,164	359,823	424,108	488,394	537,752	540,640	695,254
Cash Flow Statement																														
Cash In	3,812	4,117	634	222,917	100,998	48,154	67,283	98,588	56,134	61,407	93,483	151,703	67,756	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426	64,426
Operating Profit	0	0	0	0	24,520	28,541	32,449	35,032	34,322	38,219	42,292	46,241	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481	40,481
Depreciation	0	0	0	0	15,929	16,223	16,517	17,408	19,504	19,798	20,081	20,443	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945
Borrowing	3,812	4,117	634	222,917	60,550	3,390	18,317	46,148	4,308	3,390	31,110	85,020	3,330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	3,812	4,117	634	222,917	83,912	27,024	43,416	108,007	72,517	69,017	98,486	162,184	77,263	70,395	40,383	39,155	97,436	35,469	27,814	24,757	22,869	17,854	31,624	3,460	7,767	140	140	15,067	61,538	-90,189
Investment	3,596	3,596	0	209,653	60,550	3,390	18,317	46,148	4,308	3,390	31,110	85,020	3,330	140	2,953	140	60,620	3,460	4,378	3,390	3,390	4,185	31,110	3,460	7,767	140	140	15,067	61,538	-90,189
Int. During Construction	216	521	634	13,264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	33,069	41,719	42,203	44,820	51,412	52,028	52,512	23,888	27,383	27,375	24,758	18,165	17,550	17,066	12,621	476	0	0	0	0	0	0	0
Interest	0	0	0	0	23,362	23,634	25,099	28,791	26,490	23,424	22,536	25,752	21,906	17,743	13,543	11,632	9,441	7,251	5,270	3,817	2,413	1,048	38	0	0	0	0	0	0	0
Cash Flow for FIRR	-3,596	-3,596	0	-209,653	-20,102	41,374	30,649	6,292	49,518	54,627	31,263	-18,337	61,096	64,286	61,473	64,286	3,806	60,966	60,048	61,036	61,036	60,241	33,316	60,966	56,659	64,286	64,286	49,359	2,888	154,614

FIRR 14.16%

Appendix 12-9-8 Financial Analysis for Railway Service (Unit: 1000 M$) Alternative 3-B

Income Statement

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	5,107	7,764	10,306	11,524	9,449	11,981	14,643	17,181	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959
Operating Revenue	0	0	0	0	36,999	39,698	42,398	45,097	47,797	50,496	53,196	55,895	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594
Operating Expense	0	0	0	0	31,891	31,935	32,091	33,573	38,347	38,515	38,552	38,714	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636
Maintenance Cost	0	0	0	0	18,625	18,625	18,738	19,579	22,035	22,119	22,119	22,164	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708	26,708
Personnel Cost	0	0	0	0	2,095	2,138	2,181	2,225	2,268	2,352	2,389	2,425	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462	2,462
Fuel Cost	0	0	0	0	2,605	2,605	2,605	2,605	3,079	3,079	3,079	3,079	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190	5,190
Depreciation Cost	0	0	0	0	8,567	8,567	8,567	9,164	10,966	10,966	10,966	11,045	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275
Investment																														
Investment Total	3,596	3,596	0	209,653	0	0	14,927	42,758	918	0	0	81,560	0	0	2,813	0	0	0	918	0	0	795	0	0	4,437	0	0	14,927	918	204,583
Local Currency Total	0	0	0	810	0	0	1,964	0	46	0	0	40	0	0	140	0	0	0	46	0	0	40	0	0	652	0	0	1,964	46	0
Foreign Currency Total	3,596	3,596	0	208,813	0	0	12,963	42,758	872	0	0	81,520	0	0	2,673	0	0	0	872	0	0	755	0	0	3,785	0	0	12,963	872	204,583
Civil Work	0	0	0	2,813	0	0	0	0	918	0	0	795	0	0	2,813	0	0	0	918	0	0	795	0	0	2,813	0	0	0	918	0
Local Currency	0	0	0	140	0	0	0	0	46	0	0	40	0	0	140	0	0	0	46	0	0	40	0	0	140	0	0	0	46	0
Foreign Currency	0	0	0	2,673	0	0	0	0	872	0	0	755	0	0	2,673	0	0	0	872	0	0	755	0	0	2,673	0	0	0	872	0
Signal & Telecom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Foreign Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rolling Stock	0	0	0	204,583	0	0	0	42,758	0	0	0	80,765	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204,583
Local Currency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Foreign Currency	0	0	0	204,583	0	0	0	42,758	0	0	0	80,765	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204,583
Machinery at Depot	0	0	0	2,257	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,624	0	0	0	0	0
Local Currency	0	0	0	700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	0	0	0	0	0
Foreign Currency	0	0	0	1,557	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,112	0	0	0	0	0
Machinery at Workshop	0	0	0	0	0	0	14,927	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,927	0	0
Local Currency	0	0	0	0	0	0	1,964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,964	0	0
Foreign Currency	0	0	0	0	0	0	12,963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,963	0	0
Engineering & Consul (Foreign c	3,596	3,596	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	243,442
-Salvage Value																														
Int. During Construction	216	521	634	13,264																										

Finance Program

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance																														
Borrowing	3,812	4,117	634	222,917	0	0	14,927	42,758	918	0	0	81,560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	33,069	33,069	33,069	35,201	41,309	41,440	41,440	8,372	20,023	20,023	17,891	11,783	11,651	11,651	11,651	0	0	0	0	0	0	0	0
Balance	3,812	7,928	8,563	231,480	231,480	231,480	246,407	256,096	223,946	190,877	155,676	195,927	154,487	113,046	104,674	84,651	64,628	46,737	34,954	23,303	11,651	0	0	0	0	0	0	0	0	0
Interest	216	521	634	13,264	18,518	18,518	19,713	23,133	20,561	17,916	15,270	18,979	15,674	12,359	9,044	8,374	6,772	5,170	3,739	2,796	1,864	932	0	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	-4,844	-2,188	-839	-35,514	-33,215	-28,038	-24,862	-32,062	-32,681	-29,565	4,006	-4,163	-2,561	1,173	7,295	9,786	10,718	10,856	24,234	24,234	19,797	24,234	24,234	9,307	23,316	63,093
Cumulative Net Cash Flow	0	0	0	0	-4,844	-7,032	-7,871	-43,385	-76,600	-104,638	-129,500	-161,562	-194,443	-224,008	-220,003	-224,166	-226,727	-225,554	-217,759	-207,973	-197,255	-186,399	-162,165	-137,931	-118,134	-93,900	-69,666	-60,359	-37,043	26,050

Cash Flow Statement

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cash In	3,812	4,117	634	222,917	13,674	16,330	33,800	63,446	21,333	22,946	25,609	109,786	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234	24,234
Operating Profit	0	0	0	0	5,107	7,764	10,306	11,524	9,449	11,981	14,643	17,181	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959
Depreciation	0	0	0	0	8,567	8,567	8,567	9,164	10,966	10,966	10,966	11,045	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275	14,275
Borrowing	3,812	4,117	634	222,917	0	0	14,927	42,758	918	0	0	81,560	0	0	0	0	0	0	0	0	0	0	0	0	4,437	0	0	14,927	918	-38,859
Cash Out	3,812	4,117	634	222,917	18,518	18,518	34,640	98,960	54,548	50,984	50,471	141,848	57,115	53,799	20,229	28,397	26,795	23,061	16,440	14,448	13,516	13,379	0	0	4,437	0	0	14,927	918	-38,859
Investment	3,596	3,596	0	209,653	0	0	14,927	42,758	918	0	0	81,560	0	0	2,813	0	0	0	918	0	0	795	0	0	4,437	0	0	14,927	918	-38,859
Int. During Construction	216	521	634	13,264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	33,069	33,069	33,069	35,201	41,309	41,440	41,440	8,372	20,023	20,023	17,891	11,783	11,651	11,651	11,651	0	0	0	0	0	0	0	0
Interest	0	0	0	0	18,518	18,518	19,713	23,133	20,561	17,916	15,270	18,979	15,674	12,359	9,044	8,374	6,772	5,170	3,739	2,796	1,864	932	0	0	0	0	0	0	0	0
Cash Flow for FIRR	-3,596	-3,596	0	-209,653	13,674	16,330	3,946	-22,070	19,497	22,946	25,609	-53,334	24,234	24,234	21,421	24,234	24,234	24,234	23,316	24,234	24,234	23,439	24,234	24,234	19,797	24,234	24,234	9,307	23,316	63,093

FIRR% 5.12%

Appendix 12-9-9 Financial Analysis for Railway Service & Feeder Bus Service (Unit: 1000 M$) Alternative 3-B

Income Statement	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Operating Profit	0	0	0	0	12,578	15,728	18,765	20,477	18,896	21,921	25,123	28,200	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569
Railway	0	0	0	0	5,107	7,764	10,306	11,524	9,449	11,981	14,643	17,181	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959	9,959
Feeder Bus	0	0	0	0	7,471	7,965	8,459	8,952	9,446	9,940	10,480	11,019	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611	11,611
Operating Revenue	0	0	0	0	83,229	88,235	93,240	98,246	103,252	108,258	113,264	118,270	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276	123,276
Railway	0	0	0	0	36,999	39,698	42,398	45,097	47,797	50,496	53,196	55,895	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594	58,594
Feeder Bus	0	0	0	0	46,230	48,536	50,843	53,149	55,456	57,762	60,069	62,375	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682	64,682
Operating Expense	0	0	0	0	70,650	72,506	74,476	77,770	84,357	86,337	88,141	90,070	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707	101,707
Railway	0	0	0	0	31,891	31,935	32,091	33,573	38,347	38,515	38,552	38,714	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636	48,636
Feeder Bus	0	0	0	0	38,759	40,572	42,384	44,197	46,009	47,822	49,589	51,356	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071	53,071
Investment																														
Investment Total	3,596	3,596	0	209,653	60,550	3,390	18,317	46,148	4,308	3,390	31,110	85,020	3,330	140	2,953	140	60,620	3,460	4,378	3,390	3,390	4,185	31,110	3,460	7,767	140	140	15,067	61,538	208,043
Railway Total	3,596	3,596	0	209,653	0	0	14,927	42,758	918	0	0	81,560	0	0	2,813	0	0	0	918	0	0	795	0	0	4,437	0	0	14,927	918	204,583
Local Currency Total	0	0	0	840	0	0	1,964	0	46	0	0	40	0	0	140	0	0	0	46	0	0	40	0	0	652	0	0	1,964	46	0
Foreign Currency Total	3,596	3,596	0	208,813	0	0	12,963	42,758	872	0	0	81,520	0	0	2,673	0	0	0	872	0	0	755	0	0	3,785	0	0	12,963	872	204,583
Feeder Bus Total	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460	3,460	3,390	3,390	3,390	31,110	3,460	3,330	140	140	140	60,620	3,460
Local Currency Total	0	0	0	0	20,540	1,290	1,290	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310	1,310	1,290	1,290	1,290	9,210	1,310	1,260	40	40	40	20,560	1,310
Foreign Currency Total	0	0	0	0	40,010	2,100	2,100	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150	2,150	2,100	2,100	2,100	21,900	2,150	2,070	100	100	100	40,060	2,150
-Salvage Value																														
Int. During Construction																														

Finance Program	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Finance Total																														
Railway																														
Borrowing	3,812	4,117	634	222,917	0	0	14,927	42,758	918	0	0	81,560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	33,069	33,069	33,069	35,201	41,309	41,440	41,440	6,372	20,023	20,023	17,891	11,783	11,651	11,651	11,651	0	0	0	0	0	0	0	0
Balance	3,812	7,928	8,563	231,480	231,480	231,480	246,407	256,096	223,946	190,877	155,876	195,927	154,487	113,046	104,674	84,651	64,628	46,737	34,954	23,303	11,651	0	0	0	0	0	0	0	0	0
Interest	216	521	634	13,264	18,518	18,518	19,713	23,133	20,561	17,916	15,270	18,979	15,674	12,359	9,044	8,374	6,772	5,170	3,739	2,786	1,864	932	0	0	0	0	0	0	0	0
Feeder Bus																														
Borrowing	0	0	0	0	60,550	3,390	3,390	3,390	3,390	3,390	31,110	3,460	3,330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	8,650	9,134	9,619	10,103	10,587	11,071	15,516	7,360	7,351	6,867	6,383	5,899	5,414	970	476	0	0	0	0	0	0	0
Balance	0	0	0	0	60,550	63,940	67,330	70,720	65,460	59,716	81,207	74,564	67,307	56,236	40,720	33,360	26,009	19,141	12,759	6,860	1,446	476	0	0	0	0	0	0	0	0
Interest	0	0	0	0	4,844	5,115	5,386	5,658	5,929	5,508	7,266	6,773	6,232	5,385	4,499	3,258	2,669	2,081	1,531	1,021	549	116	38	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	5,144	8,317	10,183	-23,975	-29,609	-23,908	-22,152	-28,521	-28,419	-24,881	5,131	6,359	-51,921	10,045	17,700	20,757	22,645	27,660	13,890	42,054	37,747	45,374	45,374	30,447	-16,024	135,703
Culumtive Net Cash Flow	0	0	0	0	5,144	13,462	23,645	-330	-30,139	-54,047	-76,199	-104,720	-133,139	-158,020	-152,889	-146,530	-198,452	-188,406	-170,706	-149,949	-127,304	-99,644	-85,753	-43,698	-5,952	39,422	84,796	115,243	99,219	234,922

Cash Flow Statement																														
Cash In	3,812	4,117	634	222,917	89,057	35,341	53,599	84,033	42,707	45,109	76,314	133,663	48,844	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514	45,514
Operating Profit	0	0	0	0	12,578	15,728	18,765	20,477	18,896	21,921	25,123	28,200	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569	21,569
Depreciation	0	0	0	0	15,929	16,223	16,517	17,408	19,564	19,788	20,081	20,443	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945	23,945
Borrowing	3,812	4,117	634	222,917	60,550	3,390	18,317	46,148	4,308	3,390	31,110	85,020	3,330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Out	3,812	4,117	634	222,917	83,912	27,024	43,416	108,007	72,517	69,017	98,468	162,184	77,263	70,395	40,383	39,155	97,436	35,469	27,814	24,757	22,869	17,854	31,624	3,460	7,767	140	140	15,067	61,538	-90,189
Investment	3,596	3,596	0	209,653	60,550	3,390	18,317	46,148	4,308	3,390	31,110	85,020	3,330	140	2,953	140	60,620	3,460	4,378	3,390	3,390	4,185	31,110	3,460	7,767	140	140	15,067	61,538	-90,189
Int. During Construction	216	521	634	13,264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	33,069	41,719	42,203	44,820	51,412	52,028	52,512	23,888	27,383	27,375	24,758	18,165	17,550	17,066	12,621	476	0	0	0	0	0	0	0
Interest	0	0	0	0	23,362	23,634	25,099	28,791	26,490	23,424	22,536	25,752	21,906	17,743	13,543	11,632	9,441	7,251	5,270	3,817	2,413	1,048	38	0	0	0	0	0	0	0
Cash Flow for FIRR	-3,596	-3,596	0	-209,653	-32,043	28,561	16,965	-8,263	34,091	38,329	14,094	-36,377	42,184	45,374	42,561	45,374	-15,106	42,054	41,136	42,124	42,124	41,329	14,404	42,054	37,747	45,374	45,374	30,447	-16,024	135,703

FIRR 8.37%

Chapter 13

LAND-USE PLANNING

Appendix 13-1-1 List of Provided Materials on Urban Development Planning Integrated to RBCS in Japan

(1) Materials on suburban housing development projects integrated to the urban railway development

A. Chiba New Town

1. Developer: Housing and Urban Development Corporation

2. Construction period; 1970 -

3. Area: 1,933 ha

4. Planned population: 176,000 population

5. Location: The eastern suburbs of Tokyo Metropolitan Area

6. Access to the centre of Tokyo

Railway. A new railway line was planned to serve the convenient access from the New Town to the centre of Tokyo. The public and private sectors, related to the New Town development, established two railway companies for developing and operating the railway; the Hokusou Development Railway and the Housing Development Corporation Railway. The main part of the railway line is planned to start the operation in 1991.

Road. New Arterial roads were planned and are being developed for connecting the New Town to the existing inter-city highway and arterial road network.

7. Materials provided

Panel A-1: (1) Chiba New Town Land-Use Planning Map (with a scale of 1/25,000); (2) Location Map; and (3) Transportation Plan.

Panel A-2: The explanation of Land^Use Plan.

Panel A-3: (1) Development Process; (2) Land for Sale in Lots, and (3) Main progress Status (July 1989).

B. Tama New Town

1. Developer: (1) Tokyo Metropolitan Government; (2) Housing and Urban Development Corporation; and (3) Tokyo Metropolitan Housing Supply Corporation.

2. Construction period; 1966 -

3. Area: 3,020 ha

4. Planned population: 373,000 population

5. Location: The western suburbs of Tokyo Metropolitan Area (25 to 40 km far from the centre of Tokyo)

6. Access to the centre of Tokyo

Railway. Two private railway companies developed two lines to connect the New Town to the centre of Tokyo; the Keio Sagamihara Line and the Odakyu Tama Line. These serve about a 35-minute ride access to Shinjuku.

Road. Arterial roads were planned and have been developed for connecting the New Town to the existing arterial road network.

7. Materials prepared

Panel B-1: (1) The explanation on the basic plan; (2) Tama New Town Land-Use Planning Map (with a scale of 1/20,000); and (3) Location Map.

Panel B-2: (1) Outline of the project; (2) New Residential Town Development Program; (3) Land Readjustment Program; (4) Related Public Facilities Development Program; (5) Maps of Tama New Town Development Area by Developer; and (6) the Development/Implementation Diagram by Major Facilities

Panel B-3: (1) Roads and Railway; (2) Water Supply and Sewerage; and (3) History of Tama New Town.

Panel B-4: (1) Centres; (2) Parks and Open Spaces; (4) Housing; and (5) Education and Medical Facilities

C. Tokyu Tama Den-en Toshi (Garden City)

1. Developer: Tokyu Dentetu Ltd. (a private railway company)

The above private developer coordinated and established the land-ownership associations based on the Land Readjustment Act.

2. Construction period: 1955 -

3. Area: 5,000 ha

4. Planned population: 400,000 population

5. Location: The southwestern suburbs of Tokyo Metropolitan Area (15 to 30 km far from the centre of Tokyo)

6. Access to the centre of Tokyo

   Railway. Tokyu Den-en Toshi Line which was developed by the same company.

   Road. Tomei (Inter-City) Highway

7. Materials prepared

   Panel C-1: Tama Den-en Toshi Development Plan (a scale of 1/25,000)

   Panel C-2: Station and Local Centre; this area has been redeveloped into a more compact centre.

D. Seishin New Town

1. Developer: (1) Kobe Municipality; (2) Housing and Urban Development Corporation; and (3) Others

2. Construction period: 1971 -

3. Area: 1.287 ha

4. Planned population: 100,000 population

   The New Town includes industrial developments, universities, and education/research institutions, etc.

5. Location: The western suburbs of Kobe City (10 to 15 km far from the centre of Kobe City)

6. Access to the Kobe City Centre

Railway. Kobe Municipality which was constructed by the Municipality serves the direct access from the New Town to the city centre.

Road. A free-way and an arterial road link the New Town to the City Centre.

7. Materials prepared

Panel D-1: Location Map

Panel D-2: Land Use Plans of (1) Seishin Housing Development and Industrial Park, (2) Second Seishin Housing Development and Kobe High-Tec. Industrial Park, and (3) Kobe Gakuen-Toshi Housing Development and Industrial Development.

Panel D-3: Seishin-Chuo Centre Development around the station

Panel D-4: Gakuen-Toshi Centre Development around the station

Panel D-5: Suma Centre Development around the station

Panel D-6: Aerial photographs of the New Town and the railway constructions

E. Additional Material on Centre Development around Stations

Panel E-1: Higashi-Totsuka Station-Area
Approximately 100 ha area around the station is planned for a housing development and is under construction (December 1990). The development method is the Land Readjustment.

It is located at the southwestern suburbs of Tokyo; (about 30-km far from the Centre of Tokyo.)
Centre Development Area, which is developed within a walking distance of the station, includes high-rise housing buildings. The residents of the high-rise buildings will go to the station on foot.

Panel E-2: Moriguchi-shi Station-Front-Area Redevelopment.
Moriguchi City is mainly a commuter town of Osaka.
Integrated to the track elevation project, the station-front-area was redeveloped by the Municipality.
The station-front-area redevelopment includes: a civic centre complex including concert halls, gymnasium; community facilities for aged citizens; and so on. In addition, the construction costs were financed by the cross subsidies of the project and the government subsidies.

Panel E-3: Kawasaki Station-front-area
Kawasaki Station is located at a 18km distance from the Centre of Tokyo.
The station-front-area was redeveloped by the Kawasaki Municipality. The redeveloped area includes: intermodal transfer squares; shopping mall; and complex of shops, offices and housing.
The eastern square is well-designed in landscaping.
This project also was financed by the cross subsidies and the governmental aid.

(2) Materials on the established town planning coordinated to the urban railway network

F. The Case of Saitama Prefecture

1. Location: It is neighboring to the Tokyo Metropolitan Government Area

2. Reference Materials

Panel F-1: Existing Land-Use Map
(with a scale of 1/50,000)

Three radial lines connect the Prefecture to the Centre/Sub-Centre of Tokyo.
Areas within a 500-metre circle of the stations (green-colored circle) have been well-developed for commercial utilization (red-colored areas).
Areas within a 2-km circle (red-colored circle) of the stations have been developed for mainly housing utilization (yellow-colored area). In addition the blue-colored areas shows industrial utilization areas.

Panel F-2: Established Town Planning Maps
(with a scale of 1/50,000)

Local Governments have prepared the land-use regulation maps based on the City Planning Act.
Areas around stations are planned/regulated for mainly commercial utilization and intensive land use (by high space-floor-index); these are red-colored.
Areas for housing utilization are planned mainly at the station-areas.
In Japan, the both of RBCS and the City Planning's regulation have encouraged compact commercial/business developments around the stations.

Appendix 13-5-1 Proposed Development Action Diagram for Rawang Station-Area (Case 1)

Action Diagram for Case 1 (Rawang Station-area)

Station	Primary Zone	Secondary Zone
Rawang	L1: Intermodal Transfer Facilities in front of the station	P2:Industrial Development P1:Housing Developments
	(upgraded) A1: Intermodal Transfer Square Development A2: Town Centre Development (integrated to the existing town-centre)	A4: [Acceleration/coordination of Planned Housing Developments] <--L2:Access Road Improvement (to link the housing developments to the station)
	A3: Housing Development (including High-rise Appartments, Low-cost Housing)	
	O1: Additional Housing Development (including High-rise Appartments, Low-cost Housing)	

[Intergration of Projects] -->[A Project Package]

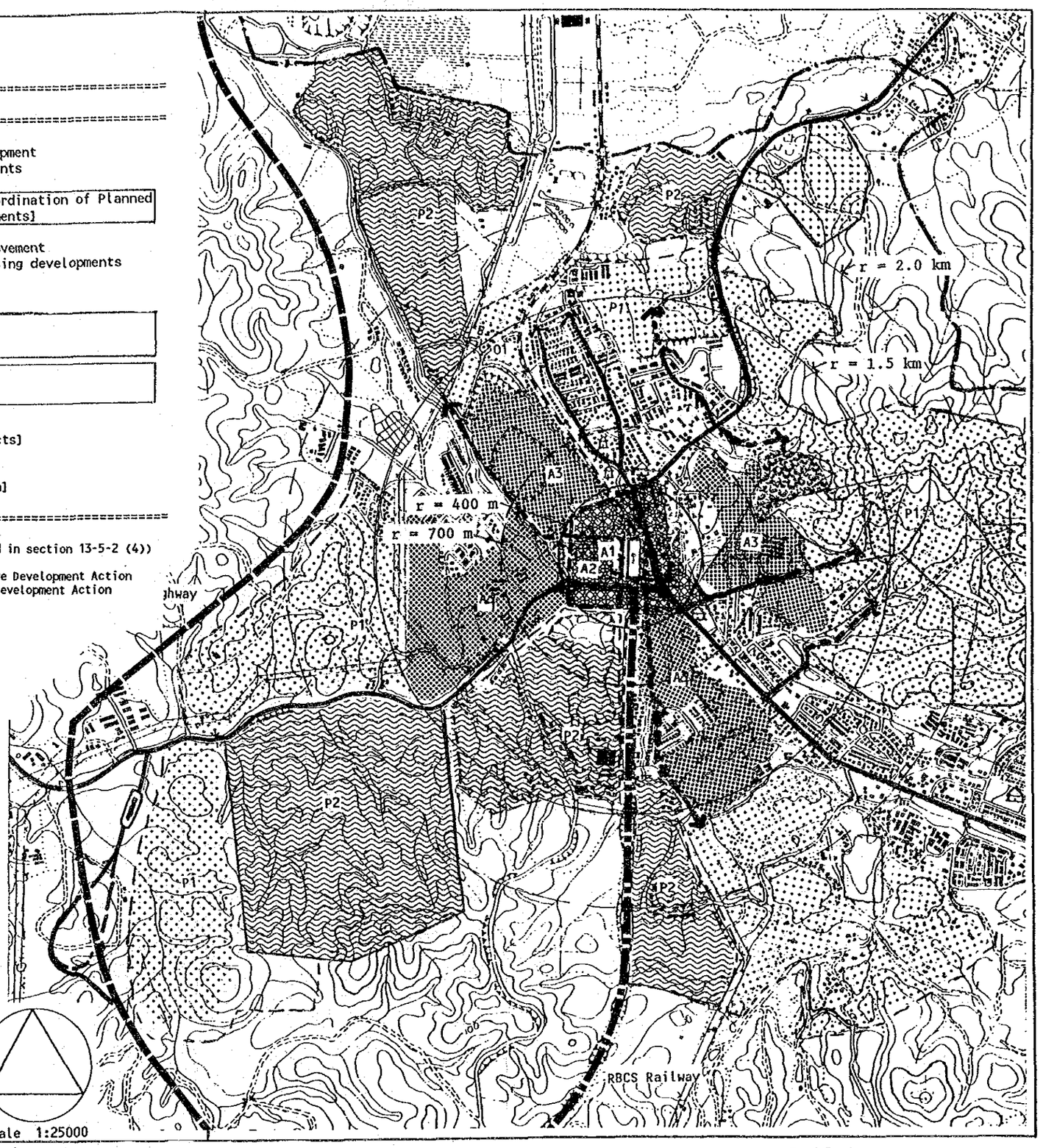
[Coordination of Projects]

[Preparation of A Guideline for Rawang Satellite Town]

[Note] Categories of Development Actions (as mentioned in section 13-5-2 (4))

L: Linkage Action
P: Planned Development Action
A: Alternative Development Action
O: Optional Development Action

[ ]: Necessary Government Action



Appendix 13-5-2 Proposed Development Action Diagram for Kuang Station-Area (Case 1)

Action Diagram for Case 1 (Kuang Station-area)

Station	Primary Zone	Secondary Zone
Kuang	L1: Intermodal Transfer Facilities in front of the station	P2: Industrial Developments P1: Housing Developments
	(upgraded) A1: Intermodal Transfer Square Development A2: Town Centre Development	A5: [Acceleration/Integration of Planned Planned Developments] A4: [Integration of Road Network relating to the housing developments]
	A3: Housing Development (including High-rise Appartments, Low-cost Housing)	
	O1: Additional Housing Development (including High-rise Appartments, Low-cost Housing)	

[Introduction of Land Readjustment]

[Intergration of Projects]

[Preparation of A Guideline for Kuang Satellite Town]

[Note] Categories of Development Actions (as mentioned in section 13-5-2 (4))

L: Linkage Action — A: Alternative Development Action
P: Planned Development Action — O: Optional Development Action

[ ]: Necessary Government Action