14.3 Evaluation of the Maintenance and Rehabilitation Works

This section provides the order of implementation of the maintenance and rehabilitation works planned for each airport. Work items of each maintenance and rehabilitation works are evaluated by considering specific and individual nature and extent of deficiencies, the work proposed to remedy each deficiency, tangible and intangible benefits, cost and ease of implementation, etc. The broadly ranked priorities determined by the criteria in the previous section are modified in the order of implementation.

(1) Gunung Sitoli

1) General Description of the Airport

The airport is outlined below:

Item	Description
- Location	North Sumatra Province, Nias Island
- Characteristics	Gateway airport for tourist resources of the island
- Airport Class (DGAC Classification)	Class IV
- No. of Annual Passengers (1989 record)	9,000 persons
- Largest Aircraft	DHC6
- Runway	900m X 30m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below:

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Runway Overlay	I	1
2) Widening of Runway Strip	III	3
3) Taxiway Overlay	I	2
4) Apron Overlay	I	2
5) Air Conditioning in Passenger Terminal Building	III	4
Airport Maintenance Equipment		
1) Mower	I	1
2) Tractor	I	1
3) Dump Truck	II	2

a) Rehabilitation Works

Runway Overlay

The overlay of the pavement in 1989 did not cover a 200m long section of the west end of the runway. The aggregates in the entire area of this section (200m X 30m) are exposed in the pavement, and safe aircraft operations are threatened. A longitudinal slope at the border of overlaid section and above 200m long section is very steep with 3% slope, which is hazardous to aircraft operations. The overlay of the remaining 200m long section of the runway should be completed urgently to assure safe aircraft operations.

Taxiway Overlay

The taxiway pavement is weathered similar to the runway. The aggregates exposed on the surface of the pavement create a hazard to aircraft. An overlay of the pavement is necessary for safe taxiing of aircraft.

Apron Overlay

The apron pavement is in the same condition as the taxiway, and requires overlay works.

Widening of Runway Strip

The width of the existing runway strip is 40m on each side of the runway from the runway centerline as observed in many small airports in Indonesia. Although there is no practical problem with the 80m wide runway strip, it is recommended to widen the strip to 150m in accordance with ICAO recommendation for aerodome reference code number of 2 in order to protect aircraft flying over it during take-off and landing operations. The widening at the runway strip is easy as the land has been already acquired. No obstacles will emerge by the widening at the runway strip except for trees and bushes.

Air Conditioning in Passenger Terminal Building

There is no air conditioning in the existing departure lounge. Provision of air conditioning for the terminal building will improve passenger comfort.

b) Airport Maintenance Equipment

- No mower is available at present. Cutting of grass is performed by manual labour in an unsatisfactory manner. There are places within the runway strip where the grass grows to a height of one meter or more. It is necessary to provide one mower and one tractor in order to carry out grass cutting efficiently.

- Provision of a dump truck will also contribute to efficient airport operations in disposing cut grass and supporting maintenance activities.

(2) Palembang

1) General Description of the Airport

The airport is outlined below:

Item	Description
- Location	South Sumatra Province, Palembang
- Characteristics	Gateway to South Sumatra
- Airport Class (DGAC Classification)	Class I
- No. of Annual Passengers (1989 record)	530,000
- Largest Aircraft	DC9
- Runway	2,200m X 45m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below:

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Runway Overlay	I	1
2) Rehabilitation of Finishings in Passenger Terminal Building	III	2
Airport Maintenance Equipment		
1) Handy Mower	I	1

a) Rehabilitation Works

Runway Overlay

The existing runway has many undulations which are located close together. A 1,350 section out of 2,200m long runway does not comply with ICAO recommendation for distance between slope changes. Passengers experience severe vibrations when an aircraft passes through undulations on the runway, and this situation is hazardous to safe aircraft operations.

An overlay of the runway pavement is urgently required to eliminate this problem. Very thick overlay works (42cm on an average) will require high construction costs of 41 billion Rp. As the alternative method, temporary overlay with minimum thickness may be proposed so as to only improve the deterioration of pavement surface and to save investment cost. However hazardous undulation will not be improved by this method anymore.

Therfore, full scale overlay is the most recommendable solution. This works will not waste the high investment because the existing runway will be continued to be used for the future according to the existing master plan of the airport.

The further explanation for pavement overlay is explained in Appendix 14.3.2.

Renovation of Finishings in Passenger Terminal Buildings

The flat roof of the arrival building leaks due to deterioration. Waterproofing with membrane roofing material is considered necessary.

Although the construction of a new passenger terminal buildings was planned in the existing master plan, this minor repair costing eight million Rp. is not a wasteful investment.

b) Airport Maintenance Equipment

The existing handy mower is out of order and difficult to repair. A new handy mower is urgently required for effective maintenance of the airport.

(3) Semarang

1) General Description of the Airport

The airport is outlined below:

Item	Description
- Location	Central Java Province, Semarang
- Characteristics	Gateway to Central Java
- Airport Class (DGAC Classification)	Class II
- No. of Annual Passengers (1989 record)	524,000
- Largest Aircraft	F28
- Runway	1,650m X 30m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below:

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Expansion of Passenger Terminal Building	I	1
Airport Maintenance Equipment		
1) Mower	I	1
2) Tractor	I	1
3) Handy Mower	I	1
4) Sweeper	I	1

a) Rehabilitation Works

Expansion of Passenger Terminal Buildings

The existing passenger terminal building is seriously congested with peak hour passengers. Passenger flows intersect in the passenger terminal buildings, arriving and departing passengers at the arrival lobby and arrival passengers and restaurant users at the baggage claim area. Number of check-in counters for shuttle

flights is insufficient for the present needs. In order to solve these problems, the following extension and remodeling works are urgently required.

- Extension of check-in lobby toward northeast (approximately 600 sq.m)
- Increase of number of check-in counters
- Construction of new baggage claim area on the northeast of the existing building (approximately 400 sq.m)
- Expansion of restaurant utilizing existing baggage claim area

Handling capacity of the passenger terminal building will be increased with this improvement. Congestion problem will be solved completely, and reduction of passenger processing time will be expected.

The existing master plan which will construct a new terminal area in a different place is considered difficult to be implemented in a short term due to incompatibility with the land use plan of the surrounding area. Since the expansion of the apron has been completed for the existing passenger terminal building, this rehabilitation works will not compete with the existing master plan in a short term.

The EIRR of the investment considerably exceeds opportunity cost of the capital of 15%. The high economic return indicates that this rehabilitation works be implemented at an earliest possible timing.

b) Airport Maintenance Equipment

No maintenance equipment is available except one mower at present. Four mowers, four tractors, four handy mowers and one sweeper are required for efficient maintenance of the airport. Provision of these equipment will contribute to safe aircraft operations by assuring the performance of air navigation aids, by preventing bird hazard and by securing visibility within the runway strip.

(4) Pontianak

1) General Description of the Airport

The airport is outlined below:

Item	Description
- Location	West Kalimantan Province, Pontianak
- Characteristics	Gateway to West Kalimantan Border airport to Singapore and Brunei
- Airport Class (DGAC Classification)	Class I
- No. of Annual Passengers (1989 record)	327,000
- Largest Aircraft	F28
- Runway	1,650m X 30m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below:

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Runway Extension	II	1
2) Taxiway Overlay	I	3 *
3) Expansion of Passenger Terminal Building	II	2
4) Air Conditioning in Passenger Terminal Building	III	4
Airport Maintenance Equipment		
1) Handy Mower	I	1
2) Sweeper	I	1

Note * : Ranked down since this taxiway is occasionally used.

a) Rehabilitation Works

Runway Extension

Due to its short length, the existing 1,650m long runway imposes

payload restriction on the F28 which is the largest aircraft operating at present. The number of passengers is restricted to 65 passengers in dry condition and to 45 passengers in wet condition down from the maximum capacity of 85 passengers. In order to eliminate these restrictions, the runway is planned to be extended to 1,850m (200m extension). As the subsoil of the extended portion of the runway is very weak, it is necessary to replace existing subsoil by one meter thick good material in order to construct a 54cm thick asphalt pavement on it.

Since the annual load factor at this airport has reached 70% and it exceeds 80% in a peak month, the extension of the runway will contribute considerably to realize the potential demand which has been restricted by the payload penalty.

The existing runway was planned to be utilized as the future parallel taxiway in the existing master plan. Therefore, the investment of the runway extension is compatible with the long-term development of the airport, and its implementation is significant.

Expansion of Passenger Terminal Building

This airport has two separate terminal buildings, one for departure and the other for arrival. It is the departure building that requires rehabilitation works. The present departure building has L-shaped check-in counters, and this is causing congestion at peak hours in the check-in lobby. The planned works are the expansion of the lobby by 135 sq.m and modification of the counters to a straight line. The departure lounge also has shortage of floor space for peak hour passenger loads and the lounge is to be expanded by 72 sq.m.

The present master plan presents a new consolidated passenger building and the above expansion works are considered temporary works until the implementation of the master plan.

The EIRR is in far excess of the opportunity capital cost of 15% and justifies this rehabilitation works.

Taxiway Overlay

The runway is connected to the apron with two taxiways of A and B. A-taxiway which was constructed together with the old apron does not have enough pavement strength to support the load of F28. The surface has alligator cracks over the entire area of taxiway, and overlay works to increase the pavement strength will be in asphalt concrete with an average thickness of 14cm.

According to priority ranking criteria mentioned in Section 14.2, this pavement overlay is ranked in Priority I. However, taxiway-A is used only on limited occasions when the traffic exceeds normal

peak volume, thus this rehabilitation work is considered to be of lower priority than the above two works.

b) Airport Maintenance Equipment

Two handy mower and one sweeper will be provided. Routine maintenance by this equipment will assure safe aircraft operations.

(5) Sampit

1) General Description of the Airport

The airport is outlined below:

Item	Description
- Location	Central Kalimantan Province, Sampit
- Characteristics	Airport handling the largest number of passengers among the Class V airports
- Airport Class (DGAC Classification)	Class V
- No. of Annual Passengers (1989 record)	30,000
- Largest Aircraft	CS212
- Runway	855m X 23m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below:

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Runway Overlay	I	1
2) Air Conditioning for Passenger Terminal Building	III	2
Airport Maintenance Equipment		
1) Mower	I	1
2) Tractor	I	1
3) Handy Mower	I	1
4) Dump Truck	II	2

a) Rehabilitation Works

Runway Overlay

There are many alligator cracks in the middle of the runway due to flooding of the runway before completion of the drainage system and the high groundwater table. There is also severe ravelling on

runway 31 threshold side, and the subbase is exposed. Soils investigation indicates that the runway has insufficient pavement strength for the present local conditions.

To overcome these deficiencies, it is planned to provide an asphalt concrete overlay about 32cm thick for the entire length of the runway.

The rehabilitation works will provide sufficient pavement strength and improve the pavement surface condition. This rehabilitation will enable the runway to continue to serve for the present traffic and ensure safe aircraft operations.

This airport has experienced the damage of pavement caused by the settlement at weak foundation area. Although the proposed overlay is expected to bear the settlement force to certain extent, it is difficult for the overlay to assure complete stability. The replacement of subgrade with qualified soil is the most reliable method. However this method requires the suspension of airport operation and high construction cost.

The practical method which compromise between the improvement of pavement by low cost and countermeasure to the damage by settlement is to initially overlay with minimum thickness approx. 7cm and to repair the part of deteriorated pavement as necessary.

The further explanation for pavement overlay is explained in Appendix 14.3.2.

Air Conditioning in Passenger Terminal Building

There is no air conditioning in the passenger terminal building. Installation of air conditioning will improve the service levels for passengers.

b) Airport Maintenance Equipment

- There is no airport maintenance equipment at present, and all airport maintenance work is carried out by hand labor. Two mowers, two tractors, and one handy mower will be required. With this mechanized equipment, maintenance work can be performed in an efficient manner, and will contribute to safe aircraft operations.

- There will be one dump truck assigned to dispose the cut grass which will allow for the work to be performed efficiently.

(6) Ambon

1) General Description of the Airport

The airport is outlined below:

Item	Description
- Location	Maluku Province, Ambon
- Characteristics	Border Airport
- Airport Class (DGAC Classification)	Class II
- No. of Annual Passengers (1989 record)	147,000
- Largest Aircraft	F28
- Runway	1,850m X 45m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below:

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Runway Overlay	I	1
2) Taxiway Overlay	I	2
3) Apron Overlay	I	2
4) Air Conditioning in Control Tower	III	2
Airport Maintenance Equipment		
1) Mower	I	1
2) Tractor	I	1
3) Handy Mower	I	1

a) Rehabilitation Works

Runway Overlay

The longitudinal runway slope at the runway 22 threshold side is about 1.0% and considerably exceeds the recommended value of 0.8% by ICAO. This is a serious infraction of the recommendations which

may endanger safe aircraft operation, and is requires to be corrected by a pavement overlay. The thickness of the asphalt pavement overlay to correct this deficiency will be very thick with 49cm on an average. The construction cost will be about 40 billion Rp. As the alternative method, temporary ovrlay with minimum thickness may be proposed so as to only improve the deterioration of pavement surface and to save investment cost. However steep slope will not be improved.

The further explanation for pavement overlay is explained in Appendix 14.3.2.

As the existing runway was planned to be used continuously for the future with an extension in the existing master plan, this rehabilitation work will not be a wasted investment. Therefore, the overlay works should be implemented in spite of its high cost.

Taxiway Overlay

The pavement of the taxiway is ravelled over its entire surface. A pavement overlay will be required of 49cm thickness on average. With this overlay work, safe aircraft operations will be assured.

Apron Overlay

The existing apron has reflection cracks and ravelling over the entire surface. The transition section between the cement concrete pavement and the asphalt concrete pavement of the apron has a steep slope of approximately 2%. The depressions caused by fuel and oil spills are observed on the apron.

In order to correct these deficiencies, a pavement overlay of asphalt concrete of about 17cm thickness is required for the entire surface of the apron except over the existing cement concrete pavement. This will assure safe aircraft operations.

Air Conditioning in Control Tower

The existing capacity of air conditioning in the control tower is only half of the requirements. It is necessary to increase the capacity in order to maintain the performance of air traffic control equipment and to improve working condition of controllers.

b) Airport Maintenance of Equipment

Five mowers, four tractors and four handy mowers are required. Provision of this equipment will improve the efficiency of airport maintenance activities and contribute to safe aircraft operations.

(7) Ternate

1) General Description of the Airport

The airport is outlined as follows:

Item	Description
- Location	Maluku Province, Ternate
- Characteristics	Hub Airport for pioneer airports in north part of Maluku Province
- Airport Class (DGAC Classification)	Class III
- No. of Annual Passengers (1989 record)	57,000
- Largest Aircraft	F27
- Runway	1,420m X 30m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below;

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Runway Extension	II	5 *1
2) Widening of Graded Area	I	2
3) Grading of Runway Strip	I	3
4) Expansion of Passenger Terminal Building	II	1 *2
5) X-Ray Baggage Screening Unit	I	1
6) Walk-Through Metal Director	I	1
7) Air Conditioning in Control Tower	III	4
8) Air Conditioning in Passenger Terminal Building	III	4
Airport Maintenance Equipment		
1) Mower	I	1
2) Handy Mower	I	1

Note *1: Ranked down due to its low economic effect
*2: Ranked up due to its high economic effect

a) Rehabilitation Works

Expansion of Passenger Terminal Building

The passenger terminal building is short of space, and is heavily congested during peak hours. The present ratio of available area to required area is as follows:

Space	Area(sq.m)	Present Ratio to Required Area
Check in Lobby	48	43%
Departure Lounge	72	77%
Baggage Claim Area	15	60%

It is urgently required to expand all these areas to solve the problem of passenger congestion in the terminal building. The economic effect of the rehabilitation works measured as EIRR considerably exceeds the opportunity capital cost of 15%. This work should be implemented urgently to realize high economic benefits.

X-Ray Baggage Screening Unit

There is no equipment provided to screen passenger baggage and the screening is performed by hand. One X-ray baggage screening unit will be provided in order to carry out screening of passenger baggage efficiently and precisely. The prevention of hi-jacking by the introduction of this equipment will contribute to safe air transportation.

Walk-Through Metal Detector

No walk-through metal detector is available, and the security check of passengers is performed by hand at present. There will be one walk-through metal detector provided, which will make the security check of passenger effective and positive. This will help to prevent hi-jacking and contribute to safe air transportation.

Widening of Graded Area

The terrain of eastern half the runway strip drops off abruptly with about 20% slope at 40m from the centerline of the runway. This part of the runway strip should be graded by filling with earth work up to a distance of 75m from the runway centerline in order to reduce the risk of damage to aircraft running off the runway and to protect aircraft flying over it during take off and landing operations.

Grading of Runway Strip

Some parts of the existing graded area on the east side of the runway have slopes of more than ICAO recommended value of 2.5%, and are inadequate as a graded area to reduce the risk of damage to aircraft running off the runway. The slopes of the grading area should be corrected in accordance with ICAO recommendation in order to assure safe aircraft operations.

Air Conditioning in Control Tower

The existing capacity of air conditioning in the control tower is only half of requirements. It is necessary to increase the capacity in order maintain the performance of air traffic control equipment and to improve working conditions for the controllers.

Air Conditioning in Passenger Terminal Building

There is no air conditioning provided for the passenger terminal building. A new system will be provided to improve service levels for passengers.

Runway Extension

The present runway length of 1,420m is 230m short for F27 aircraft to make the flight for longest sector to Ambon. A payload restriction of approximately 500kg is imposed at present. Extending the runway to the north is not adequate due to hilly terrain on the extended line of the runway. The DGAC has decided the extension to take place on the south end, and the works to divert the existing public road have started. The work of extension will require an embankment of some 5.0m high, resulting in very expensive civil work for its limited economic benefits. (Rp. 1.0 billion, EIRR = 0%).

Although runway extension is ranked in Priority II in accordance with criteria in Section 14.2, the order of implementation was kept low reflecting its low economic effect. This work should be implemented when the DGAC has sufficient budget for the work.

b) Maintenance Equipment

There are 4 tractors active at this airport, but all mowers are out of condition and cannot be used. It will be necessary to provide four mowers and two handy mowers to perform the necessary work. This will make the tractors active again and the maintenance work efficient.

(8) Mataram

1) General Description of the Airport

The airport is outlined below:

Item	Description
- Location	West Nusa Tenggara Province, Mataram
- Characteristics	Gateway to West Nusa Tenggara Province Main access infrastructures to the Province with tourist resort areas
- Airport Class (DGAC Classification)	Class III
- No. of Annual Passengers (1989 record)	187,000
- Largest Aircraft	F28
- Runway	1,600m x 30m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below:

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Runway Extension	II	4
2) Apron Expansion	II	3
3) Apron Overlay	I	1
4) X-Ray Baggage Screening Unit	I	2
5) Walk-Through Metal Detector	I	2
6) Air Conditioning in Passenger Terminal Building	III	5
Airport Maintenance Equipment		
1) Sweeper	I	1

a) Rehabilitation Works

Apron Overlay

The apron does not have sufficient pavement strength for the F-28

aircraft. The wide areas of the pavement surface has alligator cracks in an early stage of development. The asphalt concrete overlay work of about 14cm thickness to increase the pavement strength are urgent and are indispensable rehabilitation work, which will continue to serve for the present air transport.

X-Ray Baggage Screening Unit

The existing X-ray baggage screening unit is out of commission and one unit will be provided. This is to assure safe air transportation.

Walk-Through Metal Detector

The present unit is broken and cannot be repaired. A new unit will be provided.

Apron Expansion

The present apron has one parking spot for F28 aircraft and two spots for F27 and CS212 respectively. The apron often has insufficient space when delayed aircraft, non-scheduled aircraft or military aircraft use it, and this causes delays to arriving aircraft.

In order to solve the capacity deficiency problem, and to cope with the demand at least up to 1995, the apron will be expanded with an asphalt concrete pavement 74cm thick and 10m wide. The works will contribute to ensure unrestrained air transportation.

Runway Extension

The present runway length is not long enough for F28 aircraft in Mataram - Surabaya route and this imposes aircraft weight restriction.

At least 50m extension together with the grading of runway strip and moving the approach lighting system will be required to release the weight restriction.

The present annual load factor in the above route is 82 percent and very high. The potential demand may be realized by the extension work. The EIRR of the investment considerably exceeds opportunity cost of the capital of 15% and the high economic return justifies the implementation of this rehabilitation work. However, the airline company has a plan to introduce DC9 aircraft which will require further runway extension and shift of facilities such as approach lighting system again. Taking the above situation into consideration, the runway extension works are given lower priority than the expansion of the apron.

Air Conditioning in Passenger Terminal Building

There is no air conditioning provided for the departure lounge. The provision of air conditioning in this airport where about 70 percent of passengers are tourists will contribute not only to the upgrading of passenger service levels but also indirectly to the enhancement of tourism development.

b) Airport Maintenance Equipment

The airport maintenance equipment are reasonably sufficient except a sweeper for the airport maintenance work.

The provision of one sweeper makes available the cleaning of the pavement surface in a positive and efficient manner, which will assure safe aircraft operations.

(9) Bima

1) General Description of the Airport

The airport is outlined below:

Item	Description
- Location	West Nusa Tenggara, Bima
- Characteristics	Transit airport for small aircraft from the east and F27/HS-748 from the west
- Airport Class (DGAC Classification)	Class III
- No. of Annual Passengers (1989 record)	49,000
- Largest Aircraft	F27
- Runway	1,400m x 30m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below:

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Runway Extension	II	4 *2
2) Provision of Perimeter Dyke	I	1
3) Taxiway Overlay	I	2
4) Apron Expansion	II	2 *1
5) Apron Overlay	I	2
6) X-Ray Baggage Screening Unit	I	3
7) Walk Through Metal Detector	I	3
8) Air Conditioning in Passenger Terminal Building	III	5
Airport Maintenance Equipment		
1) Mower	I	1
2) Tractor	I	1
3) Handy Mower	II	2

Note *1: Ranked up due to high economic effect.
*2: Ranked down due to low economic effect.

a) Rehabilitation Works

Provision of Perimeter Dyke

This airport is located on low land and the runway strip is swamped by sea water when the tide is in, which causes the pavement to deteriorate and scouring of the land kills plant life. It is planned to construct an 800m long dyke around the runway strip on its west side and western extended portion to keep out the tide. The water trapped within the dyke will be discharged automatically by a flap gate valve.

With the tide water eliminated, the pavement and facilities in the sodding area within the runway strip will no longer be subject to damage and have a longer life. Provision of perimeter dyke will maintain the function of airport facilities stable, and contribute to safe aircraft operations. Economic effect is also expected by prolonging the life of facilities.

Taxiway Overlay

The existing taxiway does not have adequate strength and this is attributed to the ravelling of the pavement and the alligator cracks throughout the surface area. It is necessary to carry out pavement overlay to rehabilitate it. This will assure safe aircraft operations.

Apron Overlay

The apron surface is ravelling and has alligator cracks on its surface caused by the flooding at high tide. It is necessary to correct these deficiencies by a pavement overlay. This repair will allow safe taxiing and parking of aircraft.

Apron Expansion

The present apron is short of one parking spot at peak hours. The cost of constructing one additional parking spot is low and the economic benefit will be high with an EIRR of more than 15%. Apron expansion work is usually given a priority II rating. However, in the light of urgency of the apron expansion and its high economic effect, high priority of implementation is given to this work.

X-Ray Baggage Screening Unit

There is no X-Ray screening equipment at present. It is mandatory to install one unit to prevent hi-jacking of aircraft and assure safe air transportation.

Walk-Through Metal Detector

No walk-through metal detector is available at present. One unit of

walk through metal detector will be provided to assure safe air transportation by upgrading airport security.

Runway Extension

Extending the runway by an additional 250m to a total length of 1,650m will permit the elimination of the payload restriction. The economic effect is low, with an EIRR of only 2%. This is because sufficient benefits to cover the construction cost are not expected by the elimination of the payload restriction due to low traffic volume. In consideration of the low economic effect, this item has been given a low order of implementation.

Air Conditioning in Passenger Building

There is no air conditioning provided for the passenger terminal building. Air conditioning will be provided to raise the service levels for the passengers.

b) Maintenance Equipment

For the airport equipment, one mower, one tractor and one handy mower will be provided for efficient airport maintenance. This will contribute to safe aircraft operations.

(10) Merauke

1) General Description of the Airport

The airport is outlined below:

Item	Description
- Location	Irian Jaya, Merauke
- Characteristics	Border Airport Base airport of 9 pioneer airports Due to underdeveloped land transportation this airport is indispensable for daily life of local population
- Airport Class (DGAC Classification)	Class III
- No. of Annual Passengers (1989 record)	28,000
- Largest Aircraft	F28
- Runway	1,850m X 30m

2) Evaluation of Maintenance and Rehabilitation Works

The order of implementation is summarized below;

Work Items	Priority Ranking	Order of Implementation
Rehabilitation Works		
1) Runway Overlay	I	1
2) Widening of Runway Strip	III	8
3) Widening of Graded Area	I	4
4) Taxiway Overlay	I	3
5) Apron Expansion	II	5
6) Apron Overlay	I	2
7) Expansion of Passenger Terminal Building	II	6
8) Rehabilitation of Finishings in Passenger Terminal Building	III	7
9) Rehabilitation of Finishings in Administration and Operation Building	III	7
10) X-Ray Baggage Screening Unit	I	6 *
11) Walk-Through Metal Detector	I	6 *
12) Air Conditioning in Passenger Terminal Building	III	9

(continued)

(continued)

Work Items	Priority Ranking	Order of Implementation
Airport Maintenance Equipment		
1) Mower	I	1
2) Handy Mower	I	1
3) Sweeper	I	1
4) Dump Truck	I	2

Note * : the order is changed to agree with expansion of passenger terminal building

a) Rehabilitation Works

Runway Overlay

Due to low quality of construction work, a 300m long and 20m wide area in the middle of the runway, where a 3cm thick asphalt pavement overlay was undertaken in 1984, is in a weathered condition with ravelling in many places. With a 30mm deep depression, it is very dangerous for aircraft operations. It is necessary to carry out pavement overlay with asphalt concrete of 8cm thick on average in order to assure safe aircraft operations.

Apron Overlay

The asphalt pavement has been weathered for its entire area, and overlaid asphalt pavement on the old concrete slabs has many reflection cracks. All the cement concrete apron pavement has cracks on the surface of the slabs. Transition area between the cement concrete and asphalt pavement has a differential of around 15mm. In order to assure safe aircraft operations by correcting these deficiencies, it is necessary to carry out asphalt pavement overlay of an average thickness of 9cm.

Taxiway Overlay

The taxiway pavement is less deteriorated than the apron pavement, but there are cracks throughout the taxiway surface which requires rehabilitation. An asphalt pavement overlay with an average thickness of 4cm is necessary to assure safe taxiing of aircraft.

Widening of Graded Area

An open ditch running along the runway at a distance of 45.5m from the runway centerline is situated within the 75m wide graded area stipulated by ICAO. Its' 2,500m long section within the graded area

should be relocated outside the area in order to reduce the risk of damage to aircraft running off the runway.

Apron Expansion

The existing apron is short of parking spots when a non-scheduled flight arrives. In order to add one additional parking spot, it is necessary to extend the depth of the apron by 1.5m. This expansion work will enable efficient ground operation of aircraft.

Expansion of Passenger Terminal Building

The existing passenger terminal building is overcrowded with peak hour passengers. The available floor area per peak hour passenger is only 3.2 sq.m, which is approximately a half of the standard requirement of 6.0 sq.m. The expansion work is planned for the check-in lobby and the departure lobby where the congestion is serious. This 150 sq.m expansion work will improve the service levels for passengers.

X-Ray Baggage Screening Unit

A new unit will be provided to replace the existing one which is beyond repair. The X-ray screening unit is ranked Priority I, but the order of implementation is changed to agree with expansion of the passenger terminal building. The provision of the X-ray screening unit should be made simultaneously with the metal detector when the expansion of passenger terminal building is completed.

Walk-Through Metal Detector

A new unit will be provided to replace the existing one which is beyond repair. The order of implementation is ranked down for the same reason as the X-ray baggage screening unit.

Rehabilitation of Finishings in Passenger Terminal Building

The life, expired roofing is causing serious leaks. This will be replaced by corrugated non-asbestos roofing. The roof visors of about 10m are about to fall off, are hazardous and cause other leaks and should be replaced with new materials. This rehabilitation work will improve the service levels for passengers and lengthen the life of the terminal buildings.

Rehabilitation of Finishings in Administration and Operations Building

The roofing of the administration and operations building is in the same condition as the passenger terminal building, and requires replacement by new roofing materials. This rehabilitation work will improve working conditions for the airport staff and improve the efficiency of airport operation.

Widening of Runway Strip

The existing width of the runway strip is 75m on each side of the runway. Although a 150m wide runway strip has no practical problems in the light of practices for many Indonesian airports, it is planned to widen the runway strip to 300m in accordance with ICAO recommendations for an aerodrome with reference code number 4 because of its easy implementation. This widening work will contribute to protect aircraft flying over the runway strip during take-off and landing operations.

Air Conditioning in Passenger Terminal Building

Air conditioning will be provided in the departure lobby to improve the service levels for passengers.

b) Airport Maintenance Equipment

There will be three mowers and two handy mowers provided in order to increase the capacity of grass cutting. One sweeper will also be introduced. The provision of this equipment will contribute to efficient airport maintenance and safe aircraft operations.

A dump tuck will be provided in order to dispose cut grass and support other airport maintenance activities.

CHAPTER 15. CONCLUSION AND RECOMMENDATIONS

CHAPTER 15. CONCLUSION AND RECOMMENDATIONS

Effective use of the existing facilities can be achieved by proper maintenance and rehabilitation, which should overcome the operational and capacity problems resulting from insufficient investment and deterioration of aging facilities.

This Study covered twenty airports, which were chosen from 146 airports by DGAC to evaluate the present conditions, and established short-term master plans for airport maintenance and rehabilitation for ten airports. These airports were selected from the twenty airports for the urgency of the work and practicability of implementation.

Conclusion and recommendations for realization of the maintenance and rehabilitation plans are summarized for each of the selected ten airports.

(1) Gunung Sitoli

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Runway Overlay
[2] Taxiway Overlay
[2] Apron Overlay
[3] Widening of Runway Strip
[4] Air Conditioning in Passenger Terminal Building

Airport Maintenance Equipment

[1] Mower and Tractor
[2] Dump Truck

2) Effect of Implementation

The above rehabilitation works and provision of maintenance equipment will further safe aircraft operations and improve service levels of air transportation. Nias Island has many tourism resources, and the airport development will support the promotion of tourism development.

<RECOMMENDATIONS>

i) Negotiations with the local government should be commenced for felling of trees and bushes which is required for widening of the runway strip.

ii) Training of maintenance staff, strengthening of airport maintenance organization and provision of workshop and equipment garage should be considered for the operation, maintenance and repair of newly provided equipment.

(2) Palembang

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Runway Overlay
[2] Rehabilitation of Finishings in Passenger Terminal Building

Airport Maintenance Equipment

[1] Handy Mower

2) Effect of Implementation

The implementation of these rehabilitation works and provision of airport maintenance equipment will further safe air transportation.

<RECOMMENDATIONS>

An airport master plan has been prepared for this airport. The runway overlay planned in this Study would be better to be undertaken as one of the work items of the master plan if the master plan is implemented in the near future. Co-ordination is required with the implementation of the master plan in commencing the runway overlay as rehabilitation works.

(3) Semarang

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Expansion of Passenger Terminal Building

Airport Maintenance Equipment

[1] Mower, Tractor, Handy Mower and Sweeper

2) Effect of Implementation

Solving the congestion problems in the passenger terminal building will remove the probable factors that restrain the present air traffic demand. The maintenance equipment will offer efficient airport maintenance work and this will ensure safer aircraft operations.

<RECOMMENDATIONS>

Training of maintenance staff, strengthening of airport maintenance organization and provision of workshop and equipment garage should be considered for the operation, maintenance and repair of newly provided equipment.

(4) Pontianak

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Runway Extension
[2] Expansion of Passenger Terminal Building
[3] Taxiway Overlay
[4] Air Conditioning in Passenger Terminal Building

Airport Maintenance Equipment

[1] Handy Mower and Sweeper

2) Effect of Implementation

The above rehabilitation works and airport maintenance equipment will promote safe and unrestrained air transportation.

<RECOMMENDATIONS>

Almost all landside facilities were completed based on the present master plan. The rehabilitation works focus on the facilities which have not been implemented yet due to budget constraints. The passenger terminal building will be abandoned in the existing master plan. However, the rehabilitation works are planned to include rehabilitation of the terminal building in order to eliminate the present serious congestion. It is recommended that such rehabilitation works be timely started making sure of the implementation schedule of the master plan.

(5) Sampit

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Runway Overlay
[2] Air Conditioning in Passenger Terminal Building

Airport Maintenance Equipment

[1] Mower, Tractor and Handy Mower
[2] Dump Truck

2) Effect of Implementation

The above maintenance and rehabilitation works will ensure continuation of the present air transportation and safer aircraft operations.

<RECOMMENDATIONS>

Airport maintenance equipment will be provided for this airport for the first time. It is recommended that strengthening of organization, staff training and ancillary works such as provision of workshop, etc., be made in order to operate and maintain the maintenance equipment properly.

(6) Ambon

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Runway Overlay
[2] Taxing Overlay
[2] Apron Overlay
[3] Air Conditioning in Control Tower

Airport Maintenance Equipment

[1] Mower, Tractor and Handy Mower

2) Effect of Implementation

The implementation of the above rehabilitation works and provision of airport maintenance equipment will assure safer air transportation.

<RECOMMENDATIONS>

An airport master plan has been prepared for this airport. The pavement overlay planned in this Study would be better to be undertaken as one of the work items of the master plan if the master plan is implemented in the near future. Co-ordination is required with the implementation of the master plan in commencing these rehabilitation works.

(7) Ternate

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Expansion of Passenger Terminal Building
[1] X-Ray Baggage Screening Unit
[1] Walk-Through Metal Detector
[2] Widening of Graded Area
[3] Grading of Runway Strip
[4] Air Conditioning in Control Tower
[4] Air Conditioning in Passenger Terminal Building
[5] Runway Extension

Airport Maintenance Equipment

[1] Mower and Handy Mower

2) Effect of Implementation

The promote maintenance works and provision of maintenance equipment will safe aircraft operations and unrestricted air transportation. The implementation of the project will promote this airport as a base for pioneer airports and will contribute to reduce regional disparity between this region and Java island.

<RECOMMENDATIONS>

The runway extension work is placed in low priority in the order of implementation due to its low economic viability. The construction cost of the runway extension is too expensive to be included in this project which aims maximum utilization of existing facilities with minimum rehabilitation works.

(8) Mataram

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Apron Overlay
[2] X-Ray Baggage Screening Unite
[2] Walk-Through Metal Detector
[3] Apron Expansion
[4] Runway Extension
[5] Air Conditioning in Passenger Terminal Building

Airport Maintenance Equipment

[1] Sweeper

2) Effect of Implementation

The rehabilitation works will promote safer and unrestrained air transportation. This airport is the main access infrastructure to Lombok Island which will promote the utilization of tourism resources. The impact to tourism development can be expected through maintaining the airport facilities in adequate and sound condition.

<RECOMMENDATIONS>

The airline company has a plan to introduce DC9 aircraft at present, which requires longer runway than the planned one in the rehabilitation works. It is recommended that, for the implementation of rehabilitation works, that co-ordination on the DC9 introduction plan be closely made so that useless works, such as repeated shift of approach lighting system, are not made.

(9) Bima

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Provision of Perimeter Dyke
[2] Taxiway Overlay
[2] Apron Overlay
[2] Apron Expansion
[3] X-Ray Baggage Screening Unit
[3] Walk-Through Metal Detector
[4] Runway Extension
[5] Air Conditioning in Passenger Terminal Building

Airport Maintenance Equipment

[1] Mower, Tractor and Handy Mower

2) Effect of Implementation

The maintenance and rehabilitation works will prevent submergence of airport surface by sea water, and will promote safer and regular air transportation.

<RECOMMENDATIONS>

It is recommended that the administrative responsibility and management method on the following be coordinated with the local government:

- Diversion of the existing river due to runway extension

- Water level control due to the perimeter dyke

(10) Merauke

<CONCLUSION>

1) Implementation Priority

Rehabilitation Works

[1] Runway Overlay
[2] Apron Overlay
[3] Taxiway Overlay
[4] Widening of Graded Area
[5] Apron Expansion
[6] Expansion of Passenger Terminal Building
[6] X-Ray Baggage Screening Unit
[6] Walk-Through Metal Detector
[7] Rehabilitation of Finishings in Passenger Terminal Building
[7] Rehabilitation of Finishings in Administration and Operations Building
[8] Widening of Runway Strip
[9] Air Conditioning in Passenger Terminal Building

Airport Maintenance Equipment

[1] Mower, Handy Mower and Sweeper
[2] Dump Truck

2) Effect of Implementation

These rehabilitation works and the provision of maintenance equipment will promote safer aircraft operations and improve service levels of air transportation. Merauke is a commercial centre of South Irian Jaya, and will be assigned as the provincial capital when South Irian Jaya is created as a new province in the national development plan. Therefore, the rehabilitation of the existing Merauke airport would be an important policy decision in order to contribute to regional economy and to reduce the regional disparity of eastern part of Indonesia.

<RECOMMENDATIONS>

Training of maintenance staff, strengthening of airport maintenance organization and provision of workshop and equipment garage should be considered for the operation, maintenance and repair of the equipment.

APPENDIX - A. Minutes of Meetings

ATTACHMENT - 1

MINUTES OF MEETING ON THE INCEPTION REPORT FOR THE STUDY ON THE MASTER PLAN OF AIRPORT MAINTENANCE AND REHABILITATION IN THE REPUBLIC OF INDONESIA

In accordance with the Scope of Work for the Study on the Master Plan of Airport Maintenance and Rehabilitation in the Republic of Indonesia agreed upon between Directorate General of Air Communications (DGAC) and Japan International Cooperation Agency (JICA) on October 9, 1989, the JICA team submitted thirty (30) copies of the Inception Report to DGAC through Mr. Soenaryo Y., Secretary of DGAC who received a courtesy call of the JICA team on January 30, 1990.

The Meetings on the Inception Report were held at Conference room B of DGAC on January 31 and February 1, 1990 between the Counterpart team members of DGAC headed by Mr. Soegito M. and the JICA team which consists of the Advisory Committee members headed by Mr. K. Yokota and the Study team headed by S. Morita. (Attendance at the meetings is listed in ATTACHMENT - A).

Following the introduction of members of the both sides, an explanation on the contents of the Inception Report was made by the JICA team.

Main points discussed in the meetings are as follows :

1) The Indonesian Counterpart team raised the following 3 points in connection with the work schedule :

   (1) Two (2) months for the first site study period seems not sufficient to complete site surveys on 20 airports.
   A period long enough for 20 airports should be provided so as not to postpone surveys on 5 of 20 airports to the second site study period.

   (2) Ten (10) airports for rehabilitation and maintenance planning should be selected as a result of the surveys on 20 airports.

   (3) The Work in Japan scheduled for evaluation of the existing facilities, selection of several airports, etc. should be changed to a work in Indonesia so that technical transfer on these works can be achieved as was anticipated in the tentative study schedule attached to the Scope of Work agreed upon between DGAC and JICA on October 9, 1989.

   Subject to the approval of the headquarter of JICA, the JICA team indicated the following solution to which the Indonesian Counterpart team agreed.

(1) The second site study period will be provided as tentatively indicated in ATTACHMENT - B so as to carry out the works (5) through (11) in Indonesia and continue to the work (12) under the condition that this modification of the work schedule may delay the implementation of the Study for the budgetary reason.

(2) Twenty (20) airports will be surveyed in the first site study period. The study items (6), (10) and (11) will be excluded from the first site study and be included in the second site study.

2) The Indonesian Counterpart team strongly requested with reference to the Minutes of Understanding agreed upon between DGAC and JICA on October 9, 1989 that at least three (3) Indonesian counterpart members be invited to Japan. The JICA team promised to convey this request to the headquarter of JICA.

3) The JICA team requested the Indonesian Counterpart team to have the Steering Committee members in the meetings whenever important issues would be discussed.

4) The Indonesian Counterpart team strongly requested to consider a participation of Indonesian consultant personnel for the smooth execution of the Study. The JICA team promised to convey this request to the headquarter of JICA.

After explanations and discussions on the above points, DGAC understood and basically agreed upon the contents of the Inception Report and the both sides confirmed to lead this Study to success by the mutual cooperation.

Jakarta, Indonesia, February 2, 1990

Samoedro S.A.
Director of
Airport Engineering
Directorate General of
Air Communications
Ministry of Communications

Kazuo Yokota
Chairman of the
Advisory Committee,
Japan International
Cooperation Agency (JICA)

Soegito. M
Chairman of the
Counterpart Team

Shota Morita
Leader of the JICA
Study Team

ATTACHMENT - A

LIST OF ATTENDANCE AT THE MEETINGS

1. MEETING ON JANUARY 31, 1990

(1) Indonesian Side

Mr. Soegito M.	:	Chairman of the Counterpart Team
Mr. Sri Kadarisno	:	Secretary of the Counterpart Team
Mr. Yayoen Wahyoe	:	Member of the Counterpart Team
Mr. Sunarjo S.	:	Ditto
Mr. Imam Pamudji	:	Ditto
Mr. Imam Soelvan	:	Ditto
Mr. Kistubaka	:	Ditto
Mr. Sandjojo	:	Ditto
Mr. Justam Kadir	:	Ditto
Mr. Y. Takami	:	JICA Expert

(2) Japanese Side

- JICA Advisory Committee

Mr. K. Yokota	:	Chairman of the Advisory Committee
Mr. M. Nishimoto	:	Member of the Advisory Committee

- JICA Headquarter

Mr. T. Shinoura	:	Director, First Development Study Div., Social Development Study Dept.

- JICA Study Team

Mr. S. Morita	:	Leader of JICA Study Team
Mr. R. Yamagishi	:	Member of JICA Study Team
Mr. N. Wada	:	Ditto
Mr. K. Maeta	:	Ditto
Mr. T. Oda	:	Ditto
Mr. T. Hamada	:	Ditto

2. MEETING ON FEBRUARY 1, 1990

(1) Indonesian Side

Mr. Soegito M.	:	Chairman of the Counterpart Team
Mr. Sri Kadarisno	:	Secretary of the Counterpart Team
Mr. Yayoen Wahyoe	:	Member of the Counterpart Team
Mr. Moch. Fuschad	:	Ditto
Mr. Imam Soelvan	:	Ditto
Mr. Sandjojo	:	Ditto
Mr. Justam Kadir	:	Ditto
Mr. Y. Takami	:	JICA Expert

(2) Japanese Side

- JICA Advisory Committee

Mr. K. Yokota	:	Chairman of the Advisory Committee
Mr. M. Nishimoto	:	Member of the Advisory Committee

- JICA Headquarter

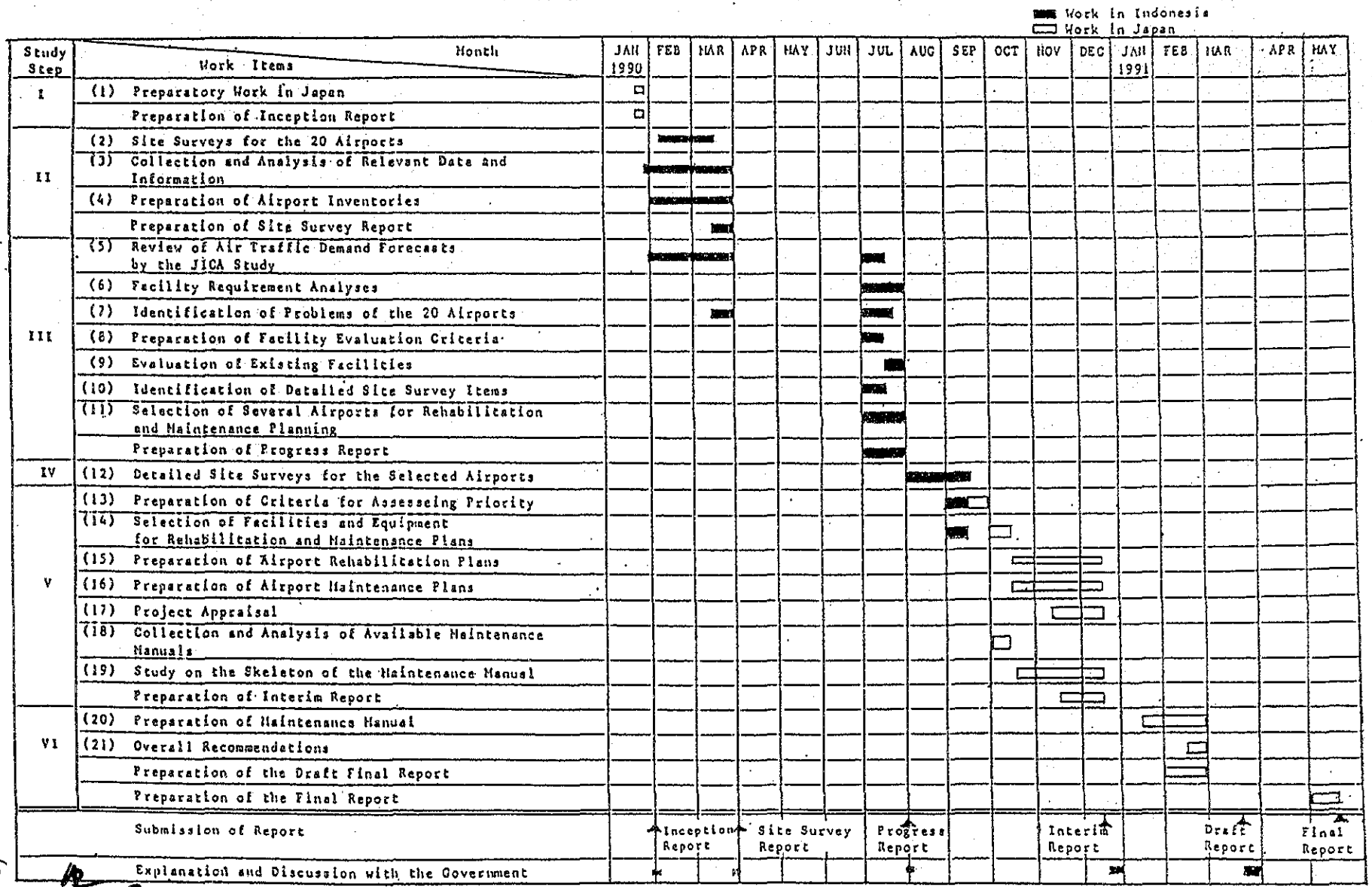
Mr. T. Shinoura	:	Director, First Development Study Div., Social Development Study Dep.

- JICA Study Team

Mr. S. Morita	:	Leader of JICA Study Team
Mr. R. Yamagishi	:	Member of JICA Study Team
Mr. N. Wada	:	Ditto
Mr. K. Maeta	:	Ditto
Mr. T. Oda	:	Ditto
Mr. T. Hamada	:	Ditto

ATTACHMENT - B

MODIFIED WORK TIME SCHEDULE (Tentative)



MINUTES OF MEETINGS
ON
THE SECOND INCEPTION REPORT
FOR
THE STUDY ON THE MASTER PLAN
OF
AIRPORT MAINTENANCE AND REHABILITATION
IN
THE REPUBLIC OF INDONESIA

AGREED UPON BETWEEN
DIRECTORATE GENERAL OF AIR COMMUNICATIONS,
MINISTRY OF COMMUNICATIONS
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

JAKARTA, JULY 10, 1990

SAMOEDRO S.A
Vice Chairman of
Indonesian Steering Committee

Kiyoshi WATANABE
on behalf of
JICA Advisory Committee

SOEGITO M.
Chairman of the Counterpart Team

Shota MORITA
Leader of the JICA Study Team

In continuation of the first site study for the Study on the Master Plan of Airport Maintenance and Rehabilitation in the Republic of Indonesia (hereinafter referred to as "the Study"), the JICA study team headed by Mr. S. Morita came back to Indonesia on July 2, 1990 for the second site study. The JICA study team submitted to the Directorate General of Air Communications (hereinafter referred to as "DGAC") on behalf of JICA thirty (30) copies of the Second Inception Report which outlines the methodology of the second site study and succeeding major study items for smooth implementation of the Study.

A series of meetings was held from July 4 through July 9, 1990 at the DGAC meeting room B on the Second Inception Report and preliminary results on the study items to be covered in the Progress Report between DGAC and JICA team, which consists of JICA advisory committee headed by Mr. K. Watanabe (joining from July 5) and JICA study team. Attendants at each meeting are as shown in ATTACHMENT-A.

After explanations and discussions on the Second Inception Report, the DGAC understood and in principle agreed upon the contents of the Inception Report with following major confirmations.

(1) DGAC requested the JICA study team to carry out cross-section survey at shorter intervals instead of 100 m intervals as proposed by JICA study team. However, DGAC agreed that the cross-section survey be carried out at 100 m intervals longitudinally and at 20 m intervals transversely in view of the accuracy required for the airport rehabilitation plan and a time limitation of 40 days allocated for the detailed site survey.

(2) DGAC requested the JICA study team to provide with testing equipment for evaluation of civil and building facilities. However, DGAC agreed that this request cannot be implemented under the present circumstances, because the JICA study team has no plan to use any testing equipment for the second site study and such equipment will be arranged by local firms for their own uses when they are entrusted by the JICA study team to carry out topographic surveys and soil investigations.

(3) The airport inventory including equipment inventory in the Site Survey Report will be modified so as to agree with the inventories of DGAC and to reflect the actual site conditions at present.

(4) DGAC requested JICA to carry out a seminar on airport planning, design, rehabilitation and maintenance at the submission of the Draft Final Report in order to maximize the objectives of the technical cooperation. JICA advisory committee promised to convey the request to JICA Headquarters in Tokyo.

(5) DGAC requested JICA to grant two personal computer equipment compatible with IBM, which are presently used by JICA study team, after the second site study in order to facilitate an efficient administration of airport rehabilitation and maintenance in Indonesia. JICA advisory committee promised to convey the request to JICA Headquarters in Tokyo.

With regard to the preliminary study results including review forecasts, facility evaluation, etc., major issues discussed were as follows :

(1) The method and results of review of air traffic demand forecast were basically accepted by DGAC. The Progress Report will be prepared in line with the scenario submitted by JICA study team in the meeting.

(2) The facility evaluation criteria and the selection method for 10 airports were basically accepted by DGAC.

(3) Ten (10) airports for rehabilitation and maintenance plans were tentatively determined as indicated in ATTACHEMENT-B.

ATTACHMENT-A

LIST OF ATTENDANCE IN MEETINGS

1. MEETING ON JULY 4, 1990

(1) Indonesian Side

Mr. Soegito. M	:	Chairman of the Counterpart Team
Mr. Sri Kadarisno	:	Secretary of the Counterpart Team
Mr. Lucky Surachman	:	Member of the Counterpart Team
Mr. Imam Pamudji	:	Ditto
Mr. Kistubaka	:	Ditto
Mr. M. Pramintohadi. S	:	Staff of Secretariat
Mr. Emrizal	:	Ditto
Mr. M. Tamura	:	JICA Expert

(2) Japanese Side

Mr. S. Morita	:	Leader of JICA Study Team
Mr. N. Wada	:	Member of Study Team
Mr. K. Maeta	:	Ditto
Mr. R. Yamagishi	:	Ditto
Mr. T. Oda	:	Ditto
Mr. H. Ijima	:	Ditto
Mr. T. Hamada	:	Ditto
Mr. S. Kobayashi	:	Ditto

2. MEETING ON JULY 5, 1990

(1) Indonesian Side

Mr. Soegito. M	:	Chairman of the Counterpart Team
Mr. Sri Kadarisno	:	Secretary of the Counterpart Team
Mr. Imam Pamudji	:	Ditto
Mr. Kistubaka	:	Ditto
Mr. M. Pramintohadi. S	:	Staff of Secretariat
Mr. Emrizal	:	Ditto
Mr. M. Tamura	:	JICA Expert

(2) Japanese Side

Mr. K. Watanabe	:	Member of JICA Advisory Committee
Mr. T. Suzuki	:	Ditto
Mr. H. Yamamoto	:	JICA Coordinator
Mr. S. Morita	:	Leader of JICA Study Team
Mr. N. Wada	:	Member of Study Team
Mr. K. Maeta	:	Ditto
Mr. R. Yamagishi	:	Ditto
Mr. T. Oda	:	Ditto
Mr. H. Ijima	:	Ditto
Mr. T. Hamada	:	Ditto
Mr. S. Kobayashi	:	Ditto

3. MEETING ON JULY 6, 1990

(1) Indonesian Side

Mr. Samoedro S.A	:	Vice Chairman of Steering Committee
Mr. Soegito. M	:	Chairman of the Counterpart Team
Mr. Sri Kadarisno	:	Secretary of the Counterpart Team
Mr. Lucky Surachman	:	Member of the Counterpart Team
Mr. Imam Pamudji	:	Ditto
Mr. M. Pramintohadi. S	:	Staff of Secretariat
Mr. Emrizal	:	Ditto
Mr. M. Tamura	:	JICA Expert

(2) Japanese Side

Mr. K. Watanabe	:	Member of JICA Advisory Committee
Mr. T. Suzuki	:	Ditto
Mr. H. Yamamoto	:	JICA Coordinator
Mr. S. Morita	:	Leader of JICA Study Team
Mr. N. Wada	:	Member of Study Team
Mr. K. Maeta	:	Ditto
Mr. R. Yamagishi	:	Ditto
Mr. T. Oda	:	Ditto
Mr. H. Ijima	:	Ditto
Mr. T. Hamada	:	Ditto
Mr. S. Kobayashi	:	Ditto

4. MEETING ON JULY 7, 1990

(1) Indonesian Side

Mr. Sri Kadarisno	:	Secretary of the Counterpart Team
Mr. Lucky Surachman	:	Member of the Counterpart Team
Mr. Imam Pamudji	:	Ditto
Mr. M. Pramintohadi. S	:	Staff of Secretariat
Mr. Emrizal	:	Ditto
Mr. M. Tamura	:	JICA Expert

(2) Japanese Side

Mr. S. Morita	:	Leader of JICA Study Team
Mr. N. Wada	:	Member of Study Team
Mr. K. Maeta	:	Ditto
Mr. R. Yamagishi	:	Ditto
Mr. T. Oda	:	Ditto
Mr. H. Ijima	:	Ditto
Mr. T. Hamada	:	Ditto
Mr. S. Kobayashi	:	Ditto

5. MEETING ON JULY 9, 1990

(1) Indonesian Side

Mr. Samoedro S.A	:	Vice Chairman of Steering Committee
Mr. Soegito. M	:	Chairman of the Counterpart Team
Mr. Sri Kadarisno	:	Secretary of the Counterpart Team
Mr. Lucky Surachman	:	Member of the Counterpart Team
Mr. Imam Pamudji	:	Ditto
Mr. Mian Simatupang	:	Staff of Secretariat
Mr. M. Tamura	:	JICA Expert

(2) Japanese Side

Mr. K. Watanabe	:	Member of JICA Advisory Committee
Mr. T. Suzuki	:	Ditto
Mr. H. Yamamoto	:	JICA Coordinator
Mr. S. Morita	:	Leader of JICA Study Team
Mr. N. Wada	:	Member of Study Team
Mr. K. Maeta	:	Ditto
Mr. R. Yamagishi	:	Ditto
Mr. T. Oda	:	Ditto
Mr. H. Ijima	:	Ditto
Mr. T. Hamada	:	Ditto
Mr. S. Kobayashi	:	Ditto

ATTACHMENT-B

SELECTION OF AIRPORTS FOR REHABILITATION AND MAINTENANCE PLANS

Facility	Evaluation Item	1.Tanjung Pinang	2.Pekan-baru	3.Gunung Sitoli	4.Patti-bang	5.Sesar-anc	6.Pontia-nak	7.Semarl	8.Palang-karaya	9.Tarakan	10.Tana Toraja	11.Palu	12.Goron-talo	13.Ambon	14.Terna-te	15.Mata-ram	16.Bima	17.Jayapu-ra	18.Kupang	19.Kai-mana	20.Mera-uke
A.1.Runway	1)Length	A (x)	C	C	C	A (x)	A (O)	C	C	C	C	C	C	C	A (x)	A (O)	A (O)	C	A (x)	C	C
	2)Width	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A (O)	C	C
	3)Longitudinal Slope	C	C	-	C	-	-	-	-	-	A (O)	C	-	-	-	-	-	-	C	-	-
	6)Pavement Deterioration	C	B	A (O)	A (O)	C	C	A (O)	C	A (O)	B	C	C	A (O)	B	C	C	B	B	A (x)	A (O)
A.2.Runway Strip	1)Width	A (x)	A (x)	A (O)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (X)	A (O)
	2)Width of Graded Area	C	A (x)	C	A (X)	C	C	A (O)	A (O)	A (O)	A (O)	C	C	C	A (O)	C	C	A (O)	A (X)	C	A (O)
	3)Transverse Slope	A (O)	-	C	-	C	C	-	-	C	C	C	A (X)	-	A (O)	-	C	-	C	C	-
A.3.Taxiway	1)Width	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A (O)	C	C
	5)Pavement Deterioration	C	B	A (O)	B	C	A (O)	C	C	B	B	C	C	A (O)	B	C	A (O)	B	A (X)	A (X)	A (O)
A.4.Apron	1)Number of Aircraft Stands	C	C	C	C	C	C	C	A (O)	A (O)	C	A (O)	C	C	C	A (O)	A (O)	A (O)	A (X)	C	A (O)
	2)Location	A (X)	A (X)	C	A (X)	C	A (X)	B	B	B	B	B	B	B	A (X)	B	A (X)	B	A (X)	B	C
	5)Pavement Deterioration	B	B	A (O)	A (X)	C	B	C	C	B	B	C	C	A (O)	B	A (O)	A (O)	C	A (X)	A (X)	A (O)
B.1.Passenger Terminal Building	1)Function	C	C	C	B	A (O)	A (O)	B	C	A (X)	C	C	C	C	A (O)	C	A (X)	C	B	C	A (O)
B.2.Control Tower	2)Structure	C	B	-	B	C	C	-	C	C	-	C	C	C	C	C	C	B	C	-	A (X)
Airport Category(CAT)		I	II	I	I	I	I	I	I	I	I	I	II	I	I	I	I	I	I	II	I
Overall Urgency				O			O			O				O	O	O	O				O
Annual Passengers (as of 1989)	I				526.000		359.000														
	II		(337.000)			524.000			133.000			143.000		150.000				144.000			
	III	69.000								82.000			(50.000)		57.000	187.000	49.000		49.000		23.000
	IV			9.000							5.000										
	V							59.000												(7.000)	
Busiest Airport in Each Airport Class				O	O	O		O								O					
Passenger Growth Rate For Past 5 Years(%)		+5.8	(3.7)	2.7	4.4	10.1	6.3	9.2	8.9	8.8	37.1	4.8	(4.1)	5.4	2.3	9.4	3.2	1.6	18.5	(29.8)	-6.7
Ditto Higher than National Average in Col.(3) (3.9 %)				O	O	O	O				O	O	(O)	O		O			O	(O)	
Importance of Airport	Gateway to Region		(O)		O	O	O		O			O		O		O		O			
	Tourism Development										O			O		O			O		
	Border Airport	O			O		O			O				O							O
Selected Airports				O	O	O	O	O						O	O	O	O				O

MINUTES OF MEETINGS

ON

THE PROGRESS REPORT

FOR

THE STUDY ON THE MASTER PLAN

OF

AIRPORT MAINTENANCE AND REHABILITATION

IN

THE REPUBLIC OF INDONESIA

AGREED UPON BETWEEN

DIRECTORATE GENERAL OF AIR COMMUNICATIONS,

MINISTRY OF COMMUNICATIONS

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

JAKARTA, SEPTEMBER 12, 1990

SOEGITO, M.

Chairman of the Counterpart Team

Niso WADA

Member of JICA Study Team

On September 10, 1990 the JICA study team on behalf of JICA submitted to DGAC, thirty (30) copies of the Progress Report completed in the second site study in accordance with the minutes of meeting on the second inception report and a series of discussions on the preliminary result of the study items to be covered in the Progress Report.

JICA study team also submitted each three (3) copies of Revision of Airport Inventories and Second Site Survey Report to DGAC on September 11, 1990.

A series of meetings was held on September 10 and 11, 1990 at the DGAC meeting room B. Attendants at each meeting are shown in ATTACHMENT.

After explanations and discussions on the Progress Report, Revision of Airport Inventories and Second Site Survey Report, DGAC understood and in principle agreed upon the contents of the Progress Report, Revision of Airport Inventories and Second Site Survey Report with following major confirmations :

Progress Report

(1) In reply to DGAC's question about the reasons why the implementation of runway extensions of Semarang airport is not effective or not recommendable, JICA study team expressed that extension to the south cannot completely solve the present weight restriction due to the railway, housing and obstructive hills and the extension to the north requires the relocation of embankment and earthworks.

DGAC understood that the runway extension of Semarang airport is not economical as the rehabilitation project, but can be carried out according to other programs.

(2) DGAC requested JICA study team to propose the typical layout plan of administration building, however JICA study team expressed that the administration building shall be laid out to users' convenience and that a new layout plan is not included in this rehabilitation project.

(3) DGAC requested JICA study team to change the title of the report cover "THE REPUBLIC OF INDONESIA" into "THE GOVERNMENT OF THE REPUBLIC OF INDONESIA, MINISTRY OF COMMUNICATIONS, DIRECTORATE GENERAL OF AIR COMMUNICATIONS".
JICA study team reported that the team had already discussed the above request with JICA head office and had been instructed to solely put the name of country without any execution organization in the report cover as the rule of JICA.

(4) Ten (10) airports for rehabilitation and maintenance plans were finally determined as follows :

1) Gunung Sitoli
2) Palembang
3) Semarang
4) Pontianak
5) Sampit
6) Ambon
7) Ternate
8) Mataram
9) Bima
10) Merauke

Revision of Airport Inventories

(1) In reply to the question about the further correction of inventories if any, JICA study team expressed that the preparation of inventories are completed by this revision and further correction will be done by DGAC themselves on the file of data disk granted together with personal computers.

Second Site Survey Report

(1) In reply to the question about the discussion items of maintenance works in the report, JICA team replies that questions were made about the discussion items of local conditions, financial conditions, organizations, manpower and others, and that the conditions and problems given by airport authorities are only summarized.

ATTACHMENT

LIST OF ATTENDANCE IN MEETING OF PROGRESS REPORT

1. MEETING ON SEPTEMBER 10, 1990

(1) Indonesian Side

Mr. Soegito M	: Chairman of the Counterpart Team
Mr. Sri Kadarisno	: Secretary of the Counterpart Team
Mr. Imam Pamudji	: Member of the Counterpart Team
Mr. M. Tamura	: JICA Expert

(2) Japanese Side

Mr. N. Wada	: Member of JICA Study Team
Mr. T. Oda	: Ditto
Mr. T. Hamada	: Ditto

2. MEETING ON SEPTEMBER 11, 1990

(1) Indonesian Side

Mr. Soegito M	: Chairman of the Counterpart Team
Mr. Imam Pamudji	: Member of the Counterpart Team
Mr. Emrizal	: Staff of Secretariat
Mr. M. Tamura	: JICA Expert

(2) Japanese Side

Mr. N. Wada	: Member of JICA Study Team
Mr. T. Oda	: Ditto
Mr. T. Hamada	: Ditto

MINUTES OF MEETINGS
ON
THE INTERIM REPORT
FOR THE STUDY ON THE MASTER PLAN
OF
AIRPORT MAINTENANCE AND REHABILITATION
IN
THE REPUBLIC OF INDONESIA

AGREED UPON BETWEEN

DIRECTORATE GENERAL OF AIR COMMUNICATIONS

MINISTRY OF COMMUNICATIONS

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

JAKARTA, DECEMBER 8, 1990

SOENARYO Y.
Chairman of
Indonesian Steering Committee

Shota MORITA
Leader of the JICA Study Team

M. Nishimoto

Mitsuhiro NISHIMOTO
On behalf of JICA Advisory Committee

In continuation of the second site study for the Study on the Master Plan of Airport Maintenance and Rehabilitation in the Republic of Indonesia (hereinafter referred to as " the Study "), the JICA study team headed by Mr. S. Morita came back to Indonesia on December 4, 1990 for the presentation of the Interim Report.

The JICA study team submitted 30 (thirty) copies of the Interim Report on behalf of JICA to the Directorate General of Air Communications (hereinafter referred to as " DGAC ") . The Report contains a result of airport maintenance and rehabilitation plans, skeleton of airport maintenance manual, etc.

A series of meetings was held on the Interim Report, from December 5 through 7, 1990 at the DGAC meeting room B between DGAC and JICA team which consists of JICA advisory committee headed by Mr. M. Nishimoto and JICA study team. Attendants at each meeting are as shown in ATTACHMENT-A.

After explanations and discussions on the Interim Report, the DGAC understood and in principle agreed upon the contents of the Interim Report with following major confirmations.

1. Modification should be made to " selection of facilities and equipment " and " project appraisal " taking the following considerations :

   1) Priority planned in Tables 1.3.1. and 5.2.3. should be reviewed taking into account characteristics peculiar to both facilities / equipment and airports in order to indicate more realistic reasons for the selection of facilities and equipment for the maintenance and rehabilitation plans.

   2) Project appraisal should be made by airport as an integrated system from the standpoints of quantitative and / or qualitative evaluations.

2. Although the Interim Report was prepared in continuation of the Progress Report and will be consolidated together with all other reports in the Draft Final Report, explanatory notes should be added wherever necessary in order to make reference to the context of the previous description for easier understanding of the report.

3. DGAC requested that the Draft Final Report should be submitted to DGAC at least one week before the official meeting between DGAC and JICA. JICA study team answered that they would convey this request to JICA 's headquarter.

ATTACHMENT - A

LIST OF ATTENDANCE IN MEETINGS

1. MEETING ON DECEMBER 5, 1990.

(1) INDONESIAN SIDE

Mr. SAMOEDRO, SA.	:	Vice Chairman of the Steering Committee
Mr. SOEGITO, M.	:	Chairman of the Counterpart Team
Mr. SRI KADARISNO	:	Secretary of the Counterpart Team
Mr. IMAM PAMUDJI	:	Member of the Counterpart Team
Mr. IMAM SOELVAN	:	Ditto
Mr. KISTUBAKA	:	Ditto
Mr. MIAN SIMATUPANG	:	Ditto
Mr. WIDJOJO MSc.	:	Ditto
Mr. BOEDI SOERJATMADJI (on behalf of Mr JUSTAM KADIR)	:	Ditto
Mr. M. PRAMINTOHADI	:	Staff of Secretariat
Mr. M. T A M U R A	:	JICA Expert

(2) JAPANESE SIDE

Mr. M. NISHIMOTO	:	Member of JICA Advisory Committee
Mr. T. SUZUKI	:	Ditto
Mr. S. MORITA	:	Leader of JICA Study Team
Mr. R. YAMAGISHI	:	Member of JICA Study Team
Mr. N. WADA	:	Ditto
Mr. T. ODA	:	Ditto
Mr. T. HAMADA	:	Ditto

2. MEETING ON DECEMBER 6, 1990

(1) INDONESIAN SIDE

Mr. SOENARYO, Y.	:	Chairman of the Steering Committee
Mr. SAMOEDRO, SA	:	Vice Chairman of the Steering Committee
Mr. KARMAN KARDIA	:	Member of the Steering Committee
Mr. RIZAL SALEH, SH	:	Ditto
Mr. SUHANDA, SY	:	Ditto
(on behalf of Mr. A.T.E. LIANDO)		
Mr. B A D R I	:	Ditto
(on behalf of Mr. H.B. ZAINUDIN ZAINUN)		
Mr. SOEGITO, M.	:	Chairman of the Counterpart Team
Mr. SRI KADARISNO	:	Secretary of the Counterpart Team
Mr. KISTUBAKA	:	Member of the Counterpart Team
Mr. MIAN SIMATUPANG	:	Ditto
Mr. WIDJOJO, MSc.	:	Ditto
Mr. M. PRAMINTOHADI	:	Staff of Secretariat
Mr. EMRIZAL	:	Ditto
Mr. M. T A M U R A	:	JICA Expert

(2) JAPANESE SIDE

Mr. M. NISHIMOTO	:	Member of JICA Advisory Committee
Mr. T. SUZUKI	:	Ditto
Mr. S. MORITA	:	Leader of JICA Study Team
Mr. R. YAMAGISHI	:	Member of JICA Study Team
Mr. N. WADA	:	Ditto
Mr. T. ODA	:	Ditto
Mr. T. HAMADA	:	Ditto

MINUTES OF MEETINGS
ON
THE DRAFT FINAL REPORT
FOR
THE STUDY ON THE MASTER PLAN
OF
AIRPORT MAINTENANCE AND REHABILITATION
IN
THE REPUBLIC OF INDONESIA

AGREED UPON BETWEEN
DIRECTORATE GENERAL OF AIR COMMUNICATIONS,
MINISTRY OF COMMUNICATIONS
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

JAKARTA, FEBRUARY 13, 1991

SOENARYO . Y.

Chairman of
Indonesian Steering Committee

Shota MORITA

Leader of JICA Study Team

Toshimitsu SAKAI

Chairman of
JICA Advisory Committee

For the presentation of the Draft Final Report for the Study on the Master Plan of Airport Maintenance and Rehabilitation in the Republic of Indonesia (hereinafter referred to as " the Study ") , the JICA Study Team headed by Mr. S. Morita returned to Indonesia on February 1, 1991.

On February 2, the JICA Study Team on behalf of JICA submitted to the Directorate General of Air Communications (hereinafter referred to as " DGAC ") 50 (fifty) copies of the Draft Final Report which contains the comprehensive results of the Study and consists of 3 (three) volumes ; Vol. I Main Report , Vol. II Airport Maintenance Manual and Vol. III Drawings.

A series of meetings was held on the Draft Final Report from February 4 through February 8 , 1991 between DGAC and JICA Team which consists of JICA Advisory committee joining from February 7 headed by Mr. T. Sakai and the JICA Study Team. The Steering Committee meeting was held on February 8 and chaired by Mr. Soenaryo. Y. , while the Counterpart Team meetings were held on the other days and chaired by Mr. Soegito M. Attendants at each meeting are shown in ATTACHMENT - A.

After explanations and discussions on the Draft Final Report , the DGAC confirmed that all the DGAC 's comments on the Interim Report , including results of detailed discussions between the Counterpart Team and the JICA Study Team which are summarized in a technical memorandum , have been incorporated in the Draft Final Report , and agreed upon the contents of the Report in principle with the following major confirmations.

(1). The following sentence shall be added at the bottom of Table 14.2.1 as a note.

" The priority ranking of the above rehabilitation works shall be modified as necessary based on the specific and individual nature of the rehabilitation works required for each airport. "

(2) Practical pavement overlay method at not only Sampit Airport but the other airports shall be proposed considering the praticality, construction economy and undisturbed airport operation , and be described in Chapter 14 together with the reasons to reach the proposal.

ATTACHMENT - A

LIST OF ATTENDANTS IN MEETINGS

1. MEETINGS ON FEBRUARY 4 , 1991

(1) INDONESIAN SIDE

Mr. SOEGITO , M.	:	Chairman of Counterpart Team.
Mr. SRI KADARISNO	:	Secretary of Counterpart Team.
Mr. BOEDI SOERJATMADJI	:	Member of Counterpart Team. (on behalf of Mr. JUSTAM KADIR)
Mr. KISTUBAKA	:	Ditto
Mr. MIAN SIMATUPANG	:	Ditto
Mr. DWI AFRIYANTO CH.	:	Ditto (on behalf of Mr. SANDJOJO)
Mr. M. PRAMINTOHADI	:	Staff of Secretariat.
Mr. T O R A S	:	Ditto
Mr. M. TAMURA	:	JICA Expert.

(2) JAPANESE SIDE

Mr. S. MORITA	:	Leader of JICA Study Team.
Mr. N. W A D A	:	Member of JICA Study Team.
Mr. H. IJIMA	:	Ditto.
Mr. T. HAMADA	:	Ditto.

2. MEETING ON FEBRUARY 5 , 1991.

(1) INDONESIAN SIDE

Mr. SOEGITO , M.	:	Chairman of Counterpart Team.
Mr. YAYOEN WAHYOE	:	Secretary of Steering Committee.
Mr. SRI KADARISNO	:	Secretary of Counterpart Team.
Mr. MIAN SIMATUPANG	:	Member of Counterpart Team.
Mr. IMAN SOELVAN	:	Ditto.
Mr. IMAM PAMUDJI	:	Ditto
Mr. S A N D J O J O	:	Ditto
Mr. KISTUBAKA	:	Ditto
Mr. BOEDI SOERJATMADJI	:	Ditto.
Mr. T O R A S	:	Ditto
Mr. M. TAMURA	:	JICA Expert.

(2) JAPANESE SIDE

Mr. S. MORITA	:	Leader of JICA Study Team.
Mr. N. W A D A	:	Member of JICA Study Team.
Mr. K. MAETA	:	Ditto.
Mr. T. HAMADA	:	Ditto.

3. MEETING ON FEBRUARY 6, 1991.

(1) INDONESIAN SIDE

Mr. SOEGITO, M.	:	Chairman of Counterpart Team.
Mr. SRI KADARISNO	:	Secretary of Counterpart Team.
Mr. MIAN SIMATUPANG	:	Member of Counterpart Team.
Mr. SANDJOJO	:	Ditto.
Mr. IMAM PAMUDJI	:	Ditto.
Mr. BOEDI SOERJATMADJI	:	Ditto.
Mr. HENRI SUPRAPTO	:	Staff of Secretariat.
Mr. EMRIZAL	:	Ditto
Mr. M. TAMURA	:	JICA Expert.

(2) JAPANESE SIDE

Mr. S. MORITA	:	Leader of JICA Study Team.
Mr. N. WADA	:	Member of JICA Study Team.
Mr. K. MAETA	:	Ditto.
Mr. T. HAMADA	:	Ditto.

4. MEETING ON FEBRUARY 7, 1991.

(1) INDONESIAN SIDE

Mr. SOEGITO, M.	:	Chairman of Counterpart Team.
Mr. SRI KADARISNO	:	Secretary of Counterpart Team.
Mr. DWI AFRIYANTO CH.	:	Member of Counterpart Team.
Mr. BOEDI SOERJATMADJI	:	Ditto.
Mr. MIAN SIMATUPANG	:	Ditto.
Mr. EMRIZAL	:	Staff of Secretariat
Mr. M. TAMURA	:	JICA Expert.

(2) JAPANESE SIDE

Mr. M. NISHIMOTO	:	Member of JICA Advisory Committee.
Mr. T. MASAKI	:	JICA Coordinator.
Mr. S. MORITA	:	Leader of JICA Study Team.
Mr. N. WADA	:	Member of JICA Study Team.
Mr. K. MAETA	:	Ditto.
Mr. H. IJIMA	:	Ditto.
Mr. T. HAMADA	:	Ditto.

5. MEETING ON FEBRUARY 8, 1991.

(1) INDONESIAN SIDE

Mr. SAMOEDRO S.A.	:	Vice Chairman of Steering Committee.
Mr. SOEGITO, M.	:	Chairman of Counterpart Team.
Mr. YAYOEN WAHYOE	:	Secretary of Steering Committee.
Mr. SRI KADARISNO	:	Secretary of Counterpart Team.
Mr. MIAN SIMATUPANG	:	Member of Counterpart Team.
Mr. BOEDI SOERJATMADJI	:	Ditto.
Mr. PRIO BUDIONO	:	Ditto.
Mr. R. BANGUN	:	Ditto.
Ms. ELLYFAH	:	Ditto.
Mr. M. TAMURA	:	JICA Expert.

(2) JAPANESE SIDE

Mr. M. NISHIMOTO	:	Member of JICA Advisory Committee.
Mr. T. MASAKI	:	JICA Coordinator.
Mr. S. MORITA	:	Leader of JICA Study Team.
Mr. N. WADA	:	Member of JICA Study Team.
Mr. K. MAETA	:	Ditto.
Mr. H. IJIMA	:	Ditto.
Mr. T. HAMADA	:	Ditto.

APPENDIX-B. Appendix to Chapters

Appendix to Chapter 3

Appendix 3.2.1 Inspection and Evaluation Method for Deterioration of Pavement Surface

1. INSPECTION

1.1 Type of Distress

The following distresses of the pavement surface will be identified by visual inspections.

Flexible Pavement	Rigid Pavement
1. Alligator cracking	1. Blow-up
2. Bleeding	2. Corner break
3. Block Cracking	3. Longitudinal/Transverse Diagonal crack
4. Corrugation	4. Joint Seal Damage
5. Depression	5. Patching
6. Jet Blast	6. Patching/Utility Cut
7. JT. Reflection (PCC)	7. Popouts
8. Long. & Trans. Cracking	8. Pumping
9. Oil Spillage	9. Scaling/Map Crack/ Crazing
10. Patching	10. Settlement/Fault
11. Polished Aggregate	11. Shattered Slab
12. Raveling/Weathering	12. Shrinkage Crack
13. Rutting	13. Spalling-Joints
14. Shoving from PCC	14. Spalling-Corner
15. Slippage Cracking	
16. Swell	

1.2 Inspection method

Inspection shall be carried out in the way as shown in Figure A.3.2.1.

1) Recognition of condition and problem by interview with airport staff.

Prior to the site survey, information on the existing condition and problems of the aircraft pavement shall be obtained from the airport office. Layout, structure and construction history of the pavement shall also be learnt so as to grasp the general conditions of the existing pavement.

2) Overall Visual Inspection

At first, visual inspection shall be done on the pavement surface of runway, taxiway and apron in terms of the above type of distress. Location, type and magnitude of distress shall be recorded in the form of inspection sheet.

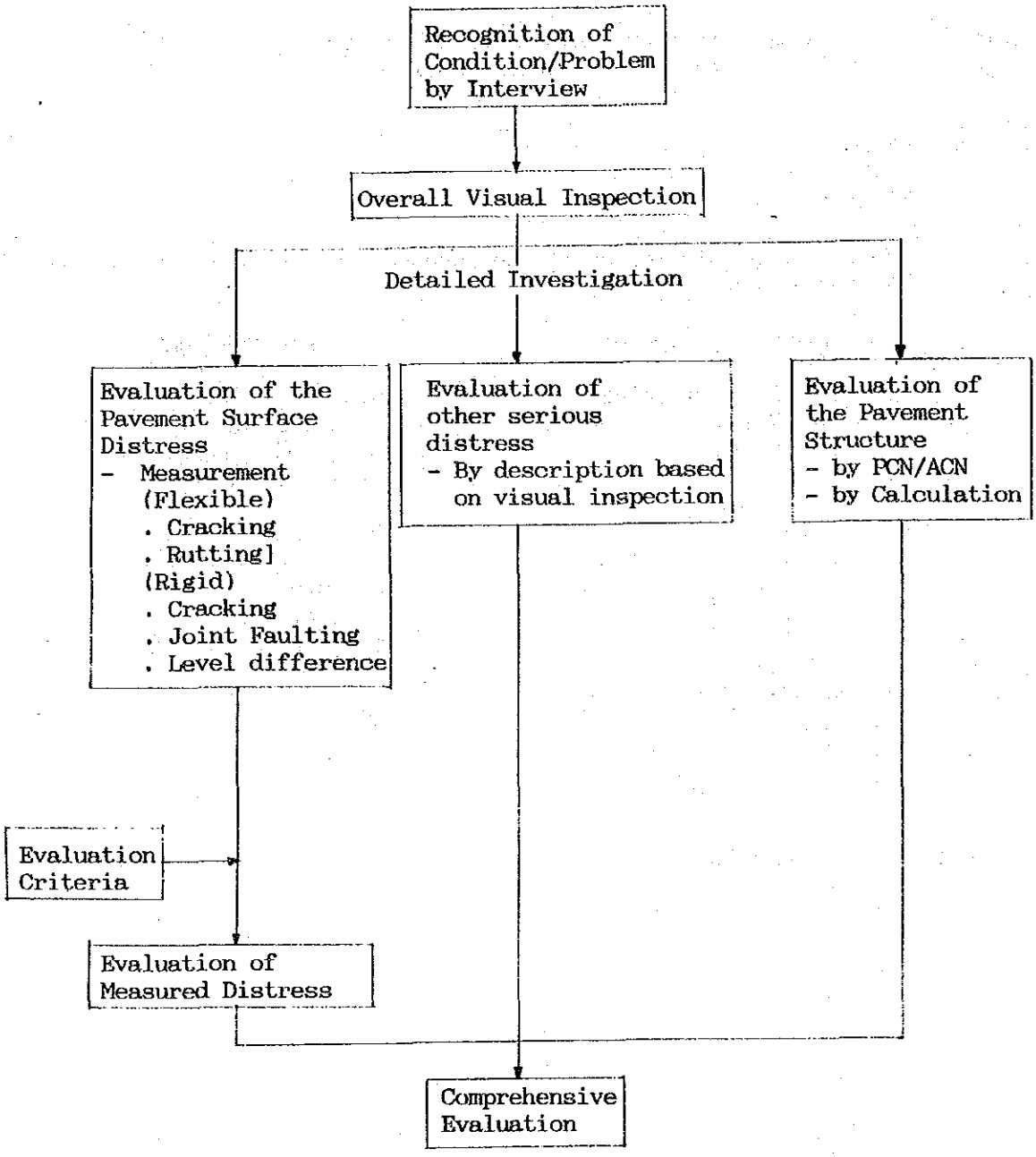


Figure A.3.2.1 Flow chart of Inspection and Evaluation of Pavement Deterioration

3) Detailed investigation

i) General

If the seriously damaged areas are found in the overall visual inspection, about two (2) areas representing those problem areas shall be investigated in detail as much as possible within the time allocated at each point.

For the numerical evaluation of the pavement surface, the following values of distress shall be meassured

a) Flexible pavement

- Cracking (To be evaluated by cracking ratio)
- Rutting (To be evaluated by maximum rut depth)

b) Rigid pavement

- Cracking (To be evaluated by cracking index)
- Joint faulting (To be evaluated by failure ratio of joint)
- Level difference (To be evaluated by maximum difference)

ii) Unit Size of Area to be Investigated

The unit size is standardized as following tables:

a) Runway

Table A.3.2.1 Unit Size of Area in Runway

Runway width	Type of Pavement Structure	
	Flexible	Rigid
60 m 45 m ~ 30 m 23 m	21 m x 30 m 14 m x 45 m 7 m x 90 m	20 m x 21 m 14 m x 30 m 7 m x 60 m

b) Taxiway and apron

Table A.3.2.2 Unit Size of Area in Taxiway and Apron

Width of Taxiway and Apron	Type of Pavement Structure	
	Flexible	Rigid
30 m 18 m~ 23 m 9 m	14 m x 45 m 7 m x 90 m	14 m x 30 m 7 m x 60 m

iii) Measurement Method of Distress on Flexible Pavement

a) Cracking

Cracks in the unit area to be measured shall be recorded in the ivestigation sheet.

Based on the values obtained from the measurement of linear crack, opening of joint, reflection and alligator cracks, a cracking ratio is calculated by the following formula :

$$CR = \frac{CA}{UA}$$

Where

CR : Cracking ratio (%)
UA : Unit area as stipulated in ii) above (m^2)
CA : Crack area (m^2)

$$CA = (LC + OJ + RC) \times 0.3\ m + AC$$

Where

LC : Length of linear crack (m)
OJ : Length of opening of joint (m)
RC : Length of reflection crack (m)
0.3 m : Width of strip influenced by crack
AC : Area of alligator crack (m^2)

For example, a cracking ratio of the measured cracks shown in Figure A.3.2.2 is calculated as follows :

$$CR = \frac{6x2+(12+14+5+3+6.5+8+4+14.5)x0.3}{21\ m \times 30\ m} \times 100$$

$$= 5.1\%$$

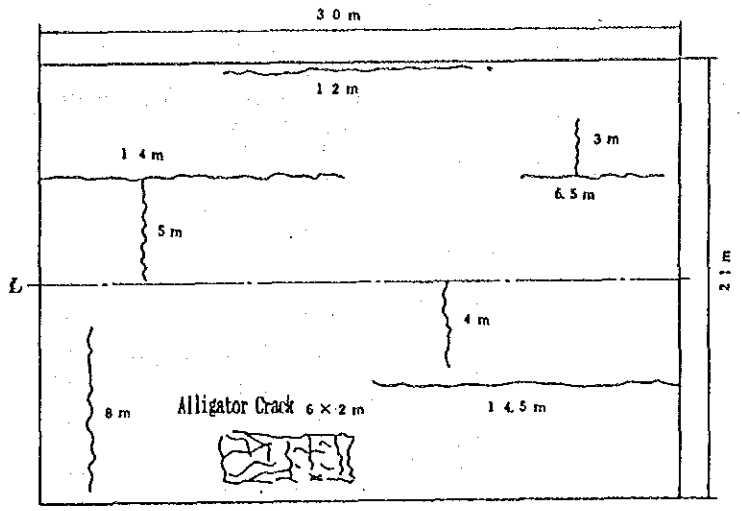


Figure A.3.2.2 Sample of Crack Measurement on Flexible Pavement

b) Rutting

A 3 m straightedge shall be utilized for measuring the maximum rut depth.

iv) Measurement Method of Distress of Rigid Pavement

a) Cracking

Based on the values obtained from the measurement of linear crack, alligator crack and corner break, a cracking index is calculated by the following formula :

$$CI = \frac{CL}{UA}$$

Where

CI : Cracking index (cm/m^2)
UA : Unit area (m^2)
CL : Crack length (cm)

$$CL = LL + AC + CB$$

Where

LL : Length of linear crack (cm)
AC : Length of alligator crack (cm)
CB : Length of corner break (cm)

For example, a cracking index of the measured cracks shown in Figure A.3.2.2 is calculated as follows :

$$CI = \frac{300+1200+750+350+350+350}{21\ m \times 30\ m}$$

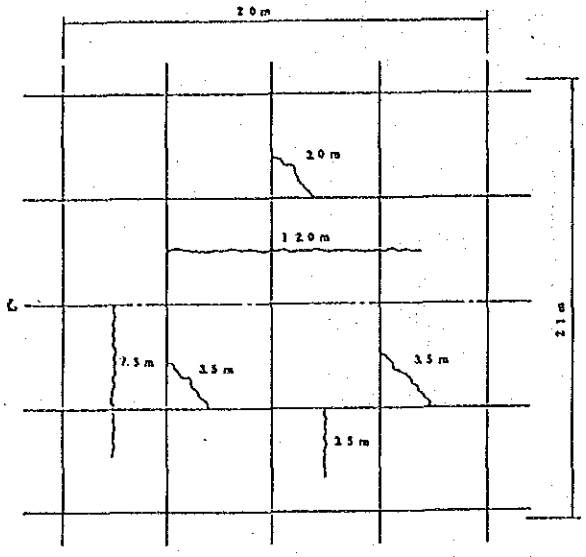


Figure A.3.2.3 Sample of Crack Measurement on Rigid Pavement

b) Joint Faulting

A failure ratio of joint is calculated by the following formula :

$$FR = \frac{FL}{JL} \times 100$$

Where

FR : Failure ratio of joint (%)
FL : Length of joint faulting in the same unit area as iv) a) (m)
JL : Total joint length in the same unit area as iv) a) (m)

For example, failure ratio of joint shown in Fig. A.3.2.4 is calculated as follows :

$$FR = \frac{(i)+.....+(Vi)}{\{(A)+ .....(D)\} + \{(a)+ .....+(e)\}} \times 100$$

$$= \frac{12.2\ m}{329.0\ m} = 3.7\%$$

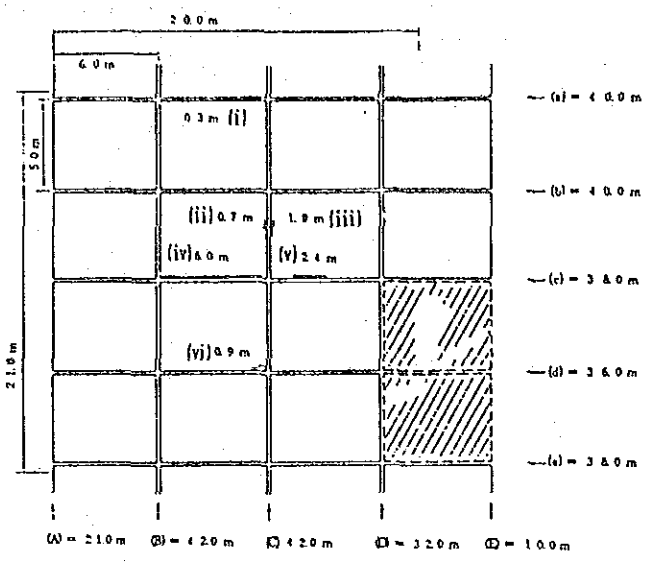


Figure A.3.2.4 Sample of Joint Faulting

c) Level Differences at Cracks and Joints

The maximum level difference in mm shall be measured in the same unit area as iv) a).

2. EVALUATION OF MEASURED DISTRESS

2.1 Flexible Pavement

The deterioration of pavement surface is evaluated by crack ratio and maximum rut depth.

Table A.3.2.3 Evaluation by Ratio and Maximum Rut Depth

Item	Pavement	EVALUATION		
		A	B	C
Crack Ratio (K) (%)	Runway	$K \geqq 7$	$7 > K \geqq 0.1$	$0.1 > K$
	Taxiway	$K \geqq 13$	$13 > K \geqq 1$	$1 > K$
	Apron	$K \geqq 17$	$17 > K \geqq 2$	$2 > K$
Maximum Rut Depth (L) (mm)	Runway	$L \geqq 40$	$40 > L \geqq 10$	$10 > L$
	Taxiway	$L \geqq 60$	$60 > L \geqq 20$	$20 > L$
	Apron	$L \geqq 70$	$70 > L \geqq 25$	$25 > L$

A : Rehabilitation required immediately
B : Rehabilitation desirable in near future
C : Rehabilitation not required

2.2 Rigid Pavement

The deterioration of pavement surface is evaluated by three elements of cracks, joint faulting and level difference.

Table A.3.2.4 Individual Evaluation by Elements

Item	Pavement	EVALUATION		
		A	B	C
Crack Ratio (N) (cm/m^2)	Runway	$N \geqq 6$	$6 > N \geqq 0.2$	$0.2 > N$
	Taxiway	$N \geqq 8$	$8 > N \geqq 0.6$	$0.6 > N$
	Apron	$N \geqq 11$	$11 > N \geqq 1$	$1 > N$
Failure Ratio of Joint (P) (%)	Runway	$P \geqq 1$	$1 > P \geqq 0.1$	$0.1 > P$
	Taxiway	$P \geqq 3$	$3 > P \geqq 0.1$	$0.1 > P$
	Apron	$P \geqq 6$	$6 > P \geqq 0.1$	$0.1 > P$
Maximum Level Difference (Q) (mm)	Runway	$Q \geqq 10$	$10 > Q \geqq 5$	$5 > Q$
	Taxiway	$Q \geqq 12$	$12 > Q \geqq 5$	$5 > Q$
	Apron	$Q \geqq 14$	$14 > Q \geqq 5$	$5 > Q$

A : Rehabilitation required immediately
B : Rehabilitation desirable in near future
C : Rehabilitation not required

Appendix 3.3.1 Formulas of Building Evaluation

The formulas of building evaluation to calculate A_1, A_2 and A_3 are determined taking account of the following considerations :

(1) Required area A_1 for sterile check-in lobby :

$$A_1 = \frac{(a+b)t_1}{60} \times 1.1 \times 1.8 \times 10.0 \times 1.1$$

PART 1 PART 2

The above formula is separated into two PARTS :

PART 1 : Calculation for the number of check-in counter

Where, a : Number of originating passengers in peak hour
b : Number of transfer passengers in peak hour
t_1: Average processing time (assumed to be 1.5 minutes.

Supplementary information

- Average processing time (t_1) is assumed to be 1.5 minutes taking account of the processing time of the domestic airports in Indonesia.
- Allowance estimated as 10 % (1.1) according to the IATA requirement.

PART 2 : Unit space of check-in lobby per one counter

Supplementary information,

- Typical width of check-in counter determined as 1.8m according to the IATA requirement.
- Depth of check-in lobby determined as 10.0m (10% allowance to be added)taking account of the following consideration :
  - The depth of check-in counter and its back space requires minimum 2.7m according to IATA requirement (3m in Japanese practice).
  - The depth of cuing area is usually chosen within the range from 6.0m to 9.0m (Average 7.5m)in the case of linear check-in system. The average depth of 7.5m is recommended so as to apply various airports in Indonesia.
  - Hence total depth of check-in lobby is calculated as 10.2m (2.7m + 7.5m). After all 10m depth with 10 % allowance is determined for the depth of check-in lobby.

(2) A_1 for non-sterile check-in lobby :

$$A_1 = s \times \frac{y}{60} \times \frac{3\,[a(1+v)+b]}{2}$$

where, s : Unit space per passenger/visitor
(assumed to be 1.5 sq.m)
y : Average occupancy time by passenger/visitor
(assumed to be 20 min.)
a : Number of originating passengers in peak hour
b : Number of transfer passengers
v : Number of visitors per passenger
(assumed to be 1.5 persons)

Supplementary information :
- Unit space 1.5 m2 per passenger is determined as physical requirement for a departure passenger.
- Average occupancy time of 20 minutes is fixed for the domestic passengers.
- Number of visitors per passengers (1.5)is the average of one or two persons.

(3) Required area (A_2)of departure lounge

$$A_2 = s \times \frac{cui+cvk}{60} \times 1.1$$

where, s : Unit space per passenger
(assumed to be 2.0 sq.m)
c : Number of departing passengers in peak hour
u : Average occupancy time by long-haul passengers
(assumed 50 min. for international only)
v : Average occupancy time by short-haul passengers (assumed to be 30 min.)
i : Proportion of long-haul passengers
k : Proportion of short-haul passengers

Supplementary information :
- Unit space 2.0m2 per passenger is determined as follows :
  · Seating ratio ; 75% Seating space ; 1.5m2
  · Standing ratio ; 24% Standing space; 1.0m2
  · Miscellaneous space ; 40%

  Unit Space = (1.5x0.75+1.0x.25)x1.4 = 2 m2

(4) Required area (A3) of baggage claim area

$$A_3 = \frac{ews}{60} \times 1.1$$

where, e : Number of terminating passengers
w : Average occupancy time by passenger (assumed to be 30 min.)
s : Unit space per passenger (assumed to be 1.8 sq.m)

Supplementary information
- Unit space 1.8 sq.m including 1.0 sq.m passenger standing space, baggage space and miscellaneous space.

Appendix to Chapter 4

Appendix 4.2.1 Formulas applied for Population Forecast

In process of the forecast for the future population by province zone, the following formulas are applied.

$$\log_e P95i = Ai + Bi.t \quad \text{---------- (A 4.2.1)}$$

where,

P95i : Trend value of the population of province (i) for the year 1995

Ai, Bi : Parameters for province (i), obtained by regression analyses using the yearly populations (1985 - 1990) for the province (i).

t : Target year 1995, t = 95

$$P24i = Ai \,.\, Bi^{TY} + Ci \quad \text{---------- (A 4.2.2)}$$

where,

P24i : Trend value of the population of province (i) for the year 2004

Ai, Bi, Ci : Parameters for the province (i), parameters of A, B and C are obtained by Formula (A 4.2.3)

TY : Target year 2004, TY = 14 (2004 - 1990)

$$B = \mathrm{Exp}\left(1/NN2 \,.\, \log_e \frac{Y3 - Y2}{Y2 - Y1}\right)$$

$$A = (Y2 - Y1) \,/\, (B^{NN2} - B^{NN1}) \quad \text{---------- (A 4.2.3)}$$

$$C = Y1 - A \,.\, B^{NN1}$$

where,

Y1, Y2, Y3 : Population for the years 1985, 1990 and 1995 respectively (the value for the year 1995 is the one after control totalled).

NN1, NN2 : NN1 = 0 (1985 - 1985), NN2 = 5 (1990 - 1985)

$$P_{it} = \frac{PTLt}{PE_{it}} \cdot PE_{it} \quad \text{---------- (A 4.2.4)}$$

where,

P_{it} : Population of the province (i) for the year (t) (t : 1995 or 2004).

PTL_t : Total population forecasted for the year (t) based on the average yearly growth rate shown in TABLE 4.2.4 in Chapter 4.

PE_{it} : Aggregated total of the trend populations of all provinces for the year (t), which have been obtained by Formula (A 4.2.1) or (A 4.2.2)

PE_{it} : Trend value of the population of the province (i) for the year (t), which have been obtained by Formula (A 4.2.1) or (A 4.2.2).

Appendix 4.2.2 Relationship between Domestic Traffic Volume and Economic Indicies

Year	Passengers (Million) y1	Passenger-KM (100 million) y2	Gross National Products (GNP) (¥ Billion) (1980 constant price) x1	Final Expenditure of Consumption (¥ Billion) (1980 constant price) x2	Population (10,000) x3
1970	40,606	587,178	153,915	103,897	10,372
1971	42,010	617,848	161,688	109,952	10,515
1972	43,275	648,188	176,628	120,434	10,760
1973	44,585	674,133	184,569	127,721	10,910
1974	45,103	693,596	183,798	129,838	11,057
1975	46,195	710,711	190,875	135,070	11,194
1976	46,685	709,549	199,630	140,512	11,309
1977	47,568	711,033	210,234	146,471	11,417
1978	49,369	747,489	221,234	155,378	11,519
1979	51,416	777,336	232,878	163,193	11,616
1980	51,720	782,031	242,131	165,153	11,706
1981	51,766	790,359	250,159	169,083	11,790
1982	51,977	804,363	258,241	175,531	11,873
1983	52,541	821,963	267,700	180,962	11,954
1984	52,982	832,307	281,399	185,642	12,031
1985	53,866	858,194	293,982	190,554	12,105
1986	54,557	875,649	301,834	197,816	12,167
1987	57,267	929,845	317,589	205,213	12,226

- $\log e\ y1 = 0.49131 \cdot \ln \frac{X_1}{X_3} + 9,34280$ $\quad R^2 = 0.9068$ (Note) Example in Japan
- $\log e\ y1 = 0.54653 \cdot \ln \frac{X_2}{X_3} + 9,38830$ $\quad R^2 = 0.8964$
- $\log e\ y2 = 0.7123 \cdot \ln \frac{X_1}{X_3} + 11,4076$ $\quad R^2 = 0.9646$
- $\log e\ y2 = 0.8084 \cdot \ln \frac{X_2}{X_3} + 11,4416$ $\quad R^2 = 0.9855$

Appendix 4.2.3 Probable Present Total Passengers ($\overline{TR89}_{i,j}$)

The present total passengers ($\overline{TR89}i,j$) between zone (i) and zone (j) should be the aggregation total of the actual number of passengers transported by each of all modes between zone (i) and zone (j), which is shown by Formula (A 4.2.5).

$$\overline{TR89}i,j = \sum_{m} \overline{TR89}mi,j \quad \text{---------- (A 4.2.5)}$$

where,

$\overline{TR89}i,j$: Aggregated number of passengers transported by every available transport mode between zone (i) and zone (j) in 1989.

$\overline{TR89}mi,j$: Number of passengers transported by mode m between zone (i) and zone (j) in 1989.

m : Available mode between zone (i) and zone (j) : m = 1,2,..,m

The available statistical data are however, so limited that those may not satisfy the formula.

Therefore, in this study the following formulas (A 4.2.6) and (A 4.2.7) are temporarily employed for substituting the formula (A 4.2.5).

$$TR189i,j = AR89i,j + OTM189i,j \quad \text{---------- (A 4.2.6)}$$

$$TR289i,j = AR89i,j + OTM289i,j \quad \text{---------- (A 4.2.7)}$$

where,

TR189i,j : Probable total passengers transported between zone (i) and zone (j), where land transportation like railway and/or bus is available, for the year 1989.

TR289i,j : Probable total passengers transported between zone (i) and zone (j), where land transportation is not available, for the year 1989.

AR89i,j : Number of airway passengers transported between zone (i) and zone (j) for the year 1989. (See Subsection 4.2.3(2)) in Chapter 4.

$$\log_e OTM189_{i,j} = A1 + B1 \log_e(Pi + Pj) - C1 \log_e Di,j \quad \text{-------- (A 4.2.8)}$$

where,

OTM189i,j : Number of aggregated passengers transported by railway, bus and/or seaway.

A1, B1, C1 : Parameters obtained by multi-regression analysis using the data in Appendix 4.2.4.
(A1 = 18.8624 , B1 = 0.657295 , C1 = -3.03049)

$$\log_e OTM289_{i,j} = A2 + B2 \log_e(Pi + Pj) - C2 \log_e Di,j \quad \text{------- (A 4.2.9)}$$

where,

OTM289i,j : Number of passengers transported by seaway

A2, B2, C2 : Parameters obtained by multi-regression analysis using the same data in Appendix 4.2.4.
(A2 = 12.0122 , B2 = 0.823397 , C2 = -2.34909)

Appendix 4.2.4 Data Utilized for the Formulation of the Total Demand Forecast Model

Zone OD Pairs	Population (x1000) 1989	Distance (km)	Railway	Bus	Seaway	Airway‡‡		Total
			1989	1989	1989	1986	(1989)	1989
DKI JAKARTA	9,104.8	476	1,825,958	900,063	-	215,312	241,499	2,967,520
- SEMARANG CITY	1,438.8							
DKI JAKARTA	9,104.8	718	1,303,840	797,449	22,887	429,880	482,163	2,606,339
- SURABAYA CITY	2,499.9							
DKI JAKARTA	9,104.8	460	1,330,974	671,450	-	145,788	163,519	2,165,943
- A Part of D.I YOGYAKARTA‡	1,987.7							
DKI JAKARTA	9,104.8	597	-	60,226	-	31,184	34,977	95,203
- A Part of BENGKULU‡	800.0							
DKI JAKARTA	9,104.8	446	-	80,209	-	210,651	236,271	316,480
- PALEMBANG CITY	1,032.7							
DKI JAKARTA	9,104.8	788	-	-	55,518	183,522	205,842	216,360
- KALIMANTAN BARAT	3,148.2							
DKI JAKARTA	9,104.8	2,016	-	-	12,089	28,257	31,694	43,783
- SULAWESI TENGAH	1,734.2							
DKI JAKARTA	9,104.8	2,515	-	-	16,845	110,198	123,601	140,446
- KALIMANTAN TIMUR	1,791.6							
JAWA TIMUR	32,868.3	891	-	-	116,485	121,037	135,758	252,243
- KALIMANTAN TIMUR	1,791.6							
JAWA TIMUR	32,868.3	1,857	-	-	22,974	12,343	13,844	36,818
- SULAWESI UTARA	2,472.9							
JAWA TIMUR	32,868.3	1,358	-	-	31,402	16,303	18,286	49,688
- SULAWESI TENGAH	1,734.2							
JAWA TIMUR	32,868.3	842	-	-	135,796	45,241	50,743	186,539
- SULAWESI SELATAN	7,001.8							
DKI JAKARTA	9,104.8	1,794	-	-	20,663	32,999	37,012	57,675
- MALUKU	1,814.2							
DKI JAKARTA	9,104.8	4,060	-	-	13,274	23,481	26,337	39,611
- IRIAN JAYA	1,555.7							
JAWA TENGAH	28,644.3	990	-	-	68,873	15,983	17,927	86,800
- KALIMANTAN SELATAN	2,463.8							

‡ A part of YOGYAKARTA includes the city of YOGYAKARTA and kabupaten of BANTUL and SLEMAN

‡ A part of BENGKULU includes the city of BENGKULU and kabupaten of BENGKULU UTARA and REJANG LEBONG

‡‡ Values in 1989 are obtained uniformly with the application of 3.9% average yearly growth rate in the air passenger traffic during the 3rd Five-year plan to 4th Five-year plan

Appendix 4.2.5 Origin and Destination Passenger Traffic Data by Mode

(1) Railway

Railway passenger OD traffic volume for several zone OD pairs have been provided by Kepala Wilayah Usaha Jawa Semarang and Daerah Operasi I Jakarta of PJKA.

However, the data provided by the latter are adjusted and expanded so as to be adapted to the zoning of Jakarta area because the data were the aggregated ones of sold tickets at the several major railway stations in Jakarta (See Table A 4.2.1).

Table A 4.2.1 The Railway OD Traffic Volume, 1989

Zone OD Pairs	Down	Up	Total	Remark
JAKARTA-SEMARANG	(912,979)	912,979	1,825,958	Figures in parentheses are estimated on the assumption of "Down is equal to up"
JAKARTA-SURABAYA	651,920	(651,920)	1,303,840	*,**:Roughly estimated by 1.5 times of the value provided by PJKA
JAKARTA-YOGYAKARTA	665,487	(665,487)	1,330,974	

(2) Bus

The procedure of the estimation consists of two steps as follows. In the first step, the original figures are obtained by the application of the following formula (A 4.2.10). Then, in the second step above mentioned original figures are adjusted by the experiential judgement mainly through the reviewing of the bus route structures. The process of the calculation is shown in table A 4.2.2. The long distance inter province bus route structures centering around Jakarta is shown in Fig. A 4.2.1.

$$BPij = BPRTrij \frac{m\ RITmi,j}{RITri,j} \quad \text{---------- (A 2.2.10)}$$

where, BPij : Number of bus passenger between zone i and zone j.

BPRTrij : Number of bus passengers transported by the bus company r on the respective bus route between zone i and zone j.

$_{m}RITmi,j$: Total number of registered bus frequencies (bus trips) of the all bus companies, authorized by Directorate General of Land Transport on the respective bus route between zone i and zone ,j.

RITri,j : Number of abovementioned registered bus frequencies of the bus company r.

m : Bus companies, (m = 1,2,...,r,...,m)

r : Bus company r (PT. DAMRI)

i,j : Zone i and zone ,j

(3) Seaway

Seaway passenger OD traffic volumes are obtained by the aggregation of the port-to-port sea way OD passengers by route, provided by PT. PELNI. (See Table A 4.2.3).

(4) Airway

Air passenger OD traffic volume are estimated mainly by tracing the airport to airport air passenger traffic volume in 1986, compiled by Central Statistic Bureau.

The contents of the above-mentioned "tracing and estimate" are shown in Table A 4.2.4.

Coefficient (0.8, 0.65 ...) described in the above-mentioned table are determined in the experiential judgement on the air route structure and the respective zoning.

Air passenger zone OD traffic volume in 1989 are obtained uniformally by the application of the average yearly growth rate 3.9% in the air passenger traffic achieved during the period of 4th Five Year Plan to that during 3rd Five-Year Plan (See Table A 4.2.5).

Table A 4.2.5 Domestic Air Traffic achieved during 3rd and 4th Five-Year Plan

Items	Unit	3rd Five-Year Plan	4th Five-Year Plan	Average yearly growth rate (3rd to 4th) (%)
1. Aircraft-km	thousand	88,163	101,786	2.9
2. Pax-carried	person	5,286,497	6,412,773	3.9
3. Cargo-carried	ton	49,772	78,655	9.6
4. Aircraft hours flown	hour	226,783	260,280	2.8
5. Available ton-kilometers	thousand	808,072	870,845	1.5
6. Performed ton-kilometers	thousand	374,776	465,891	4.4
7. Load Factor [(6) / (5)]	%	46	54	-

Source : 5th Five-Year Plan

In addition, domestic airport to airport air passenger OD table recompiled with the above-mentioned airport to airport air passengers of Central Statistic Bureau is shown in Table 4.2.6.

However, the above-mentioned OD table is the one, in which the large number of airport in IRIAN JAYA are integrated into 9 kabupatens.

Table A 4.2.2 PROCESS OF BUS PASSENGER ESTIMATE

Zone pairs i ~ j	Route	BPRT rij	RIT rij	RIT mij	BPij produced by the formula	Estimate result
PALEMBANG (PLB) ~ JAKARTA (JKT)	PLB-JKT	18,567	5 (518)	18	66,841	66,841 x 1.2 = 80,209
BENGKULU (BKL) ~ JAKARTA (JKT)	BKL-JKT	24,582	4 (718)	14	86,037	86,037 x 0.7 = 60,226
SEMARANG (SMG) ~ JAKARTA (JKT)	SMG-TGL -JKT	125,307	12 (2,895)	50	522,113	* SMG<->JKT: 522,113 + 0.4 x 944,876 = 900,063
YOGYAKARTA (YGK) ~ JAKARTA (JKT)	YGK-PKT -JKT	52,262	6 (1,204)	12	104,524	* YGY<->JKT: 104,524 + 0.6 x 944,876 = 671,450
	YGK-SMG -JKT	51,774	4 (1,362)	73	944,876	
SURABAYA (SBY) ~ JAKARTA (JKT)	SBY-SMG -JKT	49,531	2 (1,087)	46 10 of 46 are on SBY-SLO-SMG-JKT	1,139,213	** 1,139,213 x 0.7 = 797,449

Note 1 PKT: PURWOKERTO, TGL: TEGAL, SLO: SURAKARTA or SOLO

Note 2 (figure) shows the realized bus trips operated by the bus company r (PT. DAMRI) in 1989

*, ** : Figures of 0.4, 0.6 and 0.7 are dicided experientially decided through the reviewing of the bus structures, etc.

Data Source: PT. DAMRI and DIRECTORATE GENERAL OF LAND TRANSPORT.

Fig. A 4.2.1 INTER PROVINCE LONG DISTANCE BUS RUTES CENTERING AROUND JAKARTA (1)

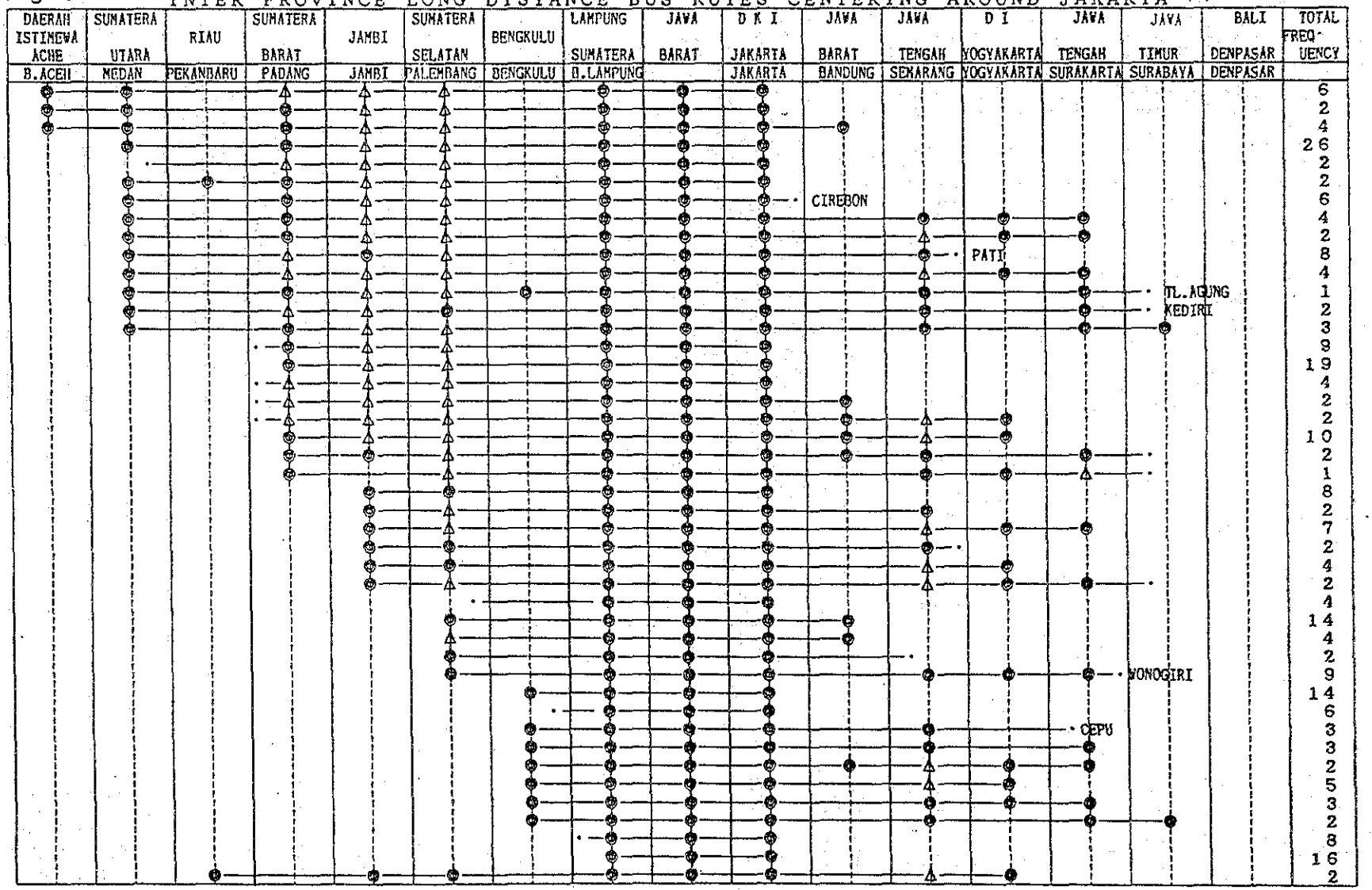


Fig. A 4.2.1 INTER PROVINCE LONG DISTANCE BUS RUTES CENTERING AROUND JAKARTA (2)

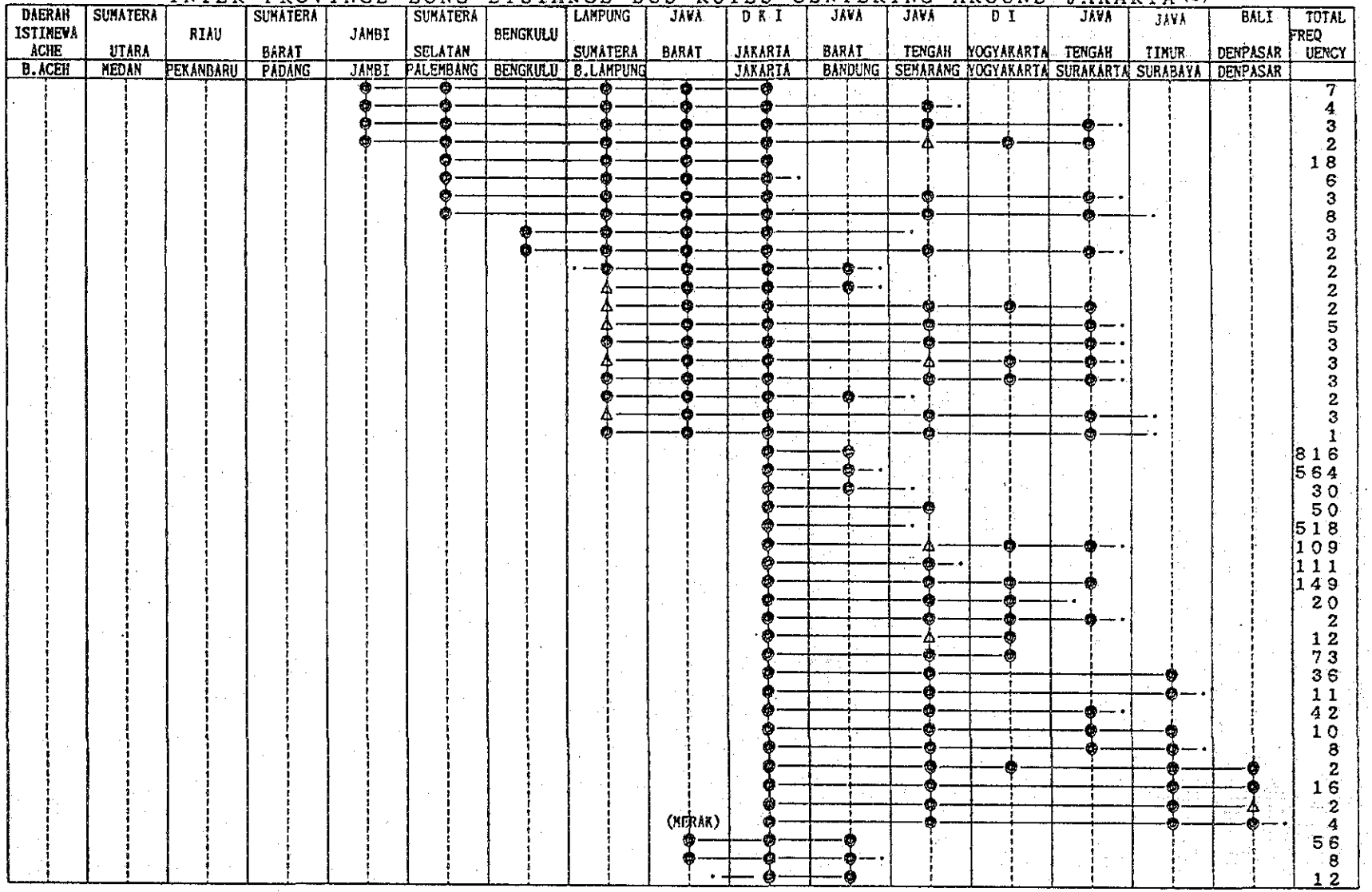
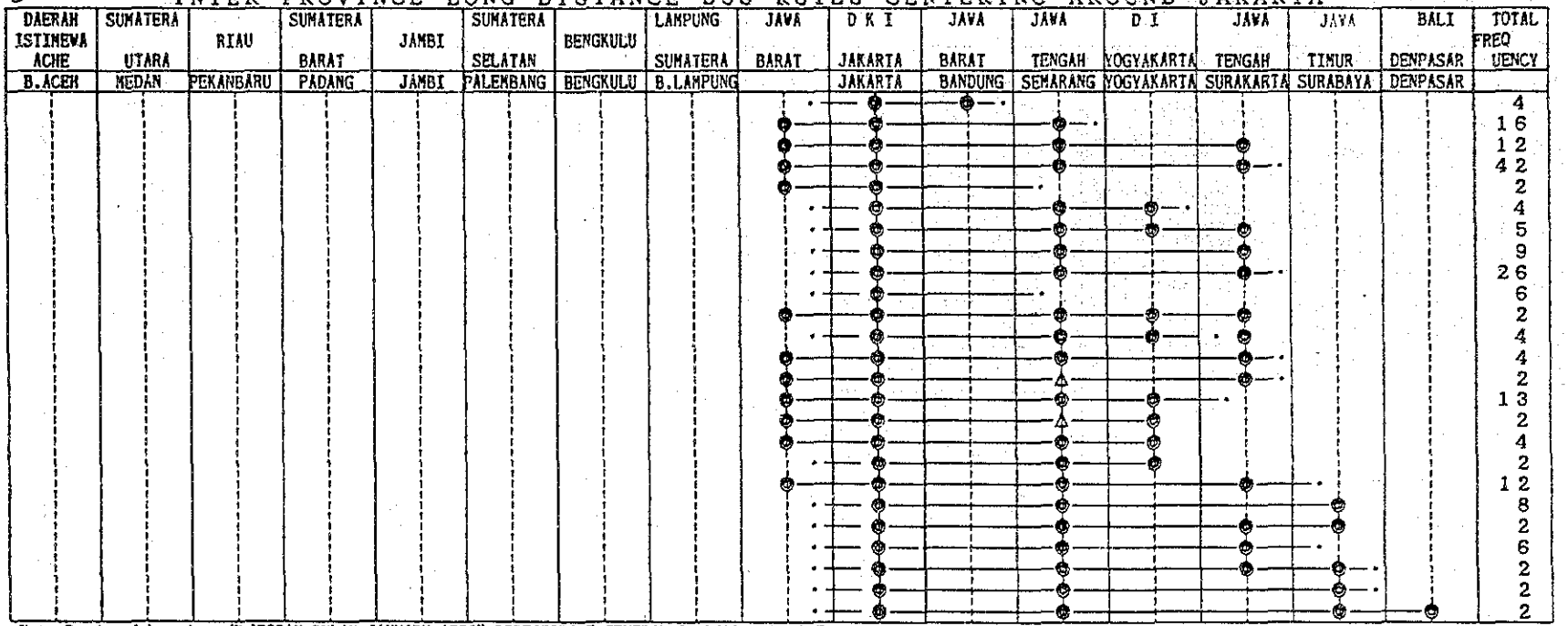


Fig. A 4.2.1 INTER PROVINCE LONG DISTANCE BUS RUTES CENTERING AROUND JAKARTA (3)



Note:Produced based on "LAPORAN BULAN JANUARY 1990",DIRECTORATE GENERAL OF LAND TRNSPORT

TABLE A 4.2.3 Selected Port-to-Port Sea Passenger OD Traffic Volume, 1989 PERSONS

		PONTIANAK	BANJAR MASIN	BALIKPAPAN	TARAKAN	KUANDANG	BITUNG	UJUNG PANDANG	PATALOAN	TOLI-TOLI	AMBON	TERNATE	SORONG	MANOKWARI	JAYAPURA	SURABAYA	PADANG
TANJUNG PRIOK	5	25,323 23,262															
	6	3,629 3,304															
	9										8,293 8,263		2,574 2,029			3,975 1,655	
	10			3,253 3,579					2,835 2,965							4,600 3,014	
	7											815 817	45 309	288	1,529 1,345	1,706 632	
	8											1,135 1,340	532 884		2,231 1,908	2,537 873	
	11			4,704 2,910	1,506 893				3,137 1,932	596 624						2,898 997	23,062 18,603
	TOTAL	55,518	0	14,446	2,399	0	0	0	10,869	1,220	16,556	4,107	5,973	288	7,013	22,887	41,665
SURABAYA	1-A			21,940 21,092	3,208 2,837			11,486 13,164									
	1-B							13,051 14,128			7,891 6,813	2,051 1,649					
	2-A			6,386 7,176	966 976			4,091 4,383									
								4,055 5,863			1,866 2,720	936 1,223					
	3							2,886 4,835									
	4							1,421 2,540									
	7					924 895	2,317 1,775	2,902 2,079									
	8					1,397 1,370	3,739 2,845	4,631 3,851									
	9							9,899 6,406									
	10			13,707 11,323			3,243 4,469	7,221 5,686	8,017 7,650								
	11			16,957 9,917				5,895 5,323	7,000 5,508	1,373 1,854							
	TOTAL	0	0	108,498	7,987	4,586	18,388	135,796	28,175	3,227	19,290	5,661					
JAWA TENGAH	6	2,563 3,258															
			25,235 19,881														
			12,639 11,118														
	TOTAL	5,821	68,873	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1-A SURABAYA-U.PANDANG-BALIK PAPAN-TARAKAN
-B SURABAYA-U.PANDANG-BAU.BAU-AMBON-TERNATE
2-A SURABAYA-U.PANDANG-BALIKPAPAN-TARAKAN
-B SURABAYA-U.PANDANG-BAU.BAU-AMBON-SORONG
3 SEMARANG-B.MASIN-SURABAYA-PD.BAAI-LEMBAR-U.PANDANG-BIMA-WAINGAPU-ENDE-KUPANG
4 SEMARANG-B.MASIN-SURABAYA-PD.BAAI-LEMBAR-U.PANDANG-BIMA-WAINGAPU-ENDE-KUPANG-DILLY
5 PONTIANAK-TG.PRIOK-MUNTOK-KIJANG-DUMAI-BELAWAN-MALAHAYATI
6 SEMARANG-PONTIANAK-TG.PRIOK-MENTOK-KIJANG-DUMAI-BELAWAN
7 TG.PRIOK-SURABAYA-U.PANDANG-KWANDANG-BITUNG-TERNATE-SORONG-MANOKWARI-JAYAPURA
8 TG.PRIOK-SURABAYA-U.PANDANG-KWANDANG-BITUNG-TERNATE-SORONG-JAYAPURA
9 BELAWAN-TG.PRIOK-SURABAYA-U.PANDANG-BAU.BAU-AMBON-SORONG
10 BELAWAN-TG.PRIOK-SURABAYA-U.PANDANG-BALIKPAPAN-PANTOLOAN-BITUNG
11 SIBOLGA-PADANG-TG.PRIOK-SURABAYA-U.PANDANG-B.PAPAN-PANTOLOAN-TOLI.TOLI-TARAKAN

Source: PT. PELNI

Table A 4.2.4 Airport to Airport Air Transport Passenger OD Traffic Volume, 1986 (1)

Zone OD Pairs	Airport to Airport	One way Passengers	Total Passengers	Adjustment
D.K.I JAKARTA ~ SEMARANG	Soekarno Hatta - Semarang	113,514		
	Halim P.K - Semarang	150		
	Semarang - Jakarta	135,476	269,140	0.8 x 269,140 = 215,312
D.K.I JAKARTA ~ SURABAYA	Soekarno Hatta - Surabaya	328,075		
	Halim P.K - Surabaya	8,845		
	Surabaya - Jakarta	324,434	661,354	0.65 x 661,354 = 429,880
D.K.I JAKARTA ~ D.I YOGYAKARTA	Soekarno Hatta - Yogyakarta	110,837		
	Halim P.K - Yogyakarta	3,995		
	Yogyakarta - Jakarta	93,436	208,268	0.7 x 208,268 = 145,788
D.K.I JAKARTA ~ BENGKULU	Soekarno Hatta - Bengkulu	18,746		
	Halim P.K - Bengkulu	5,716		
	Bengkulu - Jakarta	17,116	41,578	0.75 x 41,578 = 31,184
D.K.I JAKARTA ~ PALEMBANG	Soekarno Hatta - Palembang	134,357		
	Halim P.K - Palembang	8,719		
	Palembang - Jakarta	137,793	280,869	0.75 x 280,869 = 210,651
D.K.I JAKARTA ~ KALIMANTAN BARAT	Soekarno Hatta - Pontianak	122,754	} 125,601	
	Halim P.K - Pontianak	2,847		
	Pontianak - Jakarta	(48,887)		
	(Pontianak - Others)	(96,457)		
	Halim P.K - Ketapang	1,503	} 5,486	0.6 x 2 x (125,601 + 5,486) = 183,522
	Halim P.K - Sintang	3,983		
	Ketapang - Jakarta	(1,362)		
D.K.I JAKARTA ~ KALIMANTAN TIMUR	Soekarno Hatta - Balikpapan	62,090		
	Soekarno Hatta - Samarinda	2,537		
	Soekarno Hatta - Tarakan	2,090	84,768	
	Halim P.K - Balikpapan	17,836		0.65 x 2 x 84,768 = 110,198
	Halim P.K - Samarinda	168		
	Halim P.K - Tarakan	57		
	(Balikpapan - Jakarta)	(90,525)		
D.K.I JAKARTA ~ SULAWESI TENGAH	Soekarno Hatta - Palu	2,494	2,494	
	Soekarno Hatta - Ujung Pandang	119,230	} 124,460	0.7 x 2 x (124,460 ' (1 - 0.3700) x 0.2256 + 2,494) = 28,257
	Halim P.K - Ujung Pandang	5,230		

U. Pandang - SULAWESI UTARA	20,566	0.1517		U. Pandang - Luwuk	1,611		
" - SULAWESI TENGAH	10,235	0.0755		- Palu	37,392	39,812	0.2256
" - SULAWESI SELATAN	50,178	0.3700		- Poso	809		
" - SULAWESI TENGGARA	7,778	0.0574		- Buton	1,335		
" - MALUKU	32,182	0.2372		- Kendari	24,851	26,186	0.1484
" - IRIAN JAYA	14,672	0.1082		- Manado	30,149	30,149	0.1708
				- Ambon	50,716	50,716	0.2874
T o t a l	135,611	1.0000		- Biak	29,614	29,614	0.1679
				T o t a l	176,477	176,477	1.0000

Source: JICA REPORT 1988, 1984 Air Passenger OD Table

Table A 4.2.4 Airport to Airport Air Transport Passenger OD Traffic Volume, 1986 (2)

Zone OD Pairs	Airport to Airport		One way Passengers	Total Passengers	Adjustment
D.K.I JAKARTA ~ MALUKU	Halim P.K	- Ambon	124	1,036	0.7 x 2 x (124,460 * (1 - 0.3700) x 0.2874 + 1,036) = 32,999
	Soekarno Hatta	- Ternate	912		
	Soekarno Hatta	- Ujung Pandang	119,230	124,460	
	Halim P.K	- Ujung Pandang	5,230		
D.K.I JAKARTA ~ IRIAN JAYA	Halim P.K	- Jayapura	16	3,615	0.7 x 2 x (124,460 * (1 - 0.3700) x 0.1678 + 3,615) = 23,481
		Manokwari	180		
	Halim P.K	- Meranke	663		
	Halim P.K	- Sorong	2,756		
	Soekarno Hatta	- Ujung Pandang	119,230	124,460	
	Halim P.K	- Ujung Pandang	5,230		
JAWA TENGAH ~ KALIMANTAN SELATAN	Semarang	- Banjarmasin	7,425	15,983	1.0 x 15,983 = 15,983
	Banjarmasin	- Semarang	8,558		
JAWA TIMUR ~ KALIMANTAN TIMUR	Surabaya	- Balikpapan	85,955	86,455	0.7 x 2 x 86,455 = 121,037
		- Samarinda	500		
	(Balikpapan	- Surabaya)	(75,943)		
JAWA TIMUR ~ SULAWESI UTARA	Surabaya	- Ujung Pandang	81,936	81,936	0.7 x 2 * (81,936 * (1 - 3.700) x 0.1708) = 12,343
JAWA TIMUR ~ SULAWESI TENGAH	Surabaya	- Ujung Pandang	81,936	81,936	0.7 x 2 * (81,936 * (1 - 0.3700) x 0.2256 = 16,303
JAWA TIMUR ~ SULAWESI SELATAN	Surabaya	- Kendari	1,999		0.7 x 2 * (81,936 x 0.3700 + 1,999) = 45,241
	Surabaya	- Ujung Pandang	81,936		

Table A 4.2.6 AIRPORT TO AIRPORT ORIGIN-DESTINAITION PASSENGER TABLE (1986) I

(Persons)

O \ D	1 TG. PINANG	2 PEKANBARU	3 GN. SITOLI	4 PALEMBANG	5 SEMARANG	6 PONTI-ANAK	7 SAMPIT	8 PALANG-KARAYA	9 TARAKAN	10 TANA TORAJA	11 PALU	12 GORON-TALO	13 AMBON	14 TERNATE	15 MATARAM	16 BIMA	17 JAYAPURA	18 MAMENA	19 KAIMANA	20 MERAUKE	21 LAIN-LAIN	22 TOTAL
Bejawa																620						620
Balikpapan						2,162		795	2,197		15,139											20,293
Bandung				9,846	4,766																	14,612
Banjarmasin		423			8,558		9,496	18,727	6													37,210
Barito								2,703														2,703
Bengkulu				9,906																		9,906
Berau									3,962													3,962
Cilacap					27																	27
Denpasar															36,216	1,367						37,583
Ende																2,633						2,633
Fak-Fak																			1,540			1,540
Halim p.k		24,492		8,719	150	2,847		663	57				124		366		16			663		38,097
Jambi	439			16,049																		16,488
Wamena																	12,500					12,500
Soekarno-Hatta	16,258	40,311		134,357	133,514	122,754		21,452	2,090		2,494	1,628	5,762	912	1,641							483,173
Ketapang					1,591	9,417																11,008
Kupang													594									594
Luwuk											3,319											3,319
Manokwari													1,707				1,707					2,784
Medan		23,178	358																			23,536
Muara Teweh								2,971														2,971
Nabire																	21,222					21,222
Padang		3,400		2,792																		6,192
Pangkal Pinang	19			17,017																		17,036
Pangkalan Bun					9,051	77	1,609	7,073														17,810
Poso											1,110											1,110
Rengat		10,981																				10,981
Ruteng																2,202						2,202
Samarinda									586													586
Serui																	1,329					1,329
Singkep	1,554			154																		1,708
Sorooko										561												561
Sorong													9,311									9,311
Sumbawa Besar													602		668	16						7,171
Surabaya					28,973	1,689		1,479							5,885 15,254					573		47,968
Tambolaka																690						690
Tg. Pandan				4,129		3																4,132
Toli-Toli											4,052	354										4,397
Ujung Pandang										984	37,392		50,716			661						89,753
TOTAL	18,270	102,785	358	202,969	186,630	138,949	11,105	55,863	8,898	1,545	63,506	1,973	68,816	912	60,030	8,189	36,144	-	1,540	1,236	-	969,718

Table A 4.2.6 ORIGIN-DESTINAITION PASSENGER TABLE (1986) H-1 (Persons)

O / D	1 TG. PINANG	2 PEKANBARU	3 GN. SITOLI	4 PALEMBANG	5 SEMARANG	6 PONTI-ANAK	7 SAMPIT	8 PALANG-KARAYA	9 TARAKAN	10 TANA TORAJA	11 PALU	12 GORON-TALO	13 AMBON	14 TERNATE	15 MATARAM	16 BIMA	17 JAYAPURA	18 WAHENA	19 KAIMANA	20 MERAUKE	21 LAIN-LAIN	22 TOTAL
Batam	1,240	15,303		3,947																		20,490
Jambi	3			17,783																		17,786
Natak	12																					12
Palembang	157	2,870													1,475							4,502
Pangkal Pinang	6,763			17,087																		23,850
Pekanbaru	13,240			2,744																		15,984
Singkep	2,055	26		177									1,030									3,288
Sorong	189												3,259									3,448
Tambolaka	2,514															859						3,373
Terampak	9																					9
Aceh		17																				17
Dumai		2,855		1,820																		4,675
Medan		16,978		8,300																		25,278
Padang		3,781		3,993																		7,774
Pasir amayang		3																				3
Rengat		9,424		909																		10,333
Sungai Pakning		5,604																				5,604
T.B Karimun		4,578																				4,578
Tg. Pinang		14,373		114																		14,487
Bandung				6,832	3,810																	10,642
Bengkulu				6,946																		6,946
Pendopo				170																		170
Ranba Keluang				1,837																		1,837
Tg. Pandan				3,759																		3,759
Yogyakarta				1,985																		1,985
Babjarmasin					7,425		9,396	14,950														31,771
Pangkalan Bun					11,910	180	1,394	6,111														19,595
Balikpapan						1,111		1,697			13,590											16,398
Ketapang						4,703																4,703
Nanga Pinoh						447																447
Putu Sibau						839																839
Sintang						1,345																1,345
Palangkaraya							11,163															11,163
Buntok								2,856														2,856
Muara Teweh								3,819														3,819
Sampit								9,705														9,705
Gorontalo											6,747											6,747
Luwuk											4,284		295									4,579
Poso											229											229
Toli-Toli											4,402											4,402
Ujung Pandang											20,114		34,088			387						54,589
Menado												10,931		10,198								21,129
Palu												7,939										7,939
Amahai													168									168
Balikpapan													57									57

Table A 4.2.6 ORIGIN-DESTINAITION PASSENGER TABLE (1986) II-2

(Persons)

O / D	1 TG. PINANG	2 PEKANBARU	3 GN. SITOLI	4 PALEMBANG	5 SEMARANG	6 PONTI-ANAK	7 SAMPIT	8 PALANG-KARAYA	9 TARAKAN	10 TANA TORAJA	11 PALU	12 GORON-TALO	13 AMBON	14 TERNATE	15 MATARA	16 BIMA	17 JAYAPURA	18 WAMENA	19 KAIMANA	20 MERAUKE	21 LAIN-LAIN	22 TOTAL
Bula													1,900									1,900
Kupang													294			3						297
Langgur													4,210									4,210
Kalili													60									60
Mangole													690	472								1,162
Namlea													723									723
Nesraman													1,230									1,230
Saumlaki													519									519
Ternate													12,201									12,201
Ambon														7,737								7,737
Galela														2,771								2,771
Kao														1,426								1,426
Labuha														1,649								1,649
Morotai														260								260
Sanana														747								747
Denpasar															37,565	375						37,940
Palibelo															3,875	24						3,899
Sumbawa Besar															3,743							3,743
Aspenon																9,225						9,225
Bajawa																250						250
Endu																554						554
Komodo																33						33
Labuan Bajo																146						146
Ruteng																478						478
Waingapu																11						11
Jakarta	9,132	51,517		137,793	135,476	48,887		11,159												1,098		359,062
Surabaya				1,956	30,447	29	73	4,416							15,299	8				130		52,358
SUB TOTAL	35,314	127,329		218,152	198,068	57,541	22,026	54,713			49,366	18,870	60,724	25,260	61,957	12,353				1,228		933,901
JAYAPURA																	2,069	12,509		9,682		24,260
TELUK CEND													660				40,589	14		114		41,377
MANOKWARI													572				273					845
SORONG																	4					4
FAK-FAK																	2,047	22		2		2071
MERAUKE																	9,929	180		5,381		15,490
JAYAWIJAYA																	18,570	7,610		36		26,216
YAPEN-WAROPEN																		1				1
PANIAI																	3,960	178		55		4,193
OTHERS	12					96,457		63	39,528		4,432						1,372	367		1,151		143,382
SUB TOTAL	12					96,457		63	39,528		4,432		1,232				78,813	20,881		16,421		257,839
GRAND TOTAL	35,326	127,329		218,152	189,068	153,998	22,026	54,776	39,528		53,798	18,870	61,956	25,260	61,957	12,353	78,813	20,881		17,649		1,191,740

(Note) Compiled based on "Statistic Angkutan Udara, 1986", Central Statistic Bureau

Appendix 4.2.6 Formula for the Iteration of the Frator Method

$$x'_{ij} = t_{ij} \cdot F_i \cdot G_j \cdot \frac{L_i + L_j}{2} \qquad \text{--- (A 4.2.11)}$$

$$L_i = \frac{\sum_{j=1} t_{ij}}{\sum_{j=1} t_{ij} \cdot G_{ij}} \quad , \quad L_j = \frac{\sum_{i=1} t_{ij}}{\sum_{i=1} t_{ij} \cdot F_{ij}}$$

where

x_{ij} : Approximate value of traffic flow from zone i to zone j to be produced for the next step of the iteration.

t_{ij} : Value of the traffic flow from zone i to zone j at the present step of iteration.

L_i, L_j : Respectively "location factor" of zone i and zone j

$$F_i = G_i / \sum_j t_{ij}$$

$$G_j = A_j / \sum_i t_{ij} \qquad \text{---------- (A 4.2.12)}$$

where,

F_i, G_j : Respectively the ratio of the given value to the value at the concerned step for the generation and the attraction of zone i and zone j.

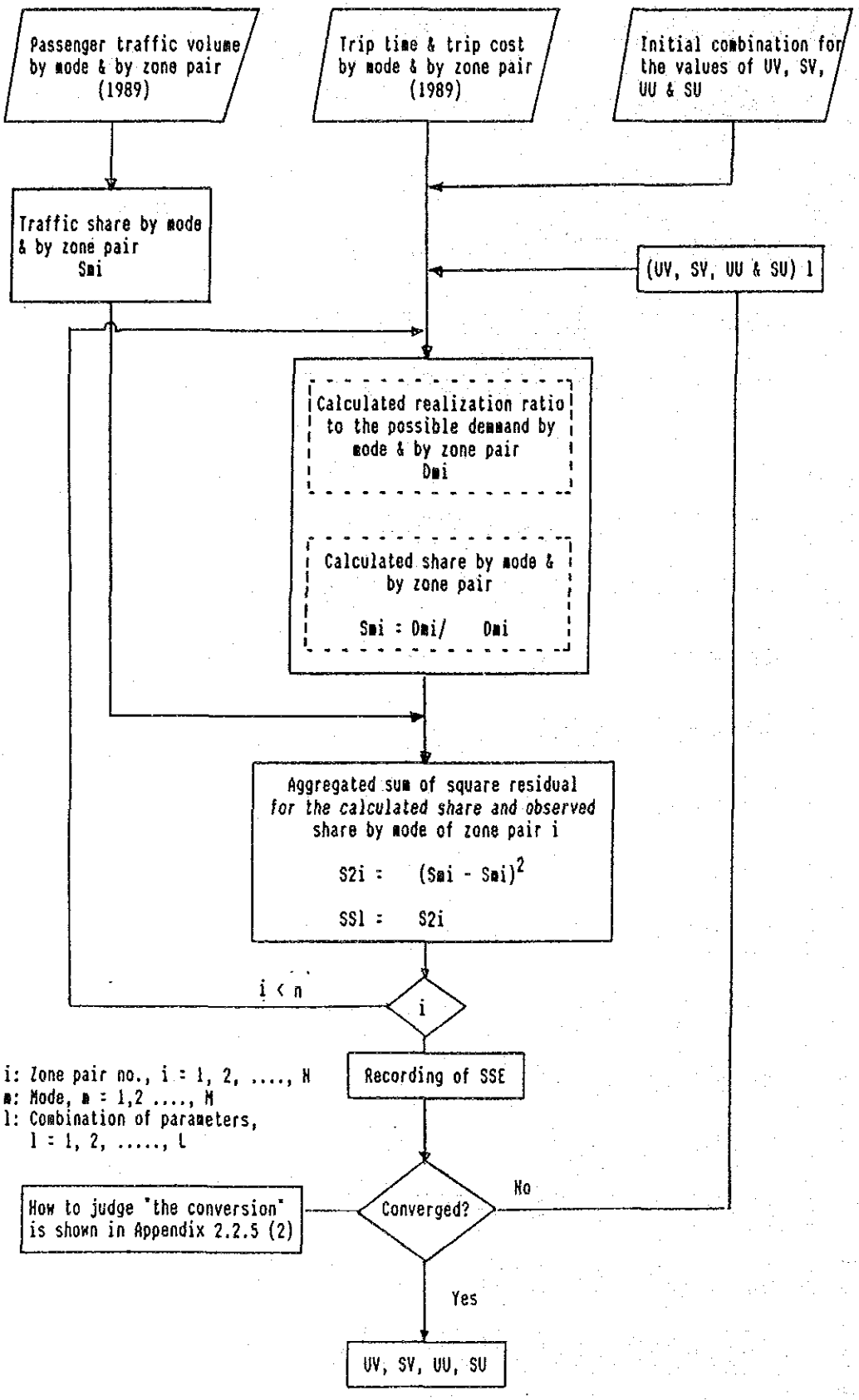
G_i : Given value of the generation for zone i

A_j : Given value of the attraction for zone j

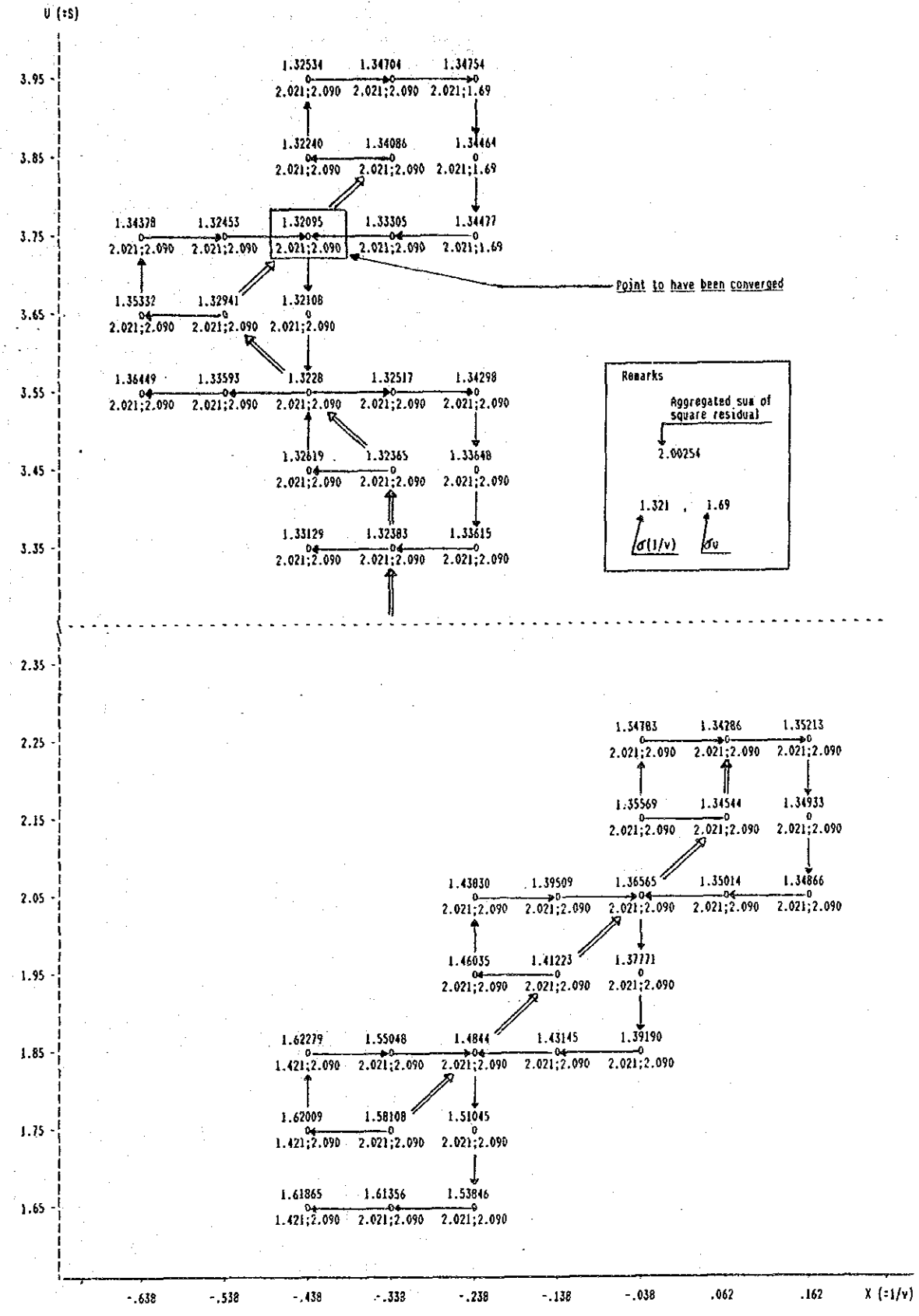
Appendix 4.2.7 AIRPORT ZONE TO & FROM PROVINCE ZONE TOTAL PASSENGER TRAFFIC FLOW (hipothetically estimated),1989

	T.PINAN	P.BARU	G.SITOL	PALMBAN	SEMARAN	PONTIAC	SAMPIT	PLNKARY	TARAKAN	T.TORJA	PALU	GORNTAL	AMBON	TERNATE	MATARAN	BIMA	JAYAPUR	WAMENA	KAIMANA	MERAUKE	TOTAL
DI.ACEH	12243	69248	23627	28678	10992	5950	934	1104	497	533	602	552	448	350	1225	665	189	164	130	137	158268
SUM.UTA	56466	576825	187493	79677	30917	20216	5072	7554	1616	1986	5353	2893	1268	1013	4106	2434	543	483	390	495	986631
SUM.BAR	54882	472014	14880	287289	42424	16429	4874	7949	1130	1391	3429	1126	1280	834	3234	1648	329	282	210	230	915861
RIAU	69768	405625	22211	279836	49595	13284	6279	8303	889	1872	1895	2391	750	554	2758	1304	261	163	169	178	857486
JAMBI	32441	352019	8595	473036	72281	11261	2515	3319	900	1812	1189	950	774	546	3476	1409	237	196	145	154	966452
SUM.SEL	29271	271244	10081	721006	157023	29492	10171	14764	2511	3063	6116	3229	1811	1329	7548	3849	1014	649	417	491	1275888
BENGKUL	4766	43293	704	386201	77954	7697	1799	2588	628	655	967	516	607	488	3134	1044	166	130	91	100	532840
LAMPUNG	24238	54691	4718	228394	369482	33391	13896	17663	3715	4518	3967	3168	2528	1822	12104	5955	774	663	503	529	786719
JAKARTA	61917	188899	8718	734031	1186290	147672	38478	44623	9085	7396	15690	9193	22881	10380	39148	16200	8493	3377	1164	2140	2539690
JAW.BAR	75018	95758	16699	641549	1872220	115626	62086	67715	18007	17001	15651	11487	13160	8186	41735	22820	5547	3319	2017	2451	3108040
JAW.TEN	34552	40349	10192	167353	2127550	66529	186761	40813	31500	30716	39054	27522	18691	11159	162946	61514	10190	5093	2525	3505	2998520
YOGCYA	8242	20874	2576	64859	1411010	20367	13866	6619	25065	4343	2932	1537	2058	1195	12760	4956	7340	2632	689	1582	1615500
JAW.TIM	27424	33884	9044	103949	1825870	56065	151139	57147	29892	59981	69389	31381	41866	21656	481430	149890	16787	7856	3535	5240	3181740
BALI	3966	11718	1171	15871	449325	8862	3818	6682	14784	15321	18623	5566	11946	5663	193310	82660	6053	2376	768	1466	859155
NT.BAR	2209	2616	871	6479	138824	5377	1776	2155	5141	12595	9946	5343	4577	2716	174950	87630	946	693	457	587	465887
NT.TIM	978	1184	477	2384	26352	9187	1834	1427	21399	2919	2695	4143	3737	1993	39893	58563	458	382	282	299	171786
TIM.TIM	389	544	124	1282	21623	3923	228	325	279	681	1885	1243	602	384	10889	8586	143	186	78	78	52263
KAL.BAR	4376	7224	1411	22122	52302	39364	13878	24574	5802	1332	12711	6861	904	662	5879	2487	304	258	196	287	202845
KAL.TEN	2344	5458	684	13078	129533	34866	58873	55097	5841	577	22688	8837	581	349	2178	888	474	230	118	157	332892
KAL.SEL	3695	8989	987	15984	279461	28141	73914	102860	18924	994	34889	11879	678	496	7388	2859	231	195	148	157	575987
KAL.TIM	1787	3569	691	13298	128395	57482	51985	74932	19965	5458	73188	28332	3913	6597	1624	699	159	132	245	186	464478
SUL.UTA	932	2334	368	3981	17796	4273	1488	2561	4697	5218	61985	75777	35859	76586	6315	2515	6318	2353	681	1432	312564
SUL.TEN	927	988	351	4171	33656	12618	13219	21849	7831	12251	111344	55289	7533	14827	9628	3848	1512	758	358	588	311841
SUL.SEL	3789	6678	1442	14818	63792	18129	4146	6469	10684	459834	151666	42839	47652	20898	71622	22515	24379	9271	2748	5684	987296
SUL.TGR	657	982	329	5915	36725	5874	518	669	1335	14662	27456	8297	7804	3634	11554	3143	788	486	278	326	131482
MALUKU	528	725	249	1533	15531	989	425	527	924	4679	9835	13269	186945	62605	4735	1755	10596	4631	1594	2638	243896
IRIAN	188	277	184	992	10487	367	316	544	268	988	2538	4849	14343	6811	1246	513	166687	58858	37966	48614	295173
TOTALL	517666	2669198	328711	4316968	18620388	763863	627384	588824	234589	670918	784873	365269	353415	262872	1316888	543381	218988	105732	57886	79224	25328388

Appendix 4.2.8 (1) Searching Procedure for the Parameters of 2 Types of Logarithmic Normal Distribution ($\mu \log_e$ V (UV), $\sigma \log_e$ V (SV), $\mu \log_e$ U (UU) & $\sigma \log_e$ U (SU))



Appendix 4.2.8 (2) Searching Process of Optimus Parameters (Example)



Appendix 4.2.9 Trip Time and Trip Cost by Zone OD Pairs for the Model Building

Unit: Hour, Rp. 1,000.-

Zone OD Pairs		Railway		Bus		Seaway		Airway	
Zone i	Zone j	Time	Cost	Time	Cost	Time	Cost	Time	Cost
D.K.I JAKARTA	SEMARANG CITY	9.76	5.212	7.83	7.520	-	-	2.53	71.556
D.K.I JAKARTA	SURABAYA CITY	14.85	7.215	13.07	12.544	21.09	16.445	3.02	105.814
D.K.I JAKARTA	A Part of D.I. YOGYAKARTA	11.07	5.807	8.92	8.560	-	-	2.53	69.241
D.K.I JAKARTA	A Part of BENGKULU	-	-	13.98	11.504	-	-	3.71	137.978
D.K.I JAKARTA	PALEMBANG CITY	-	-	11.50	9.120	-	-	2.45	67.210
D.K.I JAKARTA	KALIMANTAN BARAT	-	-	-	-	25.20	19.596	3.66	115.457
D.K.I JAKARTA	SULAWESI TENGAH	-	-	-	-	77.49	56.235	5.01	206.738
D.K.I JAKARTA	KALIMANTAN TIMUR	-	-	-	-	65.16	48.346	4.87	186.933
JAWA TIMUR	KALIMANTAN TIMUR	-	-	-	-	43.15	31.901	4.25	129.428
JAWA TIMUR	SULAWESI UTARA	-	-	-	-	70.50	53.015	5.94	247.847
JAWA TIMUR	SULAWESI TENGAH	-	-	-	-	55.49	39.790	5.03	189.521
JAWA TIMUR	SULAWESI SELATAN	-	-	-	-	24.95	19.228	3.95	122.814
D.K.I JAKARTA	MALUKU	-	-	-	-	74.74	62.974	7.01	309.445
D.K.I JAKARTA	IRIAN JAYA	-	-	-	-	139.20	103.753	10.28	422.377
JAWA TENGAH	KALIMANTAN SELATAN	-	-	-	-	19.47	14.536	3.25	82.897

Appendix 4.2.10 Distance between Zone i & Zone j for the Model Formulation

Unit: km

Zone OD Pairs		Railway		Bus		Seaway		Airway		Ferry	Area (km2)	
Zone i	Zone j	DR	CH	DB	CH	DS	ANS	DA	TS	DF	i	j
D.K.I JAKARTA	SEMARANG CITY	445	-	470			-	476	-	-	656	365
D.K.I JAKARTA	SURABAYA CITY	725	-	748		715	-	718	-	-	656	274
D.K.I JAKARTA	A Part of D.I. YOGYAKARTA	517	-	535			-	460	-	-	656	1,124
D.K.I JAKARTA	A Part of Bengkulu	-	-	719			-	955	-	30	656	14,783
D.K.I JAKARTA	PALEMBANG CITY	-	-	570			-	446	-	30	656	232
D.K.I JAKARTA	KALIMANTAN BARAT	-	-	-	-	852	-	788	-	-	656	146,807
D.K.I JAKARTA	SULAWESI TENGAH	-	-	-	-	2,445	3	1,500	-	-	656	68,033
D.K.I JAKARTA	KALIMANTAN TIMUR	-	-	-	-	2,102	2	1,337	-	-	656	211,440
JAWA TIMUR	KALIMANTAN TIMUR	-	-	-	-	1,387	1	891	-	-	47,921	211,440
JAWA TIMUR	SULAWESI UTARA	-	-	-	-	2,305	2	1,857	2	-	47,921	25,786
JAWA TIMUR	SULAWESI TENGAH	-	-	-	-	1,730	2	1,358	2	-	47,921	68,033
JAWA TIMUR	SULAWESI SELATAN	-	-	-	-	836	-	842	0	-	47,921	62,482
D.K.I JAKARTA	MALUKU	-	-	-	-	2,738	-	2,452	1	-	656	85,728
D.K.I JAKARTA	IRIAN JAYA	-	-	-	-	4,511	5	3,886	3	-	656	419,660
JAWA TENGAH	KALIMANTAN SELATAN	-	-	-	-	632	-	555	-	-	34,503	36,985

(Note) DR, DB, DS, DA, DF: Respectively route kilometers of railway, bus, seaway, airway and ferry
CH : Change of bus or train on the respective trip
ANC: Anchorage at Port or change of ship on the sea trip
TS : Transition or change on the air trip

Appendix 4.2.11 Units and Models for producing Trip Time and Trip Cost on the Zone OD Pairs

Transport modes	Trip time without access / egress	Trip cost without access / egress	Other required time & cost (access / egress & others)
Railway	$TRi,j = DRi,j / 55.0 + 1.0 \quad NTSRi,j$	$FRi,j = DRi,j \quad RTRi,j$ $RTRi,j = \exp(2.71954 - 0.00058174 \quad DRi,j)$	$TAERi,j = 0.67$ $CAERi,j = 15.0 \quad (0.67 / SPTB)$
Bus	$TBi,j = DBi,j / 60.0 + 0.5 \quad NTSBi,j$	$FBi,j = 16.0 \quad DBi,j$	$TAEBi,j = 0.33$ $CAEBi,j = 16.0 \quad (0.67 / SPTB)$
Seaway	$TSi,j = DSi,j / 38.0 + 3.5 \quad NTSSi,j$	$FSi,j = 23.0 \quad DSi,j$	$TAESi,j = (DAESi + DAESj) / SPB$ where, $DAESi = 20 + (ARi)^{0.3}$ $DAESj = 20 + (ARj)^{0.3}$ $CAESi,j = 16.0(TAESi,j / SPTB)$ $WTSi,j = 2.0$
Airway	$TAi,j = 0.262061 + 0.002065 \quad DAi,j + 1.0 \quad NTSAi,j$	$FAi,j = DAi,j \quad (156.14 - 0.01221 \quad DAi,j)$	$TAEAi,j = (DAEAi + DAEAj) / SPB$ where, $DAEAi = 20 + (ARi)^{0.3}$ $DAEAj = 20 + (ARj)^{0.3}$ $CAEAi,j = 16.0 \quad (TAESi,j / SPTB)$ $WTAi,j = 1.0$

Remarks :

- TRi,j : Railway trip time from the railway station of zone i to the railway station of zone j (hour)
- TBi,j : Bus trip time from the bus stop of zone i to the bus stop of zone j (hour)
- TSi,j : Seaway trip time from the seaport of zone i to the seaport of zone j (hour)
- TAi,j : Airway trip time from the airport of zone i to the airport of zone j (hour)
- DRi,j, DBi,j, DSi,j, DAi,j : Distance of the respective route of railway, bus, seaway and airway (km)
- FRi,j, FBi,j, FSi,j, FAi,j : Distance of the respective trip of railway, bus, seaway and airway
- $RTRi,j$: Tariff rate for the railway trip (Rp./km)
- $NTSRi,j$, $NTSBi,j$, $NTSSi,j$, $NTSAi,j$: Number of transit or change or anchorage for the respective trip of railway, bus, seaway and airway (number)
- $TAERi,j$, $TAEBi,j$, $TAESi,j$, $TAEAi,j$: Access / egress time for the respective trip of railway, bus, seaway and airway (hour)
- $CAERi,j$, $CAEBi,j$, $CAESi,j$, $CAEAi,j$: Access / egress cost for the respective trip of railway, bus, seaway and airway (rupiah)
- SPTB : Average time per Kilometer for the bus trip (h/km : 1/60 = 0.0167)
- SPB : Average speed of bus (km/h) ; 60 km/h
- DAESi, DAESj, DAEAi, DAEAj : Access / egress distance of respective mode of seaway and airway in the concerned zone i and zone j
- WTSi,j, WTAi,j : Waiting and other time for the respective mode of airway and seaway in the port of zone i and zone j
- ARi, ARj : Area of zone i and zone j (km^2)

Note :

Ferry routes are excluded from DBi,j.
Time required to travel on the abovementioned ferry route is obtained by the application of the following formula:

$$TFRBi,j = \sum_{n} DFRni,j/30.0$$

n : No. of ferry routes on the Bus trip (n = 1,2...n)
where, TFRBi,j : Time for the bus trip on the ferry route which is a port of the bus route from zone i to zone j (hour)
DFRni,j : Distance of the ferry route n (km)

Appendix 4.2.12 Data and Results of the Analyses on the Trip Time & Trip Cost

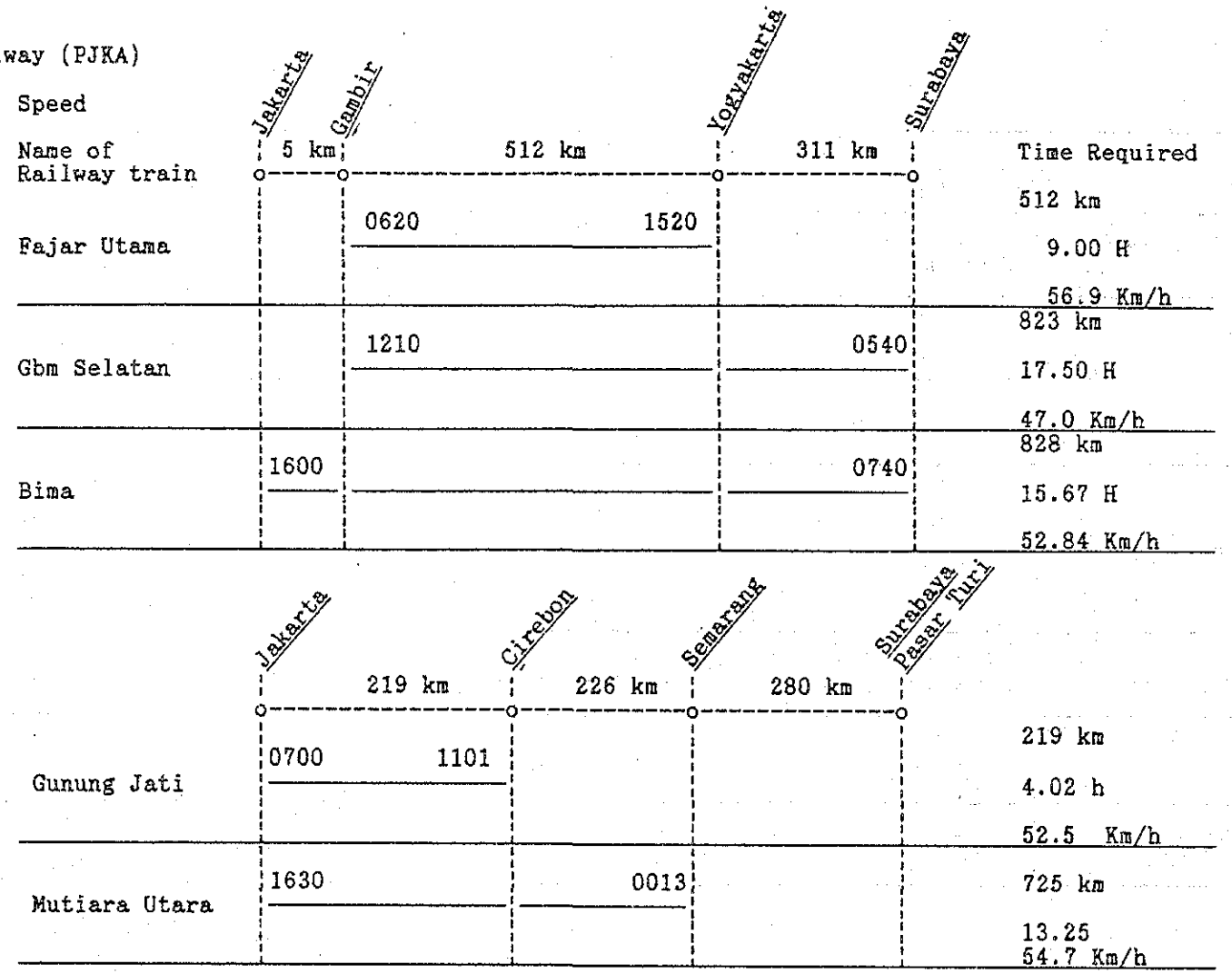
(1) Results of the Analyses

Mode	Item	Formulae and Units	Remarks
Railway	Time	55.0 Km/h	Average
	Tariff	loge RTFij = 2.71954 - 0.000582.DRij	RTFij : Railway tariff for the passenger trip between zone i and zone j (Rp.1000) Dij : Railway route kilometers between zone i and zone j (km)
Bus	Time	60.0 Km/h	Average
	Tariff	16.0 Rp/Km	Average
Seaway	Time	38.0 Km/h 3.5 h/p	Average, P = Anchored port
	Tariff	23.0 Rp/Km	Average
Airway	Time	ARTij = 0.262061 + 0.002065 DAij	ARTij : Flight time between the airports of zone i and zone j (hour) DAij : Airway route kilometers between the airports of zone i and zone j (km)
	Tariff	ARFij = 156.14 -0.01221 DAij	ARFij : Tariff for the passenger trip between the airports of zone i and zone j (Rp.1000)

(2) Data

1) Railway (PJKA)

(a) Speed



(b) Tariff (Rp./passenger-km)

From/To	Tariff (Rupiah)			Rate (Rp./pax-km)			Distance (km)	Average rate of 3rd class
	1st	2nd	3rd	1st	2nd	3rd		
Jakarta ~ Cirebon	9,500~ 17,000	6,000~ 9,500	1,800~ 5,800	43.4~ 77.6	27.4~ 43.4	8.2~ 25.5	219	17.4
Jakarta ~ Yogyakarta	10,500~ 17,000	7,000~ 10,000	4,500~ 6,100	20.3~ 32.9	13.5~ 19.3	8.7 11.8	517	10.3
Jakarta ~ Solo	15,000~ 18,000	10,000~ 11,000	4,600~ 6,400	26.0~ 31.3	17.4~ 19.1	8.0~ 11.1	576	9.6
Jakarta ~ Madiun	20,000	11,000	7,200~ 7,600	29.8	16.4	10.7~ 11.3	671	11.0
Jakarta ~ Surabaya	22,500	11,500	7,700	27.2	13.9	9.3	828	9.3
Jakarta ~ Malang	-	12,000	9,900	-	13.0	10.7	924	10.7
Jakarta ~ Tegal	13,500~ 22,000	9,500	2,500~ 5,800	45.8~ 74.6	32.2	8.5~ 19.7	295	14.1
Jakarta ~ Semarang	13,250~ 22,000	9,500	4,000~ 5,800	29.8~ 49.4	21.3	9.0~ 13.0	445	11.0
Jakarta ~ Pasarturi	25,500	-	7,700	35.2	-	10.6	725	10.6
Bandung ~ Yogyakarta	13,500	5,000~ 9,000	3,500~ 3,800	34.8	12.9~ 23.2	9.0~ 9.8	388	9.4
Bandung ~ Surabaya	17,000	8,500~ 12,000	6,100	24.3	12.2~ 17.2	8.7	699	8.7

2) Bus

(a) Tariff by region

No.	Region	Tariff/Passenger - Km
1.	Sumatera, Jawa and Bali	Rp. 10.40
2.	NTB, NTT and Tim-Tim	Rp. 14.10
3.	Kalimantan	Rp. 14.30
4.	Sulawesi	Rp. 15.00
5.	Maluku	Rp. 18.30
6.	Irian Jawa	Rp. 17.80

(Directorate General of Land Transport)

(b) Surcharges by equipment

No.	Equipment	Charge/Passenger - Km
a	Air Conditioning	4.70
b	Reclining seats	4.16
c	Toilet	2.60

(Directorate General of Land Transport)

(c) Uper limit of bus tariff and charges

Rp.25.00
==========

(d) Actual example (Jakarta - Semarang, 552 Km)

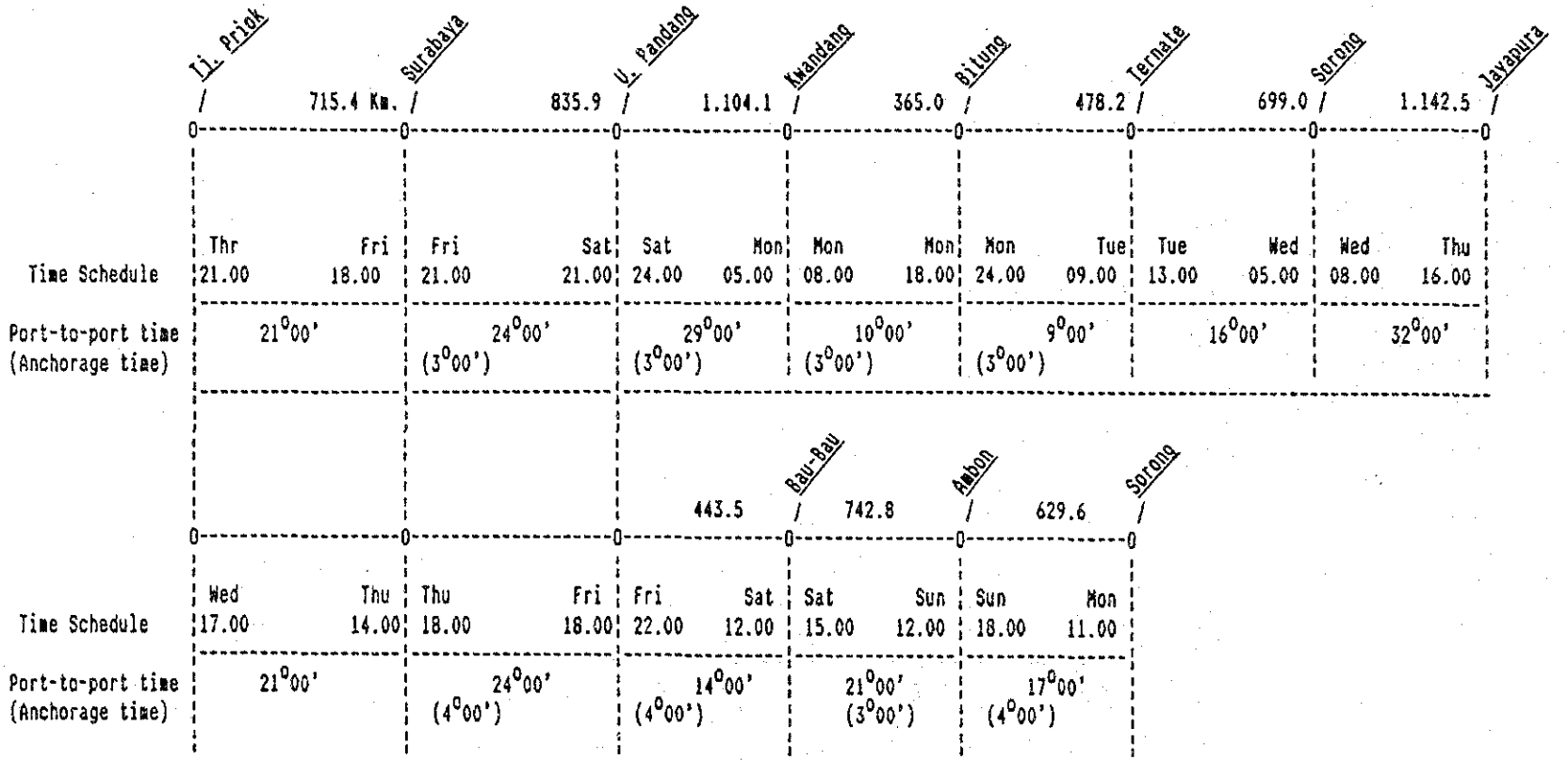
Classification	Tariff	Tarrif/Passenger - Km
Express bus Non - Air Conditioning	Rp. 6,500	Rp. 11.78
Express bus Air Conditioning	Rp.11,000	Rp. 19.92

(PT. DAMRI)

3) Ship

(a) Speed

(Example of PT. PELNI)



(b) Tariff

Example of PT. PELNI

Port - to - port		Class (adult) Rupiah					Distance	Economy
From	To	I	II	III	IV	Economy	(Km)	Rate (Rp/Km)
Tg. Priok	Surabaya	53,030	40,530	26,030	22,530	17,030	715.4	23.8
Tg. Priok	Ujung Pandang	130,030	95,030	70,030	54,030	37,530	1.551.3	24.2
Tg. Priok	Kwandang	217,030	159,530	116,530	90,030	63,030	2,655.4	23.7
Tg. Priok	Bitung	244,530	179,530	130,530	100,530	70,030	3,020.4	23.2
Tg. Priok	Ternate	252,530	185,530	136,530	108,530	74,530	3,498.6	21.3
Surabaya	Belawan	175,700	128,700	94,200	73,200	53,200	2,284.9	23.3
Surabaya	Padang	130,700	100,200	73,200	57,200	43,200	1,761.1	24.5
Surabaya	Ujung Pandang	76,700	56,700	42,200	32,700	22,700	835.9	27.2
Surabaya	Balikpapan	94,200	70,200	51,700	41,200	29,200	1,387.1	21.1
Surabaya	Tarakan	123,700	95,700	69,700	54,700	42,200	2,095.2	20.1

4) Airway

(a) Speed and tariff

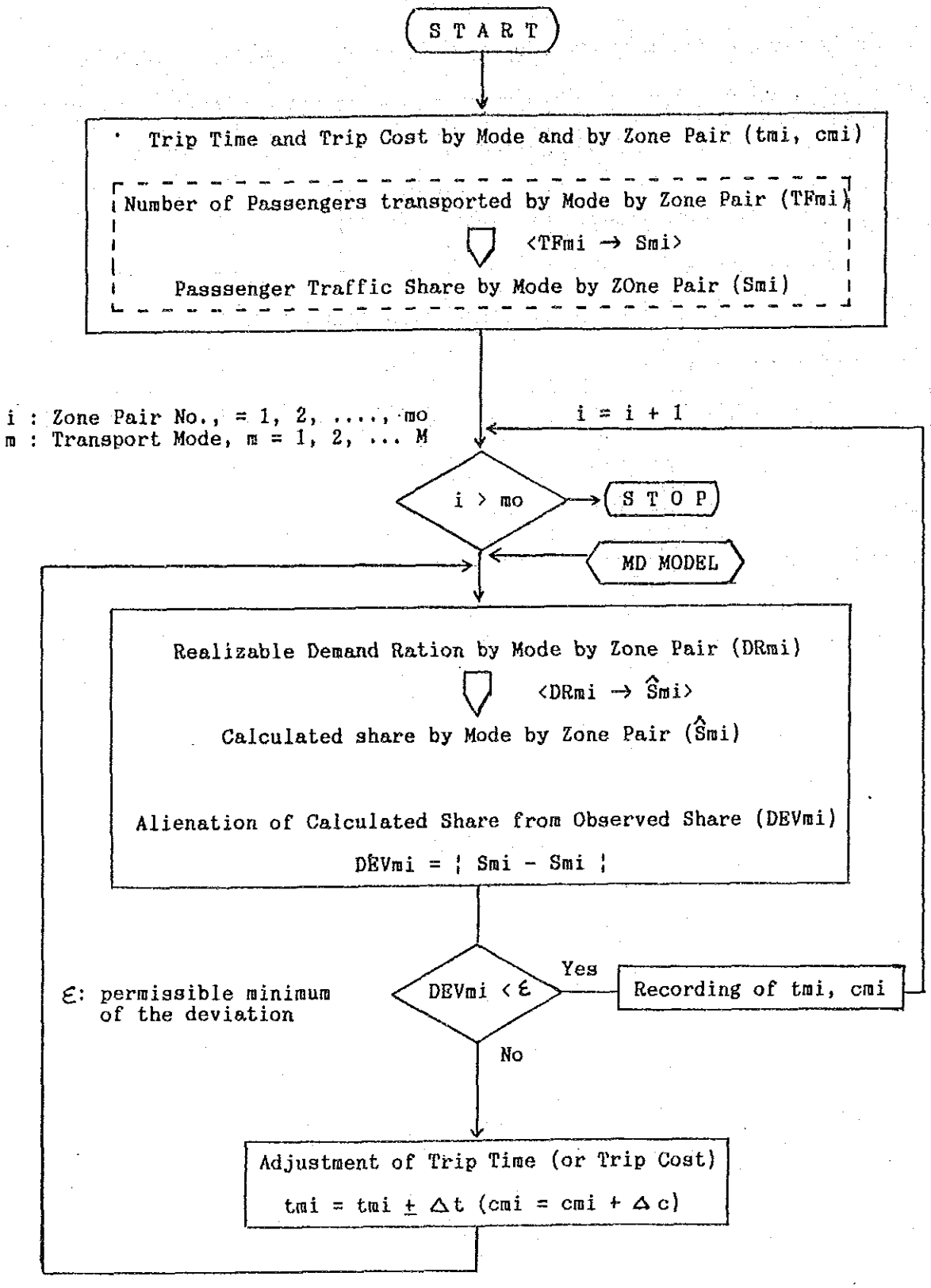
(Example)

Airport - to airport		Route	Distance (km)	Flight time				Transit Time	Total Time	Tariff (PT. GARUDA, PT. MERPATI)			Economy
From	To			1	2	3	Subtotal			First	Business	Economy	(Rp/km)
Jakarta	Semarang	JKT —476— SMG	476	1.00	-	-	1.00	-	1.00	9,000	80,000	64,000	134.5
Jakarta	Surabaya	JKT —718— SUB	718	1.33	-	-	1.33	-	1.33	144,000	129,000	103,000	143.5
Jakarta	Yogyakarta	JKT —460— JOG	460	1.17	-	-	1.17	-	1.17	101,000	90,000	72,000	156.5
Jakarta	Bengkulu	JKT —597— BKS	597	1.08	-	-	1.08	-	1.08	129,000	115,000	92,000	154.1
Jakarta	Palembang	JKT —446— PLM	446	1.00	-	-	1.00	-	1.00	105,000	94,000	75,000	168.2
Jakarta	Pontianak	JKT —788— PNK	788	1.42	-	-	1.42	-	1.42	157,000	140,000	112,000	142.1
Jakarta	Palu	JKT —1,500— UPG —516— PLW	2,016	3.25	1.17	-	4.42	1.00	5.42	375,000	335,000	268,000	132.9
Jakarta	Manado	JKT —1,500— UPG —1,015— MDC	2,515	3.25	1.58	-	4.83	1.00	5.83	435,000	389,000	311,000	123.7
Surabaya	Balikpapan	SUB —891— BPN	891	1.50	-	-	1.50	-	1.50	174,000	155,000	124,000	139.2
Surabaya	Manado	SUB —842— UPG —1,015— MDC	1,857	2.50	1.58	-	4.08	0.75	4.83	-	-	-	-
Surabaya	Palu	SUB —842— UPG —516— PLW	1,358	2.50	1.17	-	3.67	0.75	4.42	-	-	-	-
Surabaya	Ujung Pandang	SUB —842— UPG	842	2.50	-	-	2.50	-	2.50	165,000	147,000	118,000	140.1
Jakarta	Ambon	JKT —842— UPG —952— AMQ	1,794	3.25	2.75	-	6.00	0.92	6.92	374,000	334,000	267,000	148.8
Jakarta	Jayapura	JKT —1,500— UPG —2,040— BIK —520— DJJ	4,060	3.25	3.83	1.08	8.16	1.25 + 0.83 2.08	10.24	592,000	529,000	423,000	104.2
Jakarta	Banjarmasin	JKT —990— BDJ	990	2.67	-	-	2.67	-	2.67	193,000	172,000	138,000	139.4

Appendix 4.2.13 Estimate Procedures of Future Time Values (Rupiah/hour)

Items		1989	1995	2005	Remarks
$(G/P)_{(t)}$	(1)	1.00000	1.18008	1.49902	-
$(G/P)^{k}_{(t)}$	(2)	1.00000	1.12518	1.33422	K = 0.7123
TV89 x $(G/P)^{k}_{(t)}$	(3)	(1.5496)	1.7436	2.06751	TV89 = 1.5496 (1000 Rp./H)
loge $(1/tv)_{(t)}$	(4)	-0.4380	-0.5560	-0.7263	-

Appendix 4.2.14 Work Flow for the Determination of Trip Time & Trip Cost with "Dummy" by Mode & by Zone Pair



Appendix 4.2.15 (1) Airport Zone To & From Province Zone Air Passenger Traffic Share, 1989

	T.PINAN	P.BARU	G.SITOL	PALMBAN	SEMARAN	PONTIAC	SAMPIT	PLNKARY	TARAKAN	T.TORJA	PALU	GORNTAL	AMBON	TERNATE	MATARAM	BIMA	JAYAPUR	WAMENA	KAIMANA	MERAUKE	TOTAL
DI.ACEH	0.429792	0.363388	0.816337	0.565168	0.389578	0.697587	0.000000	0.000000	0.000000	0.087581	0.000000	0.228327	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SUM.UTA	0.285362	0.896144	0.881835	0.271774	0.525660	0.746236	0.339144	0.497728	0.000000	0.849325	0.682188	0.545397	0.000000	0.000000	0.195895	0.116671	0.000000	0.000000	0.000000	0.000000	0.000000
SUM.BAR	0.892884	0.851892	0.631854	0.865453	0.175560	0.650571	0.425948	0.571376	0.000000	0.084821	0.612420	0.193521	0.281332	0.174978	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
RIAU	0.818318	0.815034	0.893556	0.232515	0.196085	0.630259	0.654833	0.674931	0.000000	0.087672	0.000000	0.699347	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
JAMBI	0.842786	0.818857	0.813961	0.849223	0.853154	0.389383	0.000000	0.000000	0.000000	0.825701	0.000000	0.244315	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SUM.SEL	0.248645	0.126191	0.941663	0.122839	0.112378	0.449954	0.224963	0.338886	0.000000	0.034686	0.551353	0.416845	0.000000	0.000000	0.000000	0.000000	0.416375	0.215822	0.867889	0.167098	0.000000
BENGKUL	0.166161	0.087485	0.868204	0.023850	0.000000	0.100613	0.000000	0.000000	0.000000	0.069161	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
LAMPUNG	0.282000	0.428258	0.877999	0.836384	0.000000	0.090563	0.000000	0.000000	0.000000	0.003986	0.000000	0.152128	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
JAKARTA	0.402217	0.658333	0.233084	0.236786	0.175647	0.599655	0.175286	0.261706	0.385249	0.059225	0.629449	0.576086	0.842696	0.754732	0.497241	0.422483	0.877935	0.737277	0.425986	0.671969	0.000000
JAW.BAR	0.025141	0.094154	0.928864	0.033488	0.014279	0.146541	0.014721	0.029565	0.021436	0.006588	0.148872	0.163146	0.345665	0.226248	0.085549	0.054952	0.587658	0.283188	0.093225	0.221186	0.000000
JAW.TEN	0.025295	0.103794	0.831399	0.107174	0.002585	0.351364	0.041682	0.238682	0.299847	0.004688	0.000000	0.151514	0.322398	0.219915	0.051232	0.047696	0.681448	0.455098	0.182268	0.381763	0.000000
YOGCYA	0.237877	0.447743	0.353223	0.104728	0.000000	0.440987	0.021924	0.100614	0.867985	0.017499	0.398144	0.268278	0.438198	0.389696	0.584625	0.529108	0.951456	0.886135	0.673834	0.849653	0.000000
JAW.TIM	0.064033	0.254202	0.834719	0.231691	0.028579	0.434357	0.100358	0.580578	0.116932	0.018286	0.311188	0.183438	0.589666	0.394866	0.074383	0.084822	0.737688	0.526221	0.233189	0.455375	0.000000
BALI	0.438247	0.789359	0.297198	0.349781	0.948381	0.515819	0.539538	0.674315	0.836998	0.844254	0.388768	0.953541	0.591491	0.588882	0.382123	0.248448	0.872626	0.742498	0.458424	0.674636	0.000000
NT.BAR	0.000000	0.000000	0.089186	0.000000	0.027834	0.316926	0.000000	0.000000	0.534495	0.092223	0.000000	0.072996	0.000000	0.000000	0.151563	0.106402	0.158176	0.066428	0.021859	0.055196	0.000000
NT.TIM	0.000000	0.000000	0.000000	0.000000	0.238189	0.828771	0.283184	0.321856	0.952488	0.068522	0.000000	0.599893	0.558685	0.427564	0.641878	0.177878	0.000000	0.000000	0.000000	0.000000	0.000000
TIM.TIM	0.000000	0.000000	0.000000	0.000000	0.417613	0.522852	0.000000	0.000000	0.000000	0.063182	0.000000	0.614769	0.000000	0.000000	0.522939	0.235588	0.000000	0.000000	0.000000	0.000000	0.000000
KAL.BAR	0.133466	0.387871	0.134639	0.398208	0.286831	1.000000	0.517223	0.638633	0.235765	0.069888	0.219653	0.194692	0.000000	0.000000	0.408779	0.333731	0.000000	0.000000	0.000000	0.000000	0.000000
KAL.TEN	0.263686	0.548917	0.122528	0.389859	0.875178	0.728326	0.854174	0.189408	0.000000	0.098138	0.000000	0.138614	0.000000	0.000000	0.000000	0.000000	0.678978	0.469184	0.199928	0.394127	0.000000
KAL.SEL	0.336097	0.661845	0.143938	0.455711	0.895935	0.465427	0.155667	0.244644	0.225749	0.142984	0.215589	0.189744	0.000000	0.000000	0.654858	0.595335	0.000000	0.360000	0.000000	0.000000	0.000000
KAL.TIM	0.215569	0.498847	0.274831	0.648393	0.485946	0.592536	0.177783	0.269798	0.844578	0.849544	0.898295	0.185935	0.351615	0.884889	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SUL.UTA	0.345687	0.660634	0.158146	0.608319	0.489533	0.753569	0.635719	0.761277	0.296341	0.825295	0.173299	0.898951	0.368652	0.967288	0.233088	0.285946	0.917261	0.821239	0.567223	0.779316	0.000000
SUL.TEN	0.000000	0.000000	0.119569	0.467869	0.000000	0.196548	0.000000	0.000000	0.000000	0.022848	0.295517	0.863195	0.448976	0.093871	0.000000	0.000000	0.614989	0.429196	0.178868	0.359809	0.000000
SUL.SEL	0.197911	0.526492	0.088757	0.529761	0.155191	0.550283	0.396861	0.555296	0.263563	0.008278	0.217855	0.123742	0.425758	0.395734	0.059284	0.066268	0.897737	0.788812	0.529828	0.752615	0.000000
SUL.TGR	0.000000	0.000000	0.182298	0.599873	0.378872	0.759681	0.000000	0.000000	0.000000	0.013564	0.545666	0.454642	0.424158	0.371491	0.000000	0.000000	0.315317	0.170595	0.066784	0.147266	0.000000
MALUKU	0.000000	0.000000	0.000000	0.000000	0.289741	0.000000	0.000000	0.000000	0.000000	0.046596	0.491428	0.487116	0.323182	0.225832	0.000000	0.000000	0.659862	0.583961	0.291833	0.512557	0.000000
IRIAN	0.000000	0.000000	0.000000	0.471973	0.725469	0.000000	0.505634	0.643838	0.000000	0.382189	0.781988	0.889539	0.718368	0.691823	0.269729	0.225991	0.623898	0.377556	0.116682	0.263959	0.000000
TOTALL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Appendix 4.2.15 (2) Airport Zone To & From Province Zone Air Passenger Traffic Share (reproduced by model), 1989

	T.PINAN	P.BARU	G.SITOL	PALMBAN	SEMARAN	PONTIAC	SAMPIT	PLNKARY	TARAKAN	T.TORJA	PALU	GORNTAL	AMBON	TERNATE	MATARAN	BIMA	JAYAPUR	WAMENA	KAIMANA	MERAUKE	TOTAL
DI.ACEH	0.419280	0.353285	0.022528	0.553926	0.381241	0.675733	0.000000	0.000000	0.000000	0.015336	0.000000	0.221873	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SUM.UTA	0.197349	0.096383	0.001040	0.266811	0.514597	0.733846	0.329161	0.486869	0.000000	0.052156	0.673132	0.537358	0.000000	0.000000	0.187576	0.168745	0.000000	0.000000	0.000000	0.000000	0.000000
SUM.BAR	0.086384	0.053266	0.035834	0.068319	0.166565	0.638884	0.415492	0.574359	0.000000	0.087983	0.561273	0.185381	0.285228	0.165987	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
RIAU	0.020041	0.021798	0.093154	0.224677	0.187527	0.618549	0.643047	0.665861	0.000000	0.089269	0.000000	0.688612	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
JAMBI	0.040674	0.024680	0.019169	0.053878	0.050855	0.379065	0.000000	0.000000	0.000000	0.032485	0.000000	0.237259	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SUM.SEL	0.232549	0.123989	0.045853	0.114458	0.183768	0.439346	0.215668	0.328836	0.000000	0.037885	0.543804	0.409970	0.000000	0.000000	0.000000	0.000000	0.485983	0.214788	0.058744	0.169337	0.000000
BENGKUL	0.157257	0.086793	0.067887	0.027334	0.000000	0.096526	0.000000	0.000000	0.000000	0.013029	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
LAMPUNG	0.192849	0.417878	0.077269	0.041332	0.000000	0.098385	0.000000	0.000000	0.000000	0.011851	0.000000	0.144170	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
JAKARTA	0.391968	0.646546	0.229127	0.233337	0.166647	0.588111	0.169399	0.253872	0.375841	0.064118	0.618824	0.568688	0.845557	0.744812	0.487613	0.412038	0.873695	0.738493	0.418259	0.675748	0.000000
JAW.BAR	0.027284	0.095438	0.034171	0.038000	0.019103	0.143398	0.021797	0.032191	0.025974	0.013278	0.140053	0.155648	0.348043	0.217241	0.977084	0.946972	0.496787	0.289386	0.084933	0.222999	0.000000
JAW.TEN	0.027415	0.104464	0.036027	0.108826	0.000000	0.341351	0.046381	0.229261	0.294806	0.012178	0.000000	0.131232	0.328411	0.214112	0.947617	0.936524	0.678281	0.460265	0.175546	0.382986	0.000000
YOGCYA	0.227783	0.437181	0.348678	0.106483	0.000000	0.430790	0.026938	0.092588	0.854874	0.023930	0.388879	0.250811	0.443480	0.382894	0.573226	0.522598	0.937938	0.888765	0.661891	0.841833	0.000000
JAW.TIM	0.062966	0.252662	0.042121	0.235043	0.032788	0.430946	0.103795	0.569139	0.110877	0.025032	0.301488	0.894985	0.512680	0.386852	0.868182	0.876671	0.725479	0.538984	0.225243	0.468586	0.000000
BALI	0.437448	0.712975	0.383345	0.355148	0.845845	0.514359	0.544251	0.662419	0.839867	0.051864	0.378785	0.951832	0.593419	0.513774	0.293866	0.242026	0.875217	0.745842	0.447763	0.698345	0.000000
NT.BAR	0.000000	0.000000	0.017081	0.000000	0.035012	0.321472	0.000000	0.000000	0.539183	0.009821	0.000000	0.072954	0.000000	0.000000	0.148167	0.098236	0.157222	0.073767	0.024026	0.062883	0.000000
NT.TIM	0.000000	0.000000	0.000000	0.000000	0.226632	0.831745	0.209825	0.311234	0.954529	0.075997	0.000000	0.587683	0.547496	0.432895	0.629349	0.169758	0.000000	0.000000	0.000000	0.000000	0.000000
TIM.TIM	0.000000	0.000000	0.000000	0.000000	0.489955	0.526848	0.000000	0.000000	0.000000	0.078745	0.000000	0.683228	0.000000	0.000000	0.512189	0.229865	0.000000	0.000000	0.000000	0.000000	0.000000
KAL.BAR	0.126232	0.377963	0.137889	0.385585	0.278846	0.994008	0.508391	0.626955	0.227665	0.073582	0.218389	0.187133	0.000000	0.000000	0.398496	0.325785	0.000000	0.000000	0.000000	0.000000	0.000000
KAL.TEN	0.254082	0.538786	0.126808	0.381784	0.871963	0.708121	0.854178	0.189488	0.000000	0.092845	0.000000	0.138381	0.000000	0.000000	0.000000	0.000000	0.667851	0.474225	0.198826	0.393937	0.000000
KAL.SEL	0.326185	0.649327	0.147942	0.469877	0.895166	0.461217	0.154433	0.235328	0.225476	0.148044	0.207626	0.188658	0.000000	0.000000	0.645152	0.584388	0.000000	0.000000	0.000000	0.000000	0.000000
KAL.TIM	0.288899	0.488526	0.272866	0.644438	0.395578	0.581758	0.168786	0.268876	0.849021	0.054148	0.092896	0.176888	0.356748	0.888585	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SUL.UTA	0.336431	0.658995	0.148823	0.593099	0.399137	0.745402	0.626375	0.749184	0.293783	0.032092	0.165318	0.089552	0.368543	0.867280	0.223762	0.197169	0.915266	0.826183	0.558193	0.772444	0.000000
SUL.TEN	0.000000	0.000000	0.126598	0.472286	0.000000	0.282221	0.000000	0.000000	0.000000	0.029853	0.286508	0.861591	0.454287	0.897736	0.000000	0.000000	0.685176	0.412787	0.169878	0.365557	0.000000
SUL.SEL	0.189302	0.517897	0.093285	0.533345	0.146411	0.539199	0.386963	0.544088	0.254256	0.087422	0.287882	0.115859	0.431885	0.385417	0.053077	0.058179	0.896229	0.791129	0.519526	0.756081	0.000000
SUL.TGR	0.000000	0.000000	0.189147	0.595842	0.370084	0.759183	0.000000	0.000000	0.000000	0.019894	0.534588	0.444714	0.629827	0.378121	0.000000	0.000000	0.387593	0.177493	0.058352	0.154184	0.000000
MALUKU	0.000000	0.000000	0.000000	0.000000	0.282417	0.000000	0.000000	0.000000	0.000000	0.049588	0.433654	0.399359	0.324453	0.215746	0.000000	0.000000	0.647953	0.498193	0.282615	0.585089	0.000000
IRIAN	0.000000	0.000000	0.000000	0.464247	0.713257	0.000000	0.494743	0.633646	0.000000	0.372166	0.692581	0.876278	0.711369	0.688486	0.268168	0.217868	0.688345	0.374526	0.188839	0.268245	0.000000
TOTALL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (1)

1. Tanjung Pinang

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995					2004					
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Pekanbaru	32,900	50,200	810	1,240			16					20					20			
Jakarta	29,900	45,600	740	1,130			14					18					18			
P.Pinnang	22,800	33,400	540	820			8					14						22		
Tg.B.Kalimun	7,000	10,600	170	260				8					12						18	
Singkep	5,000	7,600	120	190				4					8						14	
Batam	3,000	4,600	70	110				6					6						8	
Total	99,800	152,000	2,450 (350)	3,750 (540)	0	0	38 (6)	18 (2)	0	0	0	52 (8)	26 (4)	0	0	0	38 (6)	22 (4)	40 (6)	0

2. Pekanbaru

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995					2004					
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Jakarta	196,300	297,100	4,550	6,890		32					72					66				
Batam	83,400	126,300	1,930	2,930		12					30						50			
Medan	58,900	89,100	1,360	2,060		18					22						34			
Tg.Pinang	44,200	66,900	1,020	1,550			14					24					26			
Rengat	24,500	37,100	570	860				20					38					22		
Padang	19,600	29,700	450	690		6					8						12			
Palembang	19,600	29,700	450	690		8					8						12			
Tg.B.Kalimun	14,700	22,300	340	520				14					22						38	
Melaka	5,100	7,500	120	170				2					8						12	
Singapore	24,500	37,100	570	860		8					8						14			
Total	490,800	742,800	11,360 (1,630)	17,220 (2,460)	0	84 (12)	14 (2)	36 (6)	0	0	148 (22)	24 (4)	68 (10)	0	0	66 (10)	148 (22)	22 (4)	50 (8)	0

Note: ( ) indicates design day traffic.

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (2)

3. Gunung Sitoli

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Medan	13,500	20,500	310	470				24					24						34	
Total	13,500	20,500	310 (45)	470 (70)	0	0	0	24 (4)	0	0	0	0	24 (4)	0	0	0	0	0	34 (4)	0

4. Palembang

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Jakarta	493,100	763,700	11,800	17,020	84		10			112	40				56	68				
Jambi	60,700	94,000	1,350	2,090		14					22						36			
P.Pinang	60,700	94,000	1,350	2,090		14					22						36			
Padang	45,500	70,500	1,010	1,570	14					14						14				
Bengkulu	22,800	35,200	510	780		14					14						14			
Bandung	22,800	35,200	510	780			14					14						28		
Batam	15,200	23,500	340	520			12					12						14		
Tg.Pandang	15,200	23,500	340	520			6					8						14		
Pekanbaru	7,600	11,800	170	260		8					8						8			
Dumai	7,600	11,800	170	260			8					8						8		
Rengat	7,400	11,700	160	260			6					6						8		
Total	758,600	1,174,900	16,910 (2,420)	26,150 (3,740)	98 (14)	50 (8)	56 (8)	0	0	126 (18)	106 (16)	48 (6)	0	0	56 (8)	82 (12)	94 (14)	64 (10)	0	0

Note: ( ) indicates design day traffic.

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (3)

5. Semarang

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995					2004					
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Jakarta	497,900	732,000	11,430	16,800		118	28				180				42	90				
Surabaya	113,800	167,300	2,610	3,840		28					40						64			
Pangkalan Bun	49,800	73,200	1,140	1,680				38				28	14					44		
Banjarmasin	28,500	41,800	650	960			14					20						24		
Bandung	21,300	31,400	490	720			10					14						18		
Total	711,300	1,045,700	16,320	24,000	0	146	52	38	0	0	220	62	14	0	42	90	64	86	0	0
			(2,330)	(3,430)		(20)	(8)	(6)			(32)	(8)	(2)		(6)	(12)	(10)	(12)		

6. Pontianak

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995					2004					
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Jakarta	370,000	529,500	9,330	13,350		60	72				112	64				128				
Ketapang	33,200	47,500	840	1,200				16	46				28	56				32		
Balikpapan	19,000	27,200	480	690		10					10						12			
Sintang	14,200	20,400	360	510				8	18				14	20					36	
Batam	14,200	20,400	360	510		4					6						8			
Putusibau	9,500	13,600	240	340					20					32				24		
Pangkalan Bun	9,500	13,600	240	340					10					32				24		
Nangapinoh	4,700	6,600	120	170					8					16						24
Singapore	16,000	24,000	400	600		6					6						10			
Kuching	4,000	6,000	100	150			2					4						4		
Total	494,300	708,800	12,470	17,860	0	80	74	26	102	0	134	68	42	156	0	128	30	84	36	24
			(1,780)	(2,560)		(12)	(10)	(4)	(14)		(20)	(10)	(6)	(22)		(18)	(4)	(6)	(12)	(4)

Note: ( ) indicates design day traffic.

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (4)

7. Sampit

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Banjarmasin	52,800	79,900	1,220	1,850				26	54				42	78				28	56	
Palangkaraya	31,900	48,200	740	1,120				16	24				28	42				14	42	
Pangkalan Bun	12,900	19,600	300	450					24					40					32	
Kuala Pumbuang	2,000	3,000	50	70										6						10
Total	99,600	150,700	2,310	3,490	0	0	0	42	102	0	0	0	70	166	0	0	0	42	130	10
			(330)	(500)				(6)	(14)				(10)	(24)				(6)	(18)	(2)

8. Palangkaraya

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Banjarmasin	54,700	80,400	1,200	1,760			12	4	50			14	14	70			14	24		
Jakarta	50,700	74,500	1,110	1,630		16					22						28			
Sampit	30,400	44,700	660	980				14	28				28	32				14	32	
Balikpapan	24,300	35,700	530	780		14					14						14			
Pangkaran Bun	22,300	32,800	490	720				14	2				28	10				8	30	
Muara Tewe	12,200	17,900	270	390					16				18						28	
Buntok	8,100	11,800	180	260					14					24					18	
Total	202,700	297,800	4,440	6,520	0	30	12	32	110	0	36	14	88	136	0	0	56	46	108	0
			(630)	(930)		(4)	(2)	(4)	(16)		(6)	(2)	(12)	(20)			(8)	(6)	(16)	

Note: ( ) indicates design day traffic.

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (5)

9. Tarakan

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995					2004					
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Balikpapan	80,200	116,500	2,020	2,940			40	4				56	8				50			
Kalimarau	19,800	28,700	500	720				14	14				28	10				14	12	
Tawau	4,400	6,400	110	160					6					14						22
Longbawan	3,300	4,800	80	120				8					8						8	
Nunukan	2,100	3,200	50	80										6						12
Total	109,800	159,600	2,760 (390)	4,020 (570)	0	0	40 (6)	26 (4)	20 (2)	0	0	56 (8)	44 (16)	30 (4)	0	0	50 (8)	14 (2)	20 (2)	34 (4)

10. Tana Toraja

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995					2004					
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
U.Pandang	13,400	20,000	440	660				14					30						48	
Total	13,400	20,000	440 (65)	660 (100)	0	0	0	14 (2)	0	0	0	0	30 (4)	0	0	0	0	0	48 (6)	0

Note: ( ) indicates design day traffic.

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (6)

11. Palu

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
U.Pandang	118,800	180,000	2,960	4,490		22	30				28	34					42	52		
Balikpapan	41,800	63,300	1,040	1,580			14					30					26			
Gorontalo	30,800	46,700	770	1,170			14					22						30		
Toli Toli	13,200	20,000	330	500				14	8				22						36	
Poso	8,800	13,300	220	330					6				14						24	
Luwuk	6,600	10,100	160	250					16					22					18	
Total	220,000	333,400	5,480	8,320	0	22	58	14	30	0	28	86	36	22	0	0	68	82	78	0
			(780)	(1,190)		(4)	(8)	(2)	(4)		(4)	(12)	(6)	(4)			(10)	(12)	(12)	

12. Gorontalo

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Manado	51,700	73,500	1,260	1,790			32	2				38					30			
Palu	27,800	39,600	680	970			20					20						25		
Total	79,500	113,100	1,940	2,760	0	0	52	2	0	0	0	58	0	0	0	0	30	25	0	0
			(280)	(390)			(8)					(8)					(4)	(4)		

Note: ( ) indicates design day traffic.

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (7)

13. Ambon

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
U.Pandang	111,400	159,700	2,750	3,940		36	4				42	4				28	26			
Sorong	21,500	30,800	530	760		14					14						14			
Ternate	19,600	28,000	480	690			14					14						18		
Biak	17,600	25,200	430	620		14					14						14			
Langgur	11,700	16,800	290	410				16					20						30	
Mongole	3,900	5,600	100	140				8					8						10	
Sanana	3,900	5,600	100	140				4					6						10	
Bandanaira	3,900	5,600	100	140				4					6						10	
Namlea	2,000	2,800	50	70				2					4						6	
Total	195,500	280,100	4,830 (690)	6,910 (940)	0	64 (10)	18 (2)	34 (4)	0	0	70 (10)	18 (2)	44 (6)	0	0	28 (4)	54 (8)	18 (2)	66 (10)	0

14. Ternate

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Manado	40,100	58,300	980	1,420			22	16				28	2					36		
Ambon	17,300	25,200	420	620			14					14						16		
Gebe	7,100	10,300	170	250				6					12						18	
Galela	5,500	8,000	130	200				8					8						14	
Kao	3,100	4,600	80	110				4					6						8	
Labuha	2,400	3,400	60	80				4					4						6	
Sanana	2,400	3,400	60	80				4					4						6	
Marotai	700	1,200	20	30				2					2						2	
Total	78,600	114,400	1,920 (270)	2,790 (400)	0	0	36 (6)	44 (6)	0	0	0	42 (6)	38 (6)	0	0	0	0	52 (8)	54 (8)	0

Note: ( ) indicates design day traffic.

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (8)

15. Mataram

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995					2004					
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Denpasar	156,000	221,700	3,730	5,300			38	50			28	28	52				90			
Surabaya	65,000	92,400	1,550	2,210		14					24						38			
Bima	26,000	37,000	620	880			14	2				14	2					22		
Sumbawa	13,000	18,400	310	440				4					20						32	
Total	260,000	369,500	6,210	8,830	0	14	52	56	0	0	52	42	74	0	0	0	128	22	32	0
			(890)	(1,260)		(2)	(8)	(8)			(8)	(6)	(10)				(18)	(4)	(4)	

16. Bima

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995					2004					
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Mataram	34,300	49,400	830	1,190			14					20						30		
Danpasar	22,600	32,500	550	790			12	6				12	6					20		
Ruteng	12,600	18,200	300	440			6	6				6	6					12		
Labuhan Bajo	7,200	10,400	170	250				12					12						18	
Maumere	5,400	7,800	130	190			6					6						6		
Tambolaka	3,600	5,200	90	130				4					6						10	
Bajawa	2,700	3,900	70	100				4					4						8	
Ende	1,900	2,600	50	60				6					6						6	
Total	90,300	130,000	2,190	3,150	0	0	38	38	0	0	0	44	40	0	0	0	0	68	42	0
			(310)	(450)			(6)	(6)				(6)	(6)					(10)	(6)	

Note: ( ) indicates design day traffic.

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (9)

17. Jayapura

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Biak	90,900	128,200	2,270	3,200	14	6	4			14	14	18				30				
Wamena	42,700	60,200	1,070	1,500			32	4				32						38		
Merauke	22,300	31,400	560	780		8					8						14			
Timika	14,800	20,900	370	520		8					8						8			
Nabire	11,100	15,700	280	390			6					8						10		
Sarmi	1,900	2,600	50	70				2					4						6	
Tana Merah	1,800	2,600	40	70				2					2						6	
Total	185,500	261,600	4,640 (660)	6,530 (930)	14 (2)	22 (4)	42 (6)	8 (2)	0	14 (2)	30 (4)	58 (8)	6 (2)	0	0	30 (4)	22 (4)	48 (6)	12 (2)	0

18. Wamena

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)																
					1990 (Actual)					1995					2004						
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Jayapura	53,400	76,800	1,430	2,050			26	20				28	32					54		
Oksibil	2,600	3,700	70	100				2					4						8	
Karubaga	2,600	3,700	70	100				2					4						8	
Kelia	1,900	2,800	50	80				2					4						6	
Bokondini	1,900	2,800	50	80				2					4						6	
Tiom	1,800	2,700	50	70				2					4						6	
Total	64,200	92,500	1,720 (250)	2,480 (350)	0	0	26 (4)	30 (4)	0	0	0	28 (4)	52 (8)	0	0	0	0	54 (8)	34 (4)	0

Note: ( ) indicates design day traffic.

Appendix 4.3.1 Future Weekly Passengers and Aircraft Movements (10)

19. Kaimana

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995						2004				
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Fak Fak	6,700	10,000	170	250				8					12						18	
Nabire	5,000	7,600	120	190				6					8						14	
Timika	900	1,300	20	30				2					2						2	
Total	12,600	18,900	310 (45)	470 (70)	0	0	0	16 (2)	0	0	0	0	22 (4)	0	0	0	0	0	34 (4)	0

20. Merauke

Route	Annual Passengers		Weekly Pax. in Peak Month		Aircraft Movements (Flights/Week)															
					1990 (Actual)					1995						2004				
	1995	2004	1995	2004	MJ	SJ	SJ	Stol	LA	MJ	SJ	SJ	Stol	LA	A300	MJ	SJ	SP	Stol	LA
Jayapura	23,800	34,800	610	900		8					12						16			
Bade	3,300	4,900	90	130				4					6						10	
Tana Merah	2,200	3,300	60	90				2					4						6	
Senggo	1,900	2,700	50	70				2					4						6	
M.Tanah	1,500	2,200	40	60				2					2						4	
Kepi	1,500	2,200	40	60				2					2						4	
Kimam	1,500	2,100	40	60				2					2						4	
Okaba	1,500	2,100	40	60				2					2						4	
Total	37,200	54,300	970 (140)	1,430 (200)	0	8 (2)	0	16 (2)	0	0	12 (2)	0	22 (4)	0	0	0	16 (2)	0	38 (6)	0

Note: ( ) indicates design day traffic.