4.3 *Construction Schedule*

4.3.1 Construction Schedule and Construction Methods

142. The construction schedule, arrangement and methods of works of each terminal have been determined in accordance with the planned scope and type of works required for development and construction of the ferry terminal.

143. Main assumptions given to the key works of construction schedule are as follows.

1) Revetment and Slope Protection
- Ability of rockwork and stone work: 100m^3/day

2) Reclamation / Land Filling
- Ability of transportation of sand from quarry: 7 - 8m^3/truck.
- Distance between construction site and quarry site: within 5km.
- Mobilization: 10 trucks to be mobilized x 7hours/day
- Ability of land filling work: 500m^3/day

3) Construction of Berth
- Ability of pile drive works is set as 2 - 3Nos./day/unit.
- Ability of reinforced concrete structures works is set as 200 - 300m^3/month.

4) Movable Bridge
- Fabrication of movable bridge requires at least a period of one year after placement of order.
- Installation and test operation of movable bridge is scheduled after completion of berth construction.

The construction schedules for each route in relation to the methods are described as follows.

4.3.2 Surabaya – Banjarmasin Route

144 Table 4.3.1(1) shows the planned construction schedule of ferry terminals of Surabaya – Banjarmasin route.

(1) Surabaya terminal

145. The land development will be carried out by reclamation works. At the same time, the water way of 5m depth and 50m width for movements of piling barge of foundation works of access bridge will be made by dredging. Grab dredger or cutter suction dredger will be used for a period of 10 months.

146. The piling works for detached pier and mooring dolphins are started in the third month after mobilization and proceed to the piling works of detached platform. After completion of waterway by dredging, piling works for foundation of access bridge will be carried out by additional pile driving equipment.

147. The concrete works for of the mooring dolphins, detached piers and platform will be started when the piling works thereof are progressed about 30% The abutment concrete of access bridge will be started when piling is completed at each abutment. The concrete mixing plant will be established on the land.

148 The 200 pieces of P.C. beams will be fabricated at site or manufacturer available in Surabaya area. They will be delivered to the site according to the progress of abutment concrete works. The P.C. beam will be installed by 2 mobile cranes with 80 tons' capacity carried on a 1,000 ton barge on which P.C. beams are stockpiled. The period of installation of P.C. beams is estimated at about 21 months.

149. While the reclamation works of the land area are in progress for 6 months, the causeway construction is started from the land. The surface layer of soft soil of mudflat will be excavated in the depth of –5.0m and 50m in width over a length of 800m. The volume is estimated at some 990,000m^3. The filling material for the foundation of causeway, fine sand, is used for the replacement of excavated soft material.

150. While the concrete works of detached platform is in progress around 18 months from commencement of the works, the overhead passenger waiting hall with passengers access bridge is constructed. The assembling of movable bridge materials will be started at site in 14 months of starting work and the installation of movable bridge will be completed in a 12 month period.

151. When the concrete works of detached pier is completed, the pile foundation of passengers access bridge is installed and steel framing of upper structure is prefabricated on the land area and placed on the foundation. Passenger boarding bridge is installed

when the upperstructure of the access bridge is placed in the position.

152. When the reclamation work with specified compression on the ground is completed, the sub-base, base course of gravel stones for foundation of pavement works by heavy roller compactors along with the drainage works is progressed parallel to construction of all the building works and utility supply system. At the same time, the construction of access road from the terminal area to the national road will be progressed and completed within 32 months.

(2) Banjarmasin terminal

153. It is assumed that the Surabaya - Banjarmasin route will be developed by one packaged contract and one contractor. The piling works for mooring facilities at Surabaya is completed, which are estimated to be completed in about 1 year from commencement of works at Surabaya. The piling works will be started from the landing deck foundation, then to mooring dolphins by the pile driving barge is 1,000 ton capacity.

154. The dredging for removal of surface soft soil in depth of -5m and 50m width at the retaining wall construction area will be started about 1 year after the contract is signed, and completed in 3 months by grab dredgers of $5m^3$ capacity. Subsequently, the steel pile driving for retaining wall is proceeded by the same equipment. All the piling works will be completed in one year's time.

155. The concrete works for dolphins, landing deck will be started and progressed in parallel to the piling works. The concrete works for coping of retaining wall is started after the anchor piles are driven from the land by mobilize crane [K 35 type diesel hammer]. The area for placement of tie-rod is excavated by grab excavator. After the concrete works of coping part is completed, the back filling by borrow material from the mountain is placed and covered by rip rap stones and armor stones for protection from scoring by river flow. These marine works will be completed in an 18 month period.

156. The grading and leveling of existing land for preparatory works of terminal area is started 12 months after commencement of work. The foundation work of terminal building is started and subsequent building works with utility supply system will be carried out. The compaction work to obtain specified compression for sub-base and base course for pavement foundation shall be carried out.

157. When the concrete work for foundation of movable bridge on landing deck is completed in 4 months, which will be around 18 months after commencement of works, meantime the fabrication of steel members of movable bridge will be progressed and delivered piece by piece to site when the concrete work thereof is completed. The movable bridge is assembled at site for 6 months and installed in position for 3 months.

158. The yearly expenditure of construction costs of the main items of the facilities with the respective quantities are shown in Table 4.3.1(2) along the planned construction schedule.

Table 4.3.1(1) Construction Schedule of Ferry Terminal
(Surabaya - Banjarmasin route)

Work Item	Year / Month	2001 1-3	2001 4-6	2001 7-9	2001 10-12	2002 1-3	2002 4-6	2002 7-9	2002 10-12	2003 1-3	2003 4-6	2003 7-9	2003 10-12	2004 1-3	2004 4-6	2004 7-9	2004 10-12
1. Mobilization	Surabaya																
	Banjarmasin																
2. Dredging	Surabaya																
	Banjarmasin																
3. Access Bridge / Trestle	Surabaya																
	Banjarmasin																
4. Detached Pier	Surabaya																
	Banjarmasin																
5. Detached Platform	Surabaya																
Landing Deck	Banjarmasin																
6. Breasting Dolphin	Surabaya																
	Banjarmasin																
7. Mooring Dolphin	Surabaya																
	Banjarmasin																
8. Bow Bresting Dolphins	Surabaya																
	Banjarmasin																
9. Movable Bridge Fabrication	Surabaya																
Installation / Test	Banjarmasin																
10. Movable Bridge	Surabaya																
Foundation Works	Banjarmasin																
11. Catwalks	Surabaya																
	Banjarmasin																
12. Causeway /	Surabaya																
Retaining Wall	Banjarmasin																
13. Land-filling and Pavement	Surabaya																
	Banjarmasin																
14. Building / Landscaping /	Surabaya																
Utility Supplies	Banjarmasin																
15. Demobilization	Surabaya																
	Banjarmasin																

Table 4.3.1(2) Yearly Construction Cost of Ferry Terminal (Surabaya - Banjarmasin Route)

Direct Construction Cost 361,933,201 (Unit: 1,000 Rp.)		2000		2001				2002				2003			
				Construction Cost		Labour Cost				Labour Cost				Labour Cost	
		Local	Foreign	Local	Foreign	Skilled	Unskilled	Local	Foreign	Skilled	Unskilled	Local	Foreign	Skilled	Unskilled
1. Mobilization	Surabaya			3,677,906	2,642,978	73,558	110,337								
	Banjarmasin			620,806	537,877	31,040	18,624								
2. Dredging	Surabaya			12,678,241	3,627,495	0	99,120	12,678,241	3,627,495	0	99,120				
	Banjarmasin							495,570	141,838	2,990	0				
3. Access Bridge / Trestle	Surabaya			18,752,505	14,706,872	40,791	34,121	56,257,514	44,120,617	122,373	102,363	23,440,631	18,383,590	50,989	42,651
	Banjarmasin														
4. Landing Deck	Surabaya							5,078,577	6,028,986	37,381	36,083				
	Banjarmasin														
5. Landing Platform	Surabaya							14,113,996	14,918,186	103,835	99,521	17,250,440	18,233,339	126,909	121,636
	Banjarmasin							767,501	750,597	5,144	4,763	2,302,503	2,251,791	15,432	14,288
6. Breasting Dolphin	Surabaya														
	Banjarmasin											1,068,727	1,383,906	8,083	7,805
7. Mooring Dolphin	Surabaya											503,813	546,968	3,083	2,901
	Banjarmasin											171,829	140,765	1,308	1,289
8. Bow Bresting Dolphins	Surabaya														
	Banjarmasin											235,566	528,013	1,650	1,560
9. Movable Bridge Fabrication	Surabaya							146,892	242,800	2,353	2,653	807,908	1,335,400	12,943	14,591
Installation and Test	Banjarmasin							140,832	234,287	2,256	2,544	774,578	1,288,578	12,410	13,991
10. Movable Bridge	Surabaya							575,090	602,461	4,297	4,140	575,090	602,461	4,297	4,140
Foundation Works	Banjarmasin							454,725	382,884	3,768	3,775	454,725	382,884	3,768	3,775
11. Catwalks	Surabaya											29,400	12,600	470	529
	Banjarmasin											105,000	45,000	1,680	1,890
12. Causeway /	Surabaya							5,101,203	479,946	3,314	18,046	6,801,605	639,928	4,419	24,061
Retaining Wall	Banjarmasin											5,792,435	5,721,655	19,850	10,311
13. Land-filling and Pavement	Surabaya			474,682	82,343	2,104	2,508	1,898,727	329,372	8,417	10,030	1,265,818	219,581	5,611	6,687
	Banjarmasin							500,809	126,373	2,395	2,471	2,003,235	505,491	9,578	9,884
14. Building / Landscaping /	Surabaya							420,380	262,189	6,860	11,054	5,044,560	3,146,271	82,321	132,652
Utility Supplies	Banjarmasin							839,035	563,065	14,382	25,771	2,517,105	1,689,195	43,146	77,312
15. Demobilization	Surabaya											1,838,953	1,321,489	36,779	55,169
	Banjarmasin											310,403	268,939	15,520	9,312
Direct Construction Cost				36,195,054	21,592,145			99,444,129	72,792,822			73,275,928	58,633,125		
Engineering Fee		8,686,397	5,790,931	2,895,466	1,930,310			2,895,466	1,930,310			2,895,466	1,930,310		
Physical Contingency		868,640	579,093	3,909,052	2,352,245			10,233,959	7,472,313			7,617,139	6,056,343		
VAT		955,504	637,002	4,299,957	2,587,470			11,257,355	8,219,545			8,378,853	6,661,978		
Grand Total		10,510,540	7,007,027	47,299,528	28,462,170			123,830,910	90,414,990			92,167,387	73,281,756		

4.3.3 Selayar - Labuhan Bajo Route

159. Table 4.3.2(1) shows the planned construction schedule of ferry terminals of Selayar – Labuhan Bajo route.

(1) Selayar terminal

160. The mobilization of heavy equipment of piling works road construction, excavator, bulldozers and material will be made from sea side by barges [1,000 ~ 2,000 ton] and transported from Ujung Pandang. The access road from Benteng [capital city of Selayar Island] is not wide enough for use by such a heavy truck.

161. The land is developed by leveling on the existing land area and reclamation with borrowed mountain soil.

162. The causeway is constructed from the land by placement of same material as used for reclamation works. The revetment for reclaimed land and causeway is provided with rip rap stones, and armor stones covered thereon.

163. The piling works will be started form the sea, by mobile hammer of K 35 type diesel hammer on barge. At the same time cutter suction dredger 1,500 ~ 2,000HP capacity will be mobilized and dredging works will progress from the turning basin area to the entrance of channel. The dredged material of about 99,000 m^3 will be deposited on the existing land behind the mangrove area.

164. When the concrete works of trestle and movable bridge foundation is completed, the pieces of steel member of movable bridge are delivered to site around 12 months from commencement of works and assembled for installation. The concrete works of abutment of movable bridge foundation is completed. The movable bridge is installed in position by using mobile crane.

165. After the piping for hydraulic operational is installed, the necessary trial operational training is provided over a one month period for both terminals.

166. The foundation of building works and pavement works will be progressed immediately after completion of reclamation works. The whole of works is estimated to be completed in 2 years time.

(2) Labuhan Bajo terminal

167. It is assumed that, this terminal is constructed as part of the same Selayar – Labuhan Bajo route construction package.

168. The mobilization of heavy equipment to this site will be made from Java Island through the ferry.

169. The contractor will start demolition of existing dolphins, immediately after mobilization, by cutting from concrete parts of dolphins to pieces and pile foundation at the level of sea bed. Then the piling works for new dolphins will be started around the 6th month of works.

170. The land development will be progressed from the land to the sea side by reclamation and the existing parking area is leveled and reinforced by specified compression. The passenger terminal building is expanded at a separate place on the reclaimed land.

171. When piling works for new dolphin are completed, the concrete works, the reinforcement of existing movable bridge shoes, grating and hydraulic operation unit will be carried out.

172. The construction works by cooperating with Patumbukan will be completed in a two year period.

173. The yearly expenditure of construction costs of the main items of the facilities with the respective quantities are shown in Table 4.3.2(2) along the planned construction schedule.

Table 4.3.2(1) Construction Schedule of Ferry Terminal
(Selayar - Labuhan Bajo route)

Work Item	Year / Month	2002				2003				2004			
		1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12
1. Mobilization / Demobilization	Labuhan Bajo												
	Selayar												
2. Demolition of Existing Dolphins	Labuhan Bajo												
3. Dredging	Selayar												
4. Site Clearance and Grading	Labuhan Bajo												
	Selayar												
5. Access Road	Labuhan Bajo												
	Selayar												
6. Trestle	Labuhan Bajo												
	Selayar												
7. Berth Construction	Labuhan Bajo												
	Selayar												
8. Movable Bridge Foundation Works	Labuhan Bajo												
	Selayar												
9. Movable Bridge Fabrication and Installation / Test	Labuhan Bajo												
	Selayar												
10. Causeway and/or Revetment	Labuhan Bajo												
	Selayar												
11. Land-filling and Pavement Works	Labuhan Bajo												
	Selayar												
12. Building/Landscaping Utility Supply	Labuhan Bajo												
	Selayar												

Table 4.3.2(2) Yearly Construction Cost of Ferry Terminal (Selayar - Labuhan Bajo route)

Direct Construction Cost 33,479,693 (Unit: 1,000 Rp.)		2000 - 2001		2002				2003			
				Construction Cost		Labour Cost		Construction Cost		Labour Cost	
		Local	Foreign	Local	Foreign	Skilled	Unskilled	Local	Foreign	Skilled	Unskilled
Mobilization / Demobilization	Labuhan Bajo			458,408	357,480	9,168	10,724				
	Selayar			982,571	686,725	19,651	29,477				
Demolition of Existing Dolphins	Labuhan Bajo			15,800	9,000	316	270				
Dredging	Selayar			3,934,212	1,120,226	14,880	0				
Rehabilitation of Existing Landing Jetty	Labuhan Bajo			8,440	1,560	169	47				
	Selayar										
Access Road	Labuhan Bajo										
	Selayar			54,000	36,000	1,080	1,620	54,000	36,000	1,080	1,620
Trestle	Labuhan Bajo										
	Selayar			1,041,659	616,021	8,806	8,445				
Berth Construction	Labuhan Bajo			1,865,389	1,867,104	12,348	12,831				
	Selayar			2,002,414	2,475,745	12,181	11,354				
Movable Bridge Foundation Works	Labuhan Bajo										
	Selayar							864,786	717,951	5,444	5,002
Movable Bridge Fabrication and Installation / Test	Labuhan Bajo										
	Selayar			329,592	572,288	5,274	5,934	329,592	572,288	5,274	5,934
Causeway and/or Revetment	Labuhan Bajo			290,167	76,483	-	1,417				
	Selayar			420,058	103,292	93	1,168				
Land-filling and Pavement Works	Labuhan Bajo			1,455,111	1,154,346	22,689	26,353				
	Selayar			691,521	685,615	7,540	5,027				
Building/Landscaping	Labuhan Bajo			349,198	214,952	6,984	10,476	1,745,992	1,074,758	34,920	52,380
Utility Supply	Selayar							2,530,308	1,598,643	50,606	75,910
Navigation Aids	Selayar							30,000	50,000	600	900
Direct Construction Cost				13,898,540	9,976,837	121,179	125,143	5,554,678	4,049,640	97,924	141,746
Engineering Fee		1,004,391	669,594	502,195	334,797			502,195	334,797		
Physical Contingency		100,439	66,959	1,440,074	1,031,163			605,687	438,444		
VAT		110,483	73,655	1,584,081	1,134,280			666,256	482,288		
Grand Total		1,215,313	810,209	17,424,890	12,477,077			7,328,816	5,305,169		

4.3.4 Wahai - Babang route

174. Table 4.3.3(1) shows the planned construction schedule of ferry terminals of Wahai – Babang route. It is assumed that these two terminals will be developed under the same package.

175. The mobilization of heavy equipment and material will be made from the sea side, since the access road from the Ambon to Wahai is narrow, mountainous and hilly, which is not easy for heavy loaded truck to negotiate.

176. The Contractor will start the land development on the submerged area at Wahai terminal first. The causeway construction at Wahai is progressed on the submerged area from the land at low water time. After completion of reclamation works at Wahai, necessary equipment is delivered to Babang site for development of terminal land on submerged area thereto.

177. At the same time, the piling works proceed from trestle to movable bridge foundation, dolphin foundation at Wahai site.

178. Immediately after piling works are completed at each structure, the concrete work is proceeded by portable concrete mixing butcher plant [1.0 ~ 1.5m^3/one butching].

179. After completion of piling work at Wahai about 8 months after commencement of works, the piling work equipment will be mobilized to Babang site.

180. The piling work at Babang will be started from trestle foundation, bow breasting dolphin, landing deck and dolphin structure and completed in 14 months from the time the contract is signed.

181. The concrete work at Babang will be started immediately after the piling work is completed by similar equipment 1.5m^3 batching plant as Wahai, which is supplied independently to Babang.

182. The concrete work of landing deck of Wahai will be completed in 17 months, and at Babang will be 14 months.

183. The concrete works at bow breasting dolphin will be carried out at LWS time which will required about 2 months for installation of fender.

184. The fabricated material for movable bridge will be delivered to Wahai site within 12 months of signing the contract and assembled in 6 months and installed here in 3 months time while it is expected that the landing deck concrete work at Babang will be completed in 14 months. The fabricated material for movable bridge is delivered to Babang, for assembly and installation.

185. The building works, pavement work and utility supply system work begin 10 months after signing the contract at both terminals independently.

186. The works at Wahai are expected to be completed in around a 20 months period. Works at Babang require a 24 month period by trial operation of movable bridge respectively.

187. The access road for Babang terminal from existing national road is developed at the beginning stage of works, when the site clearance of reclamation work for terminal site is completed.

188. The yearly expenditure of construction costs of the main items of the facilities with the respective quantities are shown in Table 4.3.3(2) along the planned construction schedule.

Table 4.3.3(1) Construction Schedule of Ferry Terminal
(Wahai - Babang route)

	Year	2002				2003				2004			
	Month	1 - 3	4 - 6	7 - 9	10 - 12	1 - 3	4 - 6	7 - 9	10 - 12	1 - 3	4 - 6	7 - 9	10 - 12
1. Mobilization	Wahai												
Demobilization	Babang												
2. Site Clearance and Grading	Wahai												
	Babang												
3. Access Road	Wahai												
	Babang												
4. Trestle	Wahai												
	Babang												
5. Landing Platform	Wahai												
	Babang												
6. Breasting Dolphin	Wahai												
	Babang												
7. Mooring Dolphin	Wahai												
	Babang												
8. Bow Bresting Dolphins	Wahai												
	Babang												
9. Movable Bridge Fabrication	Wahai												
Installation / Test	Babang												
10. Movable Bridge	Wahai												
Foundation Works	Babang												
11. Catwalks	Wahai												
	Babang												
12. Causeway / Slope Protection	Wahai												
	Babang												
13. Land-filling and Pavement	Wahai												
	Babang												
14. Building / Landscaping /	Wahai												
Utility Supplies	Babang												

Table 4.3.3(2) Yearly Construction Cost of Ferry Terminal (Wahai - Babang route)

Direct Construction Cost 31,515,106 (Unit: 1,000 Rp.)		2000 - 2001		2002				2003			
		Construction Cost		Construction Cost		Labour Cost		Construction Cost		Labour Cost	
		Local	Foreign	Local	Foreign	Skilled	Unskilled	Local	Foreign	Skilled	Unskilled
1. Mobilization	Wahai			465,623	497,576	9,313	13,969				
	Babang			153,314	203,568	3,066	4,599				
2. Site Clearance and Grading	Wahai										
	Babang			34,378	24,102	0	375				
3. Access Road	Wahai										
	Babang			476,036	294,844	5,000	3,333				
4. Trestle	Wahai			852,840	425,444	7,375	7,227				
	Babang			610,071	446,958	4,138	3,848				
5. Landing Deck	Wahai			725,607	690,450	3,730	3,271				
	Babang										
6. Breasting Dolphin	Wahai			1,046,620	1,309,621	6,184	5,656				
	Babang			1,013,205	1,710,408	6,248	5,711				
7. Mooring Dolphin	Wahai			479,892	351,380	2,999	2,780				
	Babang			517,170	400,378	3,050	2,823				
8. Bow Bresting Dolphins	Wahai			217,898	505,947	1,156	1,032				
	Babang			223,596	514,934	1,162	1,035				
9. Movable Bridge	Wahai			289,275	509,538	4,638	5,236	289,275	509,538	4,638	5,236
Fabrication and Installation /	Babang			213,173	380,057	3,411	3,838	334,987	597,233	5,361	6,031
10. Movable Bridge	Wahai			434,068	348,168	2,687	2,485	434,068	348,168	2,687	2,485
Foundation Works	Babang			294,474	238,803	1,796	1,659	588,947	477,606	3,593	3,318
11. Catwalks	Wahai							99,750	42,750	1,596	1,796
	Babang							99,750	42,750	1,596	1,796
12. Causeway / Slope Protection	Wahai			658,343	122,575	610	1,650				
	Babang			205,275	47,533	0	534				
13. Land-filling and Pavement	Wahai			1,439,946	342,699	5,570	4,988				
	Babang			530,304	328,457	5,570	3,713				
14. Building / Landscaping /	Wahai			146,905	98,228	2,938	4,407	1,615,955	1,080,512	32,319	48,479
Utility Supplies	Babang			174,980	114,528	3,500	5,249	1,924,780	1,259,812	38,495	57,743
15. Demobilization	Wahai							232,812	248,788	4,656	6,984
	Babang							76,657	101,784	1,533	2,300
Direct Construction Cost				11,202,993	9,906,196			5,696,980	4,708,940		
Engineering Fee		945,453	630,302	472,727	315,151			472,727	315,151		
Physical Contingency		94,545	63,030	1,167,572	1,022,135			616,971	502,409		
VAT		104,000	69,333	1,284,329	1,124,348			678,668	552,650		
Grand Total		1,143,998	762,666	14,127,621	12,367,830			7,465,345	6,079,150		

4.3.5 Manokwari – Biak Route

189. Table 4.3.4(1) shows the planned construction schedule of ferry terminals of Manokwari – Biak route. It is assumed that the construction of both terminals will be carried out in one package contract. The Contractor will establish their working camp and yard on the existing reclaimed land.

190. The Contractor will mobilize heavy equipment for reclamation work to Manokwari first from the sea side, and start the reclamation works there. At the same time the Contractor will start piling works at Biak from the tip of existing causeway for trestle foundation.

191. When the reclamation on the existing land works at Manokwari site is completed in 4 months time, the equipment will be delivered to Biak site for extension of the existing reclaimed land area.

192. When the piling works for trestle, dolphins at Biak is completed in 4 months time, the piling equipment is delivered to Manokwari. Then piling works will be started from the trestle, movable bridge foundation and dolphins.

193. The concrete works at Biak will be started by portable batching plant [1.5m^3 capacity] and progressed independently from the Manokwari site, where the similar capacity of batching plant will be mobilized from Manokwari city area.

194. The access road at Biak and Manokwari between the existing national road of heavy loaded pavement to the terminal area will be reinforced for transport of construction material and heavy equipment.

195. The building works for utility supply buildings and pavement works for parking lots at Biak terminal can be progressed from the available land area after the reclamation work for extension of land area is completed, subsequently pavement and passenger terminal building in the new reclaimed land will be progressed. After 12 months, deep well drilling at terminals will be started for water supply to the terminal.

196. The fabricated material for movable bridge will be delivered to the Manokwari site about 12 months after commencement of works then after 14 months it is delivered to Biak site for assembling and installation to be carried out at the same time separately.

197. The whole of works will be completed in 24 months. The yearly expenditure of construction costs of the main items of the facilities with the respective quantities are shown in Table 4.3.4(2) along the planned construction schedule.

Table 4.3.4(1) Construction Schedule of Ferry Terminal
(Manokwari – Biak route)

Work Item	Year / Month	2002				2003				2004			
		1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12
Mobilization / Demobilization	Manokwari												
	Biak												
Trestle	Manokwari												
	Biak												
Berth Construction	Manokwari												
	Biak												
Movable Bridge Foundation Works	Manokwari												
	Biak												
Movable Bridge Fabrication and Installation / Test	Manokwari												
	Biak												
Causeway and/or Revetment	Manokwari												
	Biak												
Land-filling and Pavement Works	Manokwari												
	Biak												
Building/Landscaping	Manokwari												
Utility Supply	Biak												

Table 4.3.4(2) Yearly Construction Cost of Ferry Terminal (Manokwari - Biak route)

Direct Construction Cost 33,852,952 (Unit: 1,000 Rp.)		2000 - 2001		2002				2003			
				Construction Cost		Labour Cost		Construction Cost		Labour Cost	
		Local	Foreign	Local	Foreign	Skilled	Unskilled	Local	Foreign	Skilled	Unskilled
Mobilization / Demobilization	Manokwari			692,646	512,338	13,853	20,779				
	Biak			761,676	540,966	15,234	22,850				
Trestle	Manokwari			1,059,549	513,575	11,049	12,057				
	Biak			1,209,622	595,882	12,040	13,059				
Berth Construction	Manokwari			1,410,221	1,432,798	11,883	7,802				
	Biak			778,893	888,884	6,715	7,028	778,893	888,884	6,715	7,028
Movable Bridge Foundation Works	Manokwari			239,177	161,030	2,073	2,195	478,353	322,060	4,147	4,389
	Biak							717,742	450,263	6,346	6,647
Movable Bridge Fabrication and Installation / Test	Manokwari			368,904	631,256	5,903	6,642	368,904	631,256	5,903	6,642
	Biak			329,592	572,288	5,274	4,434	329,592	572,288	5,274	4,434
Causeway and Slope Protection	Manokwari			561,930	171,017	353	2,331				
	Biak			425,330	118,608	-	1,603				
Land-filling and Pavement Works	Manokwari			1,583,591	926,983	10,053	8,961				
	Biak			2,295,288	966,277	10,053	10,278				
Building/Landscaping	Manokwari			431,240	269,043	8,625	12,937	2,156,205	1,345,213	43,124	64,687
Utility Supply	Biak							2,655,995	1,708,705	53,120	79,680
Direct Construction Cost				12,147,659	8,300,945	113,108	132,956	7,485,684	5,918,669	124,629	173,507
Engineering Fee		1,015,589	677,059	507,794	338,530			507,794	338,530		
Physical Contingency		101,559	67,706	1,265,545	863,947			799,348	625,720		
VAT		111,715	74,476	1,392,100	950,342			879,283	688,292		
Grand Total		1,228,862	819,241	15,313,098	10,453,764			9,672,109	7,571,210		

4.3.6 Implementation Program

198. The construction project will proceed along the assumed implementation program shown in Table 4.3.5.

- The first year of the implementation program is to be used for the period of Financial Arrangement, which consists of process of application of loan to finance institute by the concerned governmental agency and appraisal of the project.

- The second year is to be used for topographic/hydrographic survey and soil investigation of the project sites and detail design of the planned facilities. And the process of prequalification of contractor and tender process is to be started in the last quarter of the year.

- In the case of Surabaya – Banjarmasin Route, the quantity of construction work is relatively large so that the construction process is to be started at the middle of the third year, and is to be completed at the end of 2003.

- In the case of the other three routes, the construction process starts from the year of 2002 and will be able to be completed at the end of 2003.

- The sixth year (2004) is scheduled as the start year of the ferry service operation and maintenance period of the construction.

Table 4.3.5 Implementation Program

Work Item	1999				2000				2001				2002				2003				2004			
	1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12
(1) Surabaya - Banjarmasin Route																								
Financial Arrangement																								
Survey and Detail Design																								
Prequalification and Tender																								
Costruction (Construction Supervision)																								
Maintenance Period																								
(2) Selayar - Labuhan Bajo Route																								
(3) Wahai - Babang Route																								
(4) Manokwari - Biak Route																								
Financial Arrangement																								
Survey and Detail Design																								
Prequalification and Tender																								
Costruction (Construction Supervision)																								
Maintenance Period																								

Chapter 5 Environmental Impact Assessment

5.1 General

1. IEE (Initial Environment Examination) for the project "Development of Nation-wide Ferry Service Route in the Republic of Indonesia" was carried out on completion of the second site survey. Details of IEE result are summarized in Table A9.1.1 of Part 2.

2. Based on this survey result of IEE, environmental field survey was carried out from February to March 1998. EIA (Environmental Impact Assessment) was carried out on four (4) selected ferry routes for feasibility study for the year 2004. EIA report was prepared based on the results of IEE and Indonesian regulations (ANDAL). The data obtained by field survey are attached in a separate volume of this report. In this chapter and appendix, the summary of findings of EIA, justification of the project implementation and recommendation for monitoring program are described.

5.2 Legal Aspect and Environmental Policy

3. The government policy regarding biological conservation is based upon its desire to promote cultural and economic development of the Indonesian people in harmony with the natural environment, as expressed in several Government laws. According to this policy, all forms of natural life and pattern of all ecosystems have an important role in human welfare and must be preserved for the benefit of the present and future generations. This is elucidated in the Environment Management Law (Law No. 4, 1982) which makes provision for the management of the living environment. It emphasizes the importance of forestland, stating that they form the primary means of maintaining harmony between man and the environment. With regard to the Environmental Impact Analysis, the evaluation of each item was carried out based on the guidelines for the determination of significant impact stipulated in the law "Decree of the Head of the Environmental Impact Management Agency" (Law No. KEP-056, 1994).

5.3 Prediction and Evaluation of the Environmental Impact

4. Impact identification and prediction were carried out on the basis of analysis of the interactions between project activity components and environmental parameters/ characteristics, which are used as impact indicators. The various interactions are shown in a matrix to show the cause-and-effect relationships. The results of impact are analyzed at three stages i.e. pre-construction phase, construction phase, and operation phase.

5. The environmental impact at the above stages by the project implementation was assessed based on the Government regulations and guidelines.
Environmental impacts are evaluated into four (4) categories as follows:

3	:	Serious negative impact
2	:	Moderate negative impact
1	:	Minor (little) negative impact
0	:	Positive

5.4 Study Method

6. The methodology applied in this study is summarized as follows:

(1) Firstly the present environmental conditions were checked and confirmed through field survey and by means of literature review.
(2) Identification was made of those components of the proposed project which may have an impact (negative or positive) on the environment and lead influence to the current conditions.
(3) Evaluation was made on the impact of the project by using matrix forms in which project activities are set against environmental characteristics to foster cause-and-effect relationship
(4) To conduct a precise evaluation and study for EIA, the following site survey, laboratory analysis and data collection were conducted in each project site:

1) Seawater quality survey
2) Seabed quality survey
3) Survey of benthic ecosystem
4) Survey of fisheries
5) Survey of local inhabitants
6) Survey of fauna and flora
7) Survey of soil conditions

The findings of field survey except the above item 5) and 7) are described in the Appendix A5.1. The Environmental Impact Assessment of each terminal site is summarized hereinafter.

5.5 Surabaya

7. The project site is situated between Gresik Port and the existing Surabaya Public Port (Tanjung Perak) and is located inside developing area of the master plan prepared by public port cooperation. There are a lot of industries, salt field and dwellings of local populace in the coastal area. There is no vulnerable ecological system in this project area. It is anticipated that the following impacts will affect the local communities during the project construction period.

1) Damage to access road due to transport of materials and equipment.
2) Temporary dust and noise problem during transport of equipment and materials for construction.
3) Traffic jam during transport of equipment and materials for construction.

8. However, it is possible to reduce impact by corresponding mitigation measures, environmental monitoring and management. To avoid traffic jams during construction period, sea transportation of equipment and materials are recommended. The planned ferry port is located in the bay area 2.5km away from the coastal area. Access road to the offshore facilities is planned to be connected to the existing road network system which is located along the bay area. According to the traffic survey of the existing road which is to be utilized as access road, it is observed that there is traffic jam of large type trailers utilized by local factories. Even at the present situation, it is observed that the main road between Gresik and Surabaya City in the bay area is congested with that traffic. More than 4,000 large size trucks and trailers per day are passing this road, however the number of cars for loading and unloading from ferry boats are estimated to be 120 per day at maximum. The impact by the ferry transport to the present traffic is considered minor. Furthermore, there is a widening plan for this road up to seventeen (17) meters. It is foreseen that traffic congestion will be eliminated after completion of this plan.

9. To avoid the above described environmental impact during the construction and operation stage, it is recommended to conduct the following environmental monitoring and management :

Construction Stage

- Damage to road surface due to mobilization of heavy equipment
- Dust and noise pollution due to mobilization of equipment and construction materials
- Traffic jam due to mobilization of equipment and construction

- Damage to marine ecology due to reclamation, dredging, piling, etc.
- Disturbance of fishing activity
- Temporary restraint of local traffic due to the transportation

Operation Stage

- Damage to marine ecology due to port operation
- Air pollution and noise
- Traffic jam by loading and unloading of traffic
- Seawater pollution due to oil spills, etc.

10. Based on the result of EIA, the suggestions of environmental monitoring and mitigation are described in the Appendix A5.2. According to the survey result described above, no serious significant effect on the environmental aspect is expected by the project implementation during the construction and operation stage. The influence caused by implementation of this project is estimated to be only minor. From the environmental point of view, the implementation of this project will not foster much difficulty.

5.6 Banjarmasin

11. The proposed project area is a well-developed industrial area and is connected to the public port area. Hence, the socioeconomic impact from the port development will be quite limited. There is also no vulnerable ecological system in this project area. It is anticipated that the following impacts will affect the local communities during the project construction period.

1) Damage to access road due to transport of materials and equipment.
2) Temporary dust and noise problem during transport of equipment and materials for construction.
3) Traffic jam during transport of equipment and materials for construction.

12. However, it is possible to reduce the impact by corresponding mitigation measures. To avoid traffic jams during construction period, sea transportation of equipment and materials are recommended. New highway which is connected between new industrial area and new airport through the Trisakti Port by outskirts link road outside the city is under construction at present. After completion of this highway project, it is foreseen that the access route for project area will be changed and traffic problems caused by the loading and unloading to vessels can be minimized.

13. On the aspect of land acquisition, the land required for the implementation of

this project is being utilized by a private company (Pt. Daya Sakti). It will therefore be required to conduct negotiation for land acquisition from the private company for the short-term development plan before implementation of this project.

14. To avoid the above described environmental impact during the construction and operation stage, it is recommended to conduct the following environmental monitoring and management :

Construction Stage

- Damage to road surface due to mobilization of heavy equipment
- Dust and noise pollution due to mobilization of equipment and construction materials
- Traffic jam due to mobilization of equipment and construction
- Damage to marine ecology due to reclamation, dredging, piling, etc.
- Temporary restraint of local traffic due to the transportation

Operation Stage

- Air pollution and noise
- Traffic jam by loading and unloading of traffic
- Seawater pollution due to oil spills, etc.
- Change of coastal hydrology due to deposition and erosion

15. Based on the result of EIA, the suggestions of environmental monitoring and mitigation are described in the Appendix A5.2. According to the survey result described above, no serious significant effect on the environmental aspect is expected by the project implementation during the construction and operation stage. The influence caused by implementation of this project is estimated to be only minor. From the environmental point of view, the implementation of this project will not foster much difficulty.

5.7 Selayar (Patumbukan)

16. A part of the coastal area of the bay is covered with tropical, jungle and unmanned trees. There are only six (6) families living in the coastal area and adjacent to the project area. It is foreseen that the environmental impact is relatively small. There is no vulnerable ecological system in this project area. Most of the identified potential adverse impacts are temporary in nature, and are limited during the construction and installation phases of the project. It is anticipated that the following impacts will affect the local communities and the coastal ecology during construction period. However, these environmental impacts are expected to be relatively small and it is possible to reduce the

impact by corresponding mitigation measures.

1) Damage to access road due to transport of equipment and materials for construction
2) Impact to coastal ecology by the dredging work

To avoid the damage to the existing access roads which improvement project is considered as part of the project during construction period, sea transportation of equipment and materials are recommended. In this project, dredging works for port and channel is included, however fishermen do not conduct their operations in this bay area and as such, impact to fisheries is estimated to be small.

17. To avoid the above described environmental impact during the construction and operation stage, it is recommended to conduct the following environmental monitoring and management :

Construction Stage
- Damage to road surface due to mobilization of heavy equipment
- Dust and noise pollution due to mobilization of equipment and construction materials
- Traffic jam due to mobilization of equipment and construction
- Damage to marine ecology due to reclamation, dredging, piling, etc.
- Temporary restraint of local traffic due to the transportation

Operation Stage
- Damage to marine ecology due to port operation
- Seawater pollution due to oil spills, etc.
- Change of coastal hydrology due to deposition and erosion

18. Based on the result of EIA, the suggestions of environmental monitoring and mitigation are described in the Appendix A5.2. According to the survey result described above, no serious significant effect on the environmental aspect is expected by the project implementation during the construction and operation stage. The influence caused by implementation of this project is estimated to be only minor. From the environmental point of view, the implementation of this project will not foster much difficulty.

5.8 Labuhan Bajo

19. The project site is situated on the outskirts of town. In the bay area, there are many shops, restaurants, and family houses along the access road. The shore located at the north side of proposed ferry port serves as fish landing. From this place, a part of the fish caught is distributed directly to the consumers, fish market and other towns. There are many local inhabitants living at the south of the proposed project area. However, coastal area for this project site is under control of the local government. There are no legal or illegal local inhabitants in the planned project area except the port staff. It is foreseen that environmental impact is relatively small. There is no vulnerable ecological system in this project area and most of negative impacts anticipated are temporary and manageable.

20. To avoid the expected minor environmental impact during the construction and operation stage, it is recommended to conduct the following environmental monitoring and management:

Construction Stage
- Traffic jam due to mobilization of equipment and construction
- Damage to marine ecology due to reclamation, piling, etc.
- Damage to aquatic habitats and human health due to siltation and turbidity increased by earthwork in coastal area.
- Disturbance of fishing activity
- Temporary restraint of local traffic due to the transportation

Operation Stage
- Damage to marine ecology due to port operation
- Traffic jam by loading and unloading of the traffic
- Seawater pollution due to oil spills, etc.

21. Based on the result of EIA, the suggestions of environmental monitoring and mitigation are described in the Appendix A5.2. According to the survey result described above, no serious significant effect on the environmental aspect is expected by the project implementation during the construction and operation stage. The influence caused by implementation of this project is estimated to be only minor. From the environmental point of view, the implementation of this project will not foster much difficulty.

5.9 Manokwari (Sowi)

22. The project site is situated on the outskirts of town and is recommended by the local Government. The site is located approximately 5km southwest of Manokwari Town. The vicinity of the proposed site is flat and covered by bush. There is no vulnerable ecological system in this project area except corals. Coral reefs are observed adjacent to the proposed ferry port site. However, it is foreseen that corals will receive minimal damage due to the scale of required construction works. According to EIA, no significant environmental impact is expected and most of negative impacts anticipated are temporary and manageable. Most of the identified potential adverse impacts are temporary in nature, and are limited during the construction and installation phases of the project. There is an ethnic group (Traja) living adjacent to the project area. However, no specific measures targeting a potentially vulnerable group will be necessary for this project.

23. To avoid the expected environmental impact during the construction and operation stage, it is recommended to conduct the following environmental monitoring and management :

Construction Stage

- Damage to road surface due to mobilization of heavy equipment
- Dust and noise pollution due to mobilization of equipment and construction materials
- Traffic jam due to mobilization of equipment and construction
- Damage to marine ecology due to reclamation, piling, etc.
- Disturbance of fishing activity
- Temporary restraint of local traffic due to the transportation
- Physical damage to coastal ecology

Operation Stage

- Damage to marine ecology due to port operation
- Traffic jam by loading and unloading of traffic
- Seawater pollution due to oil spills, etc.

24. Based on the result of EIA, the suggestions of environmental monitoring and mitigation are described in the Appendix A5.2. According to the survey result described above, no serious significant effect on the environmental aspect is expected by the project implementation during the construction and operation stage. The influence caused by implementation of this project is estimated to be only minor. From the environmental point of view, the implementation of this project will not foster much difficulty.

5.10 Biak (Mokmer)

25. The project site is situated at the outskirts of town. The proposed site is developed by reclamation for the ferry terminal being constructed by DGLT and is located approximately 20 minutes by vehicle from Biak Town. The local government has already completed land acquisition from the local inhabitants based on a short term development plan. There are tombs for the local inhabitants and a monument of World War II constructed by the Japanese Government near the project area. There is no vulnerable ecological system in this project area. The existing access road has sufficient width and less traffic, and the construction work for this project will be completed within two (2) years. Therefore it is foreseen that the impact of temporary traffic caused by this project will be small. The adverse impacts of civil works may be minimized through proper planning and execution of the construction activities.

26. To avoid the expected environmental impact during the construction and operation stage, it is recommended to conduct the following environmental monitoring and management :

Construction Stage
- Damage to road surface due to mobilization of heavy equipment
- Damage to marine ecology due to reclamation, piling, etc.
- Disturbance of fishing activity
- Temporary restraint of local traffic due to the transportation
- Physical damage to coastal ecology

Operation Stage
- Damage to marine ecology due to port operation
- Traffic jam by loading and unloading of traffic
- Seawater pollution due to oil spills, etc.
- Damage to road surface due to mobilization of heavy equipment
- Dust and noise pollution due to mobilization of equipment and construction materials

27. Based on the result of EIA, the suggestions of environmental monitoring and mitigation are described in the Appendix A5.2. According to the survey result described above, no serious significant effect on the environmental aspect is expected by the project implementation during the construction and operation stage. The influence caused by implementation of this project is estimated to be only minor. From the environmental point of view, the implementation of this project will not foster much difficulty.

5.11 Wahai

28. The proposed site is located approximately 3km east of Wahai Town which is the largest town on the northern coast of Seram Island. The proposed site is adjacent to the harbor that is under control of the provincial government. Renovation of this harbor was completed last year (1997). The ferry port development project of Wahai is expected to have a generally positive and favorable effect on the local community of this town. A part of the coastal area of the bay is covered with tropical, jungle and unmanned trees. However, it is foreseen that environmental impact is relatively small. There are no local inhabitants living in the coastal area adjacent to the project area. The types of flora found are mangrove, coastal vegetation, secondary forest and wet tropical forest. There are five types of mangroves and bushes around the proposed project area. There is no vulnerable ecological system in this project area. All negative impacts anticipated are temporary and manageable.

29. However, to avoid the expected environmental impact during the construction and operation stage, it is recommended to conduct the following environmental monitoring and management :

Construction Stage
- Damage to road surface due to mobilization of heavy equipment
- Damage to marine ecology due to reclamation, piling, etc.
- Temporary restraint of local traffic due to the transportation
- Physical damage to coastal ecology

Operation Stage
- Damage to marine ecology due to port operation
- Seawater pollution due to oil spills, etc.
- Damage to road surface due to mobilization of heavy equipment
- Dust and noise pollution due to mobilization of equipment and construction materials

30. Based on the result of EIA, the suggestions of environmental monitoring and mitigation are described in the Appendix A5.2. According to the survey result described above, no serious significant effect on the environmental aspect is expected by the project implementation during the construction and operation stage. The influence caused by implementation of this project is estimated to be only minor. From the environmental point of view, the implementation of this project will not foster much difficulty.

5.12 Babang

31. The project site is situated on the outskirts of town. The site is located approximately 16km east of Labuha Town, the largest town in the Bacan Island. A private timber company had already done land reclamation on the proposed site. However this area is not being used at present. There is no vulnerable ecological system in this project area. No significant environmental impact is expected and most of negative impacts anticipated are temporary and manageable. Access to the project site can utilize only one route, the one passing through the center of town. To avoid interference to traffic during the construction period, it is necessary that the contractor carry out traffic safety control and management.

32. In addition to the above, to avoid the expected environmental impact during the construction and operation stage, it is recommended to conduct the following environmental monitoring and management :

Construction Stage

- Damage to road surface due to mobilization of heavy equipment
- Dust and noise pollution due to mobilization of equipment and construction materials
- Traffic jam due to mobilization of equipment and construction
- Damage to marine ecology due to reclamation, piling, etc.
- Temporary restraint of local traffic due to the transportation

Operation Stage

- Damage to marine ecology due to port operation
- Air pollution and noise
- Increase of local employment
- Seawater pollution due to oil

33. The land required for implementation of this project belongs to a private company. Therefore, it will be required to conduct negotiation for land acquisition from the private company (Pt. Kayu Manis) based on the short-term development plan before implementation of this project. The port activities will improve other business opportunities in the service sector in the island. Hence, the port development will result in an increase in the prosperity of the region.

34. Based on the result of EIA, the suggestions of environmental monitoring and mitigation are described in the Appendix A5.2. According to the survey result described

above, no serious significant effect on the environmental aspect is expected by the project implementation during the construction and operation stage. The influence caused by implementation of this project is estimated to be only minor. From the environmental point of view the implementation of this project will not faster much difficulty.

5.13 Result of EIA

35. The study result of the Environmental Impact Assessment on this project is shown in Table 5.13.1 and a complete EIA report, including data used, is presented in the attached Appendix. According to the EIA as carried out, it is found that no serious significant effect on the environmental aspect is expected. The influence caused by implementation of this project is estimated to be minor. From the environmental point of view, the implementation of each project will not foster much difficulty.

Table 5.13.1 Result of EIA

Construction phase & Envi. Components	Type of Impact	Impact agent	Surabaya	Banjarm-asin	Selayar	L. Bajo	Manokw-ari	Biak	Wahai	Babang
Pre-construction stage										
Local community	Social conflicts due to field survey	Negative perception of the project	-	-	-	-	-	-	-	-
	Social conflicts due to resettlement	Relocation program of household/land affected	-	-	-	-	-	-	-	-
Construction stage										
Local community	Employment		0	0	0	0	0	0	0	0
	Damage to roads	Over weight	1	1	1	1	-	-	1	1
	Temporary dust and noise problem	Equipment and materials mobilization and construction	1	1	-	-	-	-	-	-
	Traffic jam	Equipment and materials mobilization and construction	1*	1**	1	1	1	1	1	1
	Fishing activity	Construction work : Reclamation, dredging, piling, earth work, etc.	1	-	-	-	-	-	-	-
Water quality: aquatic environment	Impact to marine ecology (fish/aquatic organism)	Construction work : Reclamation, dredging, piling, earth work, etc.	1	-	1	1	1	1	1	1
Inhabitants and fishermen activity	Interference with transportation and fishing	Equipment mobilization Construction work in sea area	1	1	-	1	-	-	-	-
Coastal hydrology	Change of coastal hydrology	conditions	1	-	1	-	-	-	-	-
Ecology	Impact of coastal ecology	Design of facility and construction method	-	-	1	1	1	1	1	1
Operation stage										
Water quality : aquatic Environment	Impact to marine ecology (fish/aquatic organism)	Oil spills/leakage within port	-	-	-	-	-	-	-	-
Ecology	Impact to marine ecology (fish/aquatic organism)	Liquid waste from port facilities and boats	-	-	-	-	-	-	-	-
Local community	Air pollution and noise	Loading & unloading of traffic	1	1	-	-	-	-	-	-
	Public health and sanitation	Solid waste from ferry boats and passengers.	-	-	-	-	-	-	-	-
	Traffic jam/noise	Loading & unloading of traffic	1*	1**	-	-	-	-	-	-
	Employment		0	0	0	0	0	0	0	0
Coastal hydrology	Change of coastal hydrology	conditions	-	-	-	-	-	-	-	-
	Surface soil erosion	Soil erosion by rain water	-	-	1	-	-	-	-	-

Grade 3 : Serious negative impact, 2 : Moderate negative impact, 1 : Minor negative impact, 0 :Positive, - : No effect is expected.

Note : 1* The environmental impact to the existing traffic system will be resolved after widening plan of the existing road.

1** The environmental impact to the existing traffic system will be resolved after completion of new highway project.

Chapter 6 Ferry Operation Planning

6.1 General Conditions on Ferry Operation

6.1.1 Transportation Volume

1. Transportation volume on each route was included in Part 2. The forecast results of annual volume and the planning peak-day volume in the year 2004 are summarized in Table 6.1.1.

Table 6.1.1 Transportation Volume

Route	Annual Demand		Planning Peak-day Demand	
	Passenger	Car	Passenger	Car
Surabaya- Banjarmasin	559,800	63,550	2,000	195
Selayar - Labuhan Bajo	84,500	9,550	300	30
Manokwari- Biak	72,600	8,230	260	25
Wahai - Babang	47,700	5,370	170	15

Note: Planning Peak-day Demand is described in Chapter 3 on the Part 2.

6.1.2 Ferry Boat Size and Capacity

2. The optimum ferry boats size should be determined based on navigational conditions (navigation safety), distance (speed and trip hours) of the routes as well as on transportation volume and capacity.

3. As for Surabaya - Banjarmasin route, 5,000GRT class boats may be suitable for the demand in 2004. (It might be better to introduce larger size boats in future if both ports come to be available by further development as the demand is forecast to greatly increase.)

4. On Selayar - Labuhan Bajo, Manokwari - Biak, Wahai - Babang routes, the forecast demand is not technically high enough in 2004 to introduce 1,000GRT class boats. But considering the distance of the routes, navigational safety for cruising in the open sea, efficiency of shipping and increase in demand in near future, a smaller boat is not thought to be preferable.

5. The capacity of ferry boats is determined according to its specification (length, breadth, deck space, number of seats, life saving facilities, fire prevention and fire

fighting equipment and so on). However, the specification of all vessels including ferry boat is confirmed by inspection and authorization by DGSC. And furthermore, as for the capacity of boats for ferry service, the actual loading capacity is specified by DGLT according to several transportation conditions on each route such as frequency and number of ferry companies.

6. Therefore the ferry boat size and capacity on each route should be precisely determined at the operational stage with the authorization of the competent authorities according to the actual boats which will be introduced. In the Study, the boat size and capacity are set tentatively as shown in Table 6.1.2 considering standard conditions

Table 6.1.2 Ferry Boat Size and Capacity

Route	Boat Size	Capacity	
		passenger	car
Surabaya – Banjarmasin	5,000GRT	800	76
Selayar - Labuhan Bajo	1,000GRT	500	42
Manokwari – Biak	1,000GRT	500	42
Wahai – Babang	1,000GRT	500	42

7. There are some exceptional cases when the passenger loading capacity can be increased to 130% of the regular capacity. For example, capacity overload could be permitted in the highest demand season such as just after Ramadan on routes where the navigational condition is very safe for a limited period of time. In that case, the number of seats would not have to be increased, but additional life jackets and life boats should be supplied to cope with the increased capacity.

6.1.3 Frequency and Time Schedule of Service

8. To achieve a convenient transportation service and efficient operation, it is important to offer an appropriate frequency of ferry service. In the operation planning, the frequency is arranged to ensure that load factors of the routes do not exceed about 70% in passenger or 80% in car on planning peak-day.

9. Although many ferry routes are being operated in daytime in Indonesia at present, nighttime operation is also conducted on major routes such as Merak-Bakauheni, Ujung-Kamal, Padangbai-Lembar, Bajoe-Kolaka, Balikpapan-Mamuju. To develop the long and middle distance ferry routes, night cruising is indispensable. In addition, sometimes it is more convenient for passengers to travel at night.

10. Furthermore, operational efficiency would be increased as nighttime operation makes it possible to employ only one boat per route. Without nighttime operation, two boats are necessary.

6.1.4 Setting of Operation Schedule

11. Considering the role of ferry as public transportation and users' convenience, it is desirable that a fixed schedule (departure, arrival time and day) be kept as much as possible.

12. It is necessary to arrange sufficient time for berthing at each port. The berthing time should include the time for loading on and off of passengers and vehicles, cleaning deck and cabin, water and fuel supply, inspection of boat, etc.

13. To preventing crowding due to high frequency service, berthing time should be estimated exactly by simulation of queuing to load on according to the terminal conditions. The minimum berthing time is 1.5 hours.

14. In the Study, the berthing time is set as 3 hours for 5,000GRT class boat and 2 hours for 1,000GRT boats on condition that the berth is equipped with movable bridges. These times would be sufficient even in the event of a short delay caused by changeable operational conditions or any trouble due to lack of experience of users or operators at the starting point of the new route.

15. As for cruising speed, higher speeds are convenient for passengers, but result in poor fuel efficiency.

16. Cruising speeds of ferry boats now operated in Indonesia at present are 18knots on average (20knots in maximum) for 5,000GRT class boats and 15knots (17knots in maximum) for 1,000GRT class. In Japan, cruising speed of ferry boats has recently been increased and very high speed ferry (more than 25knots) has already been introduced. It should be thought that a higher speed boat will be introduced in the near future also in Indonesia.

17. In the Study, the standard cruising speeds of ferry boats in 2004 are set at less than 20knots for 5,000GRT class boat and less than 17knots for 1,000GRT class boat considering user's convenience, boats performance at present and cost efficiency of operators.

6.2 Operation Program of the Four Routes

18. To cope with the demand in ferry transportation, the operation program of the four routes is arranged as follows according to the several planning factors mentioned above.

6.2.1 Surabaya - Banjarmasin

19. Outline of operation program of Surabaya - Banjarmasin route in 2004 is as follows (See Table 6.2.1).

20. It is most effective to set time of trip as 15 hours (36 hours for 1 round trip including berthing time, i.e: 2 round trips in 3 days by 1 boat). An example of operation schedule in 2004 is shown on Figure A 6.2.1 (2).

Table 6.2.1 Operation Program of Surabaya - Banjarmasin Route

Surabaya – Banjarmasin	
1. Annual Demand	
(a) passenger	559,000
(b) car	64,000
2. Boat Size	5,000 GRT
3. Frequency	2 round trips/day
4. Route Distance	256 NM
5. Cruising Speed	17 knot
6. Time of Trip	15 hours
7. Berthing Hour	3 hours/trip
8. Number of boats	3 boats
9. Berthing Hour	6 hours/day
10.Required No. of Berth	1 berth

6.2.2 Selayar - Labuhan Bajo

21. Outline of operation program of Selayar - Labuhan Bajo route is as follows (See Table 6.2.2).

22. As it is less than 9 hours to cruise between Selayar and Labuhan Bajo, one way trip a day can be made without nighttime cruising in 2004. An example of operation schedule in 2004 is shown in Figure A 6.2.2 (2).

Table 6.2.2 Operation Program of Selayar - Labuhan Bajo Route.

Selayar – Labuhan Bajo	
1. Annual Demand	
(a) passenger	85,000
(b) car	10,000
2. Boat Size	1,000 GRT
3. Frequency	1/2 round trip/day
4. Route Distance	135 NM
5. Cruising Speed	14 knot
6. Time of Trip	10 hours
7. Berthing Hour	2 hours/trip
8. Number of boats	1 boat
9. Berthing Hour	2 hours/2days
10.Required No. of Berth	1 berth

23. Labuhan Bajo - (Komodo) - Sape route is now in operation using a 500GRT class boat. So the new ferry berth at Labuhan Bajo will serve the two ferry routes (the Slayar route and Sape route). This will be possible by coordinating the schedule of the two routes.

6.2.3 Manokwari - Biak

24. Outline of operation program of Manokwari - Biak route is as follows (See Table 6.2.3).

Table 6.2.3 Operation Program of Manokwari - Biak Route.

Manokwari – Biak	
1. Annual Demand	
(a) passenger	73,000
(b) car	8,000
2. Boat Size	1,000 GRT
3. Frequency	1/2 round trip/day
4. Route Distance	144 NM
5. Cruising Speed	14 knot
6. Time of Trip	10 hours
7. Berthing Hour	2 hours/trip
8. Number of boats	1 boat
9. Berthing Hour	2 hours/2days
10.Required No. of Berth	1 berth

25. As the time of trip will be around 10 hours between Manokwari - Biak, a one-way trip per day can be made in the daytime in 2004. An example of operation schedule in 2004 is shown in Figure A6.2.3 (2).

26. Biak - Serui route is now being operated using a 500GRT class boat. So the new ferry berth at Biak will serve the two ferry routes (Manokwali route and Serui route). This will be possible by coordinating the schedule of the two routes.

6.2.4 Wahai - Babang

27. Outline of operation program of Wahai - Babang route is as follows (See Table 6.2.4).

28. As the time of trip will be around 12 hours between Wahai - Babang, it would be preferable to depart early in the morning and to arrive in the early evening to avoid nighttime cruising. An example of operation schedule in 2004 is shown in Figure A6.2.4 (2).

Table 6.2.4 Operation Program of Wahai - Babang Route.

Wahai – Babang	
1. Annual Demand	
(a) passenger	48,000
(b) car	5,000
2. Boat Size	1,000 GRT
3. Frequency	2 round trips/week
4. Route Distance	178 NM
5. Cruising Speed	14 knot
6. Time of Trip	13 hours
7. Berthing Hour	2 hours/trip
8. Number of boats	1 boat
9. Berthing Hour	4 hours/week
10.Required No. of Berth	1 berth

6.2.5 Operation Capacity of Each Route

29. Operation capacity of the route means here the maximum capacity which can be transported by ferry operations using the newly constructed berth according to the short-term development plan (i.e. without any further development).

30. The focus is on the berthing capacity, which is the most important component in this case. The operational conditions are assumed as follows for the study.

1) The terminals can be to operated for 24 hours in future at Surabaya and Banjarmasin, and for around 16 hours at the other ports (i.e: without

midnight terminal operations) considering availability of access transportation to and from the ports.

2) Berthing time per trip is the same as set in the operation program.

3) Berthing occupancy ratio in a day (Total berthing time/ Terminal operation hour) should be within 50% in total considering flexibility of schedule adjustment.

4) The existing routes on Labuhan Bajo and Biak will continue to share the new berth and will increase the frequency according to the demand increase.

31. The operation capacities on each route are estimated as shown in Table 6.2.5.

Table 6.2.5 Operation Capacities on Each Route

	Surabaya-Banjarmasin	Selayar-L. Bajo	Manokwari-Biak	Wahai-Babang
Newly Constructed Berth	1berth	1berth	1berth	1berth
Max. Frequency of Trip	4 trips/day	4 trips/day	4 trips/day	4 trips/day
1) For New Route	4	2	2	4
2) For Existing Route	0	2	2	0
Total Berthing Hour	12hours (4x3h)	8hours (4x2h)	8hours (4x2h)	8hours (4x2h)
Terminal Operation Hour	24hours	16hours	16hours	16hours
Berth Occupancy Ratio	50%	50%	50%	50%

32. The transportation capacity of the route depends on the maximum frequency of trip estimated by the operation capacity of the berth and the transportation capacity of one round trip. The results are shown in Table 6.2.6.

Table 6.2.6 Maximum Transportation Capacity of Route

		Surabaya-Banjarmasin	Selayar-L. Bajo,	Manokwari-Biak	Wahai-Babang
(a) Max. Frequency of Trip		4 trip/day	2 trip/day	2 trip/day	4 trip/day
(b) Transportation capacity by 1 trip	1)Pax.	800 x 2	500 x 2	500 x 2	500 x 2
	2)Car	76 x 2	42 x 2	42 x 2	42 x 2
(c) Transportation capacity per day	1)Pax.	4480	1400	1400	2800
	2)Car	488	136	136	272
(d) Annual transport -ation capacity	1)Pax.	1,254,000	392,000	392,000	784,000
	2)Car	161,000	45,000	45,000	90,000
(e) Year capacity is saturated		2014	-	-	-

Note: 1. Pax. is passenger.

2. (b): Capacity of ferry boats.(Surabaya-Banjarmasin: 5,000GRT, Others: 1,000GRT)

3. (c): (a) x (b) x Load Factor (Pax.: 70%, Car: 80%)

4. (d): (c) / Peak-day concentration ratio (Pax.: 1/280, Car: 1/330)

5. (e): Demand after 2019 is estimated by the fixed increasing number the same as during 2018-2019.

33. The details including future projection of operation program on four routes are shown on Table A6.2.1 - Table A6.2.4 and Figure A6.2.1 - Figure A6.2.4.

6.3 Navigation Safety

6.3.1 Ferry Boats Safety

34. The stability and strength of ships is the most important element of ship safety. Ship inspection is vital for the safety for ships. It plays a very important role in keeping persons onboard ships safe and comfortable, in normal conditions and in emergencies. Safety inspections of ships principally involve the following check points, a) structure, b) machinery room, c) life-saving equipment, d) fire-fighting equipment, e) navigational installations, f) radio equipment g) loaded line related matters and h) others.

35. The Indonesian government has ratified the international conventions according to the classification of vessels as well as other conventions regarding ship safety. Therefore the inspection of ferry boats at shipyards should be performed in the same manner as other vessels.

6.3.2 Navigational Safety

36. Sea and weather conditions on the four routes are described in Section 2.2 of the Part 2. In general the sea and weather conditions here are moderate, and few severe problems can be found from the navigational point of view. But needless to say, because the area belongs to the tropical monsoon climate region, seasonal variation of strong wind and current, squalls, sea disturbance and swell should not be made light of.

37. Surabaya - Banjarmasin route goes across Java Sea from south to north on which PT. PELNI passenger ships and many other boats are frequently cruising. So any additional steps such as setting navigational aids would not be necessary to establish the new ferry route.

38. Selayar - Labuhan Bajo route goes from north to south crossing Flores Sea. The sea condition is not bad but tropical cyclones should be taken into account in Nusa Tenggara region although they are rare. There is no existing scheduled shipping service on the route. It is desirable to settle a navigational aids such as light beacon along the route as the need arises.

39. Manokwari - Biak route is an east-west route crossing Yapen Strait and Cenderawasih Bay. There are lighthouses at Biak and Numfoor Island which is located on the middle of the route, and light buoy at Manokwari. No navigational difficulty is found in establishing the ferry route including nighttime cruising, judging from the present situation that PT. PELNI is now operating scheduled shipping service without any problem and from interviews with navigation staffs of PT. ASDP at Biak .

40. Wahai - Babang route runs roughly south-north crossing Seram Sea. There is no existing scheduled shipping service on the route. navigational aids such as light beacon should be placed along the route as the need arises.

6.3.3 Operation Safety

41. For safe and efficient loading and unloading of passengers and vehicles, a movable bridge and an access bridge for passengers to load on and off separately from vehicles at Surabaya and Banjarmasin are desirable to be set on berth. And for the same purpose, it is advisable to introduce stem/stern ramp type ferry boats which have ship ramp on stem and stern to enable vehicles to be loaded on and off without any turning or reversing.

42. Lighting system in the ferry terminals (berth, parking and terminal) is indispensable for nighttime handling (There is no special requirement for equipment on boats.).

6.3.4 Maintenance of Ferry Boats

43. Maintenance of ferry boats should be regularly conducted to keep boats in operational conditions, to secure the safety of passengers and vehicles and to prevent damage and trouble.

44. The following three types of ship maintenance are described in the Technical Direction of Ship Maintenance of PT. ASDP.

1) Routine maintenance:

The maintenance which is implemented periodically (daily, weekly, monthly) to secure safety and optimum condition and to repair damages that affect ship operation.

2) Running repair:

Repairs which are implemented during operations to limit work stoppages and to shorten the docking maintenance term.

3) Docking maintenance:

Docking maintenance is implemented in accordance with the regulation and requires completion inspection by the competent authorities. Docking is to be implemented every year for the annual inspection and furthermore every four years for the special inspection of the hull and mechanical/electrical installations.

45. Operators of ferry boats should set up an annual maintenance scheme beforehand to avoid the stoppage of operation in high demand season, especially for the docking maintenance, which ordinarily takes at least one month.

6.4 Recommendation on Ferry Operation

(Ferry Boat Size and Capacity)

46. The specification of all vessels including carrying capacity of ferry boat is confirmed by DGSC. However, the actual loading capacity of boats for ferry service is specified by DGLT. Therefore the ferry boat size and capacity on each route should be precisely determined at the operational stage with the authorization of the competent authorities according to the actual boats which will be introduced.

(Operation Efficiency)

47. To encourage constant demand for ferry transportation, it is necessary to promote reliable, convenient, comfortable and safe operation. This requires adjusting the schedule during docking maintenance with the estimated demand fluctuation. Also, to operate efficiently with a small number of boats, it is necessary to increase cruising speed, decrease berthing/anchoring time and introduce nighttime operation.

(Raising the Level of Service)

48. Service should be reliable and punctual, with fewer cancellations and less short shipment (left-off). This entails proper frequency, fixed time arrival and departure, easy access to and from the ferry terminals, and so on. In addition, better accommodations including comfortable waiting lounge in passenger terminal and cabin with sufficient number of chairs, concessions on boats, and so on are needed.

(Navigation Safety)

49. The stability and strength of ships is the most important element of ship safety.

Ship inspection is vital for the safety for ships. The Indonesian government has ratified the international conventions according to the classification of vessels as well as other conventions regarding ship safety. Therefore the inspection of ferry boats at shipyards should be performed in the same manner as other vessels.

50. In addition, life saving facilities, fire prevention and fire fighting equipment should be securely rigged on ferry boats in conformity to the regulations including life jackets and life boats corresponding to the maximum number of passengers.

51. Navigational aids which indicate the location near the entrance of ports (except Surabaya, Banjarmasin and Labhan Bajo) and en route navigational aids should be installed as the need arises.

52. For safe and smooth loading on and off of passengers and vehicles, a movable bridge, an access bridge for passengers to load on and off separately from vehicles at Surabaya and Banjarmasin, a stem/stern ramp type boat for smooth loading on and off without reversing and a lighting system on berth for nighttime operation should be introduced.

53. Concerning the safety ferry operation, it is recommendable to take possible certain steps as soon as possible such as the comprehensive operation supervision, the modernization of facilities concerned and the training of a capable task force including crews to ensure the highest degree of safety and create a promising ferry service.

54. Maintenance of ferry boats should be regularly conducted to keep boats in operational condition, to secure the safety of passengers and vehicles and to prevent damage and trouble. Operators of ferry boats should set up an annual maintenance scheme beforehand to avoid the stoppage of operation in high demand season, especially for the docking maintenance, which ordinarily takes at least one month.

Chapter 7 Ferry System Management

7.1 Management and Operation of Ferry Transportation in the Short-term Development Plan

7.1.1 Enhancement of Profitability

1. As mentioned in Chapter 6 of Part 2, with more than 70% of the service routes of PT. ASDP being so called "Pioneer Routes" and operating under a government subsidy, the current situation has to be improved.

2. To reach an equitable situation between PT. ASDP and other private ferry operators, profitability of all the present pioneer routes should be reviewed from the view point if that a subsidy should be applied due to the special importance or public benefit of routes in accordance with government policy.

3. Especially the newly planned routes in 2004, Surabaya - Banjarmasin, Serayar - Labuhan Bajo, Manokwari - Biak and Wahai - Babang, which are expected to enjoy high demand should be managed aiming at operation with no subsidy or a small subsidy if necessary.

4. Since its financial arrangements come under the control of the Ministry of Finance (MOF), PT. ASDP should take this opportunity to conduct drastic rationalization. In this sense, for the purpose of more efficient operation, it is recommended that PT. ASDP, in collaboration with the governmental agencies including MOF set concrete objectives, such as: "Achieve profitability in 70% of the routes in five years".

5. An efficient means to realize this target is to allocate staff efficiently to each activity and to set up proper tariff levels.

6. Needless to say, revenues should exceed the expenses for management and operation. The annual expenses for each of the four routes developed for 2004 will be dependent on the number of ferries put on the route and the frequency of operation as given in Chapter 6 of Part 3. Therefore, tariffs should be set up to cover these calculated expenses. Then, there will be no need for PT. ASDP to require a government subsidy. Newly built ferries are basically provided by the government and the purchase price is not taken into consideration.

7. When setting up the shipping tariffs for the newly opened routes in 2004, it is important to consider it in harmonization with the PT. PELNI's tariffs for the competitive routes, such as Surabaya - Banjarmasin and Manokwari - Biak.

8. For example, a passenger tariff for PT. PELNI service on the Surabaya - Banjarmasin route is Rp.46,000 for economy class (Rp.100,000 for 2nd and Rp.132,600 for 1st). For PT. ASDP, on the other hand, the average tariff per mile on the commercial routes with an operation distance over 100NM is approximately Rp.100 for economy class. Therefore, as the distance of the Surabaya - Banjarmasin route is 256NM, the tariff for this route would be roughly around Rp.25,600. Furthermore, in consideration of the annual expenses of this route, the passenger tariff might even be set at a lower level (say less than Rp.15,000). The tariff of PT. ASDP service for this route has to be set up paying attention to this point.

9. As aforementioned in Chapter 3 of Part 1, Government Regulation No.12 in January of 1998 stipulates that, the financial aspects of all state-owned companies will be under the control of the Ministry of Finance (MOF) including PT. ASDP. PT. ASDP will need to make every effort to realize efficient management and operation. The target should be complete privatization, in consideration of the new policy.

7.1.2 Establishment of an Efficient PT. ASDP Organization

10. *In order for PT. ASDP to seek profitability in the management and operation of* the four routes in the short-term development plan, it is important that financial soundness of PT. ASDP be guaranteed.

11. As described at the policy of Government Regulation No. 12, in order to increase efficiency, competitive ability and development of PT. ASDP, it is necessary to clarify the working mechanism of the organization in accordance with the principles of the company.

12. In 1997, the number of staff of PT. ASDP was 3,119, including contract employees. The 34 branch offices have a total staff of 2,934, or 94% of the total. To create an 'efficient organization', rationalization of branch offices is indispensable.

13. Currently, the allocation of staff is not always conducted in consideration of profitability. In terminal management, in particular, as most business activities are concentrated during the time a ferry enters or departs the terminal, it is possible to raise

the working efficiency by providing multiple tasks to each staff member. Efficiency can also be improved in shipping management. For instance, moorings are basically handled by terminal staff, but sometimes shipping staff are also placed in "mooring-like supervisor" roles. To promote rationalization, it is recommended that the tasks of the terminal staff and shipping staff be clearly defined.

14. Besides the physical reduction of employees, pressing for improvements in the quality of the work of each staff by the establishment of a personnel educational system is another way to ensure more efficient management. It is especially important to let administrative staff obtain a sense of business management.

15. All personnel training for administrative staff of PT. ASDP is currently conducted by having staff members participate in training courses organized by related ministries or other knowledgeable institutions on management, operation, etc. However, it will be increasingly important to provide training courses focusing on what would be required of PT. ASDP to develop a nationwide ferry network in Indonesia, intensifying effectiveness of services as well as improving the economic and financial situation.

16. The basic rationale for planning these training courses that will directly link activities of PT. ASDP has been summarized as: "More effective organization and operational system should be established in which costs are reduced as much as possible".

7.1.3 System of Ferry Service

17. As for ferry service, jurisdiction of DGLT and DGSC has not been completely defined, so that ferry operators and passenger ship operators are still under the control of different organizations in spite of their similar service styles.

18. In 2004, Surabaya-Banjarmasin, the longest distance ferry route, is going to open, which will obviously put it in competition with passenger ship service by PT. PELNI. These two big cities in Island Java and Karimantan are also to be connected by two similar services by independent operators supervised by different governmental organizations.

19. Since they are not under the control of the same supervisor, ferries which use MOC/KANWIL terminal and passenger ships which call at the sea port managed by PELINDO, pay different port charges.

20. For users, especially for passengers with no car, it does not matter which service they use, PT. ASDP or PT. PELNI. Although it makes sense that both shipping operators be completely privatized and offer specialized service, either ferry or passenger only ship service, the problem is that they are supervised by different organizations making their similar services differ in such areas as transportation fee.

21. More than 70% of PT. ASDP's services are unprofitable, while for PT. PELNI this rate is 50%. What should be noted is that PT. ASDP can be granted a government subsidy in the case of loss, but there is no such system prepared for PT. PELNI.

22. There are some differences in ferry service system between PT. ASDP and PT. PELNI in spite of their similar service style as above mentioned. On the other hand, both PT. ASDP and PT. PELNI are going to come under the control of MOF in financial aspects, which includes budgeting and related tariff setting. At this stage, what DGLT and DGSC are responsible for will be only technical matters.

23. Then, as a conclusion, the liaisons in every aspect of maritime affairs, including ferry transportation, passenger transportation and even cargo transportation are necessary in order to achieve an efficient system of ferry service..

7.2 Terminal Management and Operation in the Short-term Development Plan

7.2.1 Enhancement of Profitable Management and Subsidy System

24. In terminal management as well as shipping management, the ultimate goal is to realize profitability. It is necessary to find other sources of revenue and to establish a system to reduce expenses.

25. For example, the terminal management body collects berthing fees set by ministerial decree. But, there are no regulations obliging shipping operators to pay an "anchoring fee" while their ship is waiting offshore for berthing or adjusting the scheduled time.

26. On the other hand, general vessels, including the passenger only ships by PT. PELNI, have to pay "Port Dues" when they get into designated sea areas. When we consider that one of the characteristic points of ferry transportation is to offer scheduled service, adjusting time by "anchoring" is necessary. Therefore, it is recommended that a new regulation be prepared where by the terminal management body can collect this

anchoring fee and thus increase their revenues.

27. As for allotment of terminal staff, it is recommended that an efficient way of allotment be established, in collaboration with the ferry operating companies, to ensure that their duties do not overlap.

7.2.2 Setting of Proper Terminal Tariff

28. All terminals to be developed by 2004 will be managed by MOC/KANWIL after opening, at least for the time being. Then, if the present regulations are followed, terminal tariff would be set up to the same level as other existing terminals. Paying attention to the fact that ferry functions as a lifeline to the people of Indonesia, it is reasonable that all public terminals set fixed terminal charges. On the other hand, this does not always make sense because low profitability of terminals is covered by a subsidy from the government.

29. Furthermore, Surabaya - Banjarmasin service, the longest distance route with the largest boats servicing it, is expected to enjoy a huge demand in the future, so the tariff of the terminals on both sides should not have to adopt the existing fixed charge. If anything, the tariff for this route should be set independently in consideration of the aforementioned situation.

30. Right from the beginning, one of the fundamental problems is that the existing tariff is set on condition of the subsidy granted from the government. It is recommended that the tariff be set by each terminal in consideration of their own financial situation.

31. Not only in the new terminals, but in general, a new tariff determination system that considers characteristics of each region should be established. In particular, taking advantage of this opportunity to set up tariff for planned terminals in the new sites, the "tariff discrimination system", including the introduction of the season commuter pass mentioned in Chapter 6 of Part 2, should be adopted.

32. MOF's supervision over the finances of PT. ASDP as terminal operator and of the sea port managing body PELINDO may influence the present level of port charges, so it is important that ferry terminal tariff be set up giving heed to how the sea port tariff goes. The present tariff is used for financial analysis.

7.2.3 Terminal Management Body

33. Under the present condition, it is true that most public terminals have not realized profitable management as yet, so that management depends on the government subsidy.

34. Aiming for economic and competitive management skills, MOF is going to supervise all maritime related public corporations as aforementioned. Under these circumstances, the one and only exception will be the ferry terminal operator KANWIL. In order for KANWIL to introduce efficient management system for the future as well as for other corporations, all terminal management might have to be transferred once to PT. ASDP's control.

35. Even the eight terminals to be developed by the year of 2004 should transfer their management right to PT. ASDP as soon as possible where finances will be supervised by MOF.

Chapter 8 Economic Analysis

8.1 Objectives and Methodology of the Economic Analysis

8.1.1 Objective

1. The objective of the economic analysis is to appraise the economic feasibility of the four projects, i.e. Surabaya-Banjarmasin route, Selayar-Labuhan Bajo route, Manokwari-Biak route and Wahai-Babang route, selected as the feasibility study routes in the target year (2004) from the viewpoint of the national economy.

2. Therefore, the objectives of this chapter are to investigate the economic benefits as well as the economic costs that will arise from these projects, and to evaluate whether the net benefits of these projects exceed those that could be obtained from other investment opportunities in Indonesia.

8.1.2 Methodology

3. Economic analysis shall be performed as a comparison of the cases in which the project is implemented ("With case") and not implemented ("Without case"). The benefits and costs of the project will be obtained from the difference between With case and Without case in market price, and they will be converted to economic price. All benefits and costs are evaluated using economic prices in the economic analysis based on the border price concept.

4. There are various methods to evaluate the feasibility of this type of development project. Here, the economic internal rate of return (EIRR) based on a cost-benefit analysis is used to appraise the feasibility of these projects.

5. The procedure used for this economic analysis is shown in Figure 8.1.1.

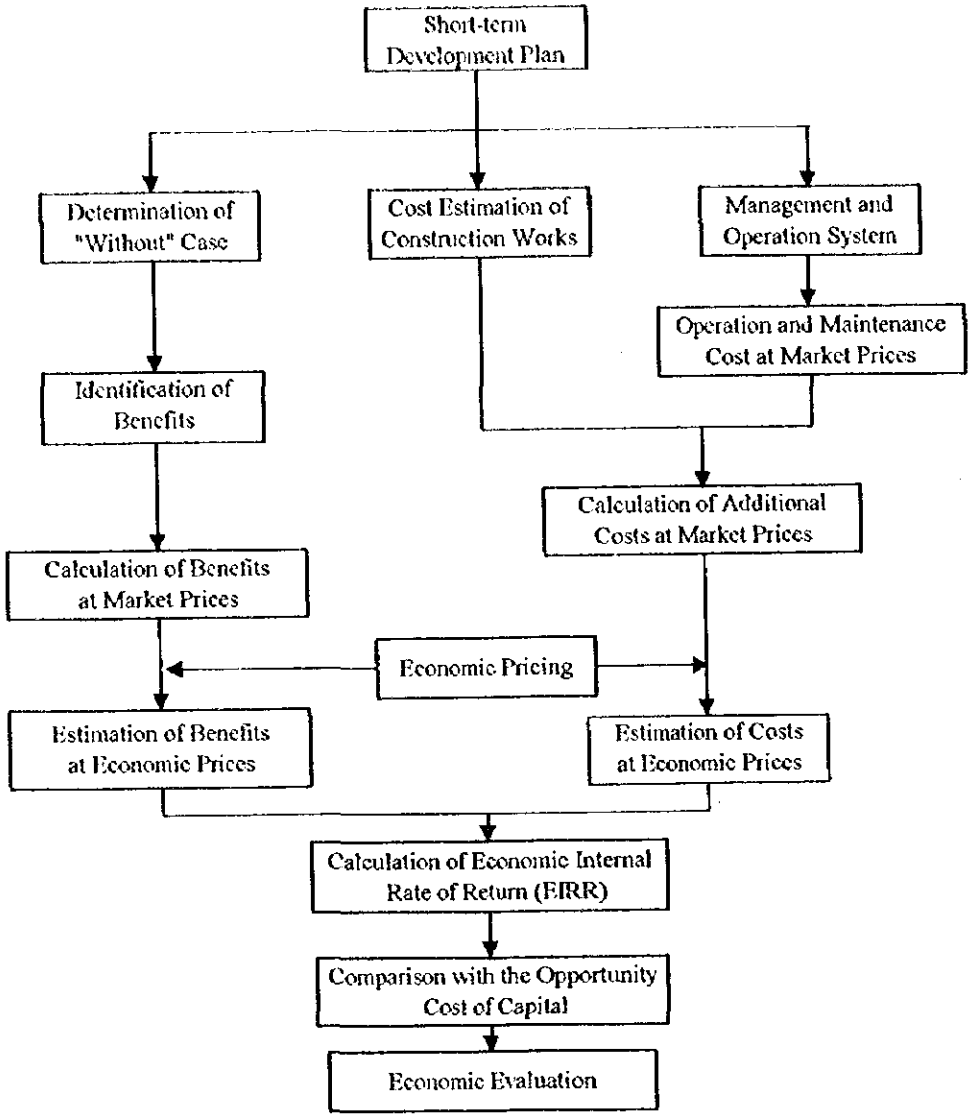

Figure 8.1.1 Flow Chart of Economic Analysis Procedure

8.2 Prerequisites of the Economic Analysis

6. In order to estimate the costs and benefits, the following requisites are assumed for the economic analysis.

8.2.1 Base Year

7. The "Base Year" here means the standard year in the estimation of costs and benefits. Taking into consideration the base year in cost estimation of construction, 1998 is set as the "Base Year" for this study.

8.2.2 Implementation Schedule

8. The period for the project implementation of the ferry service development works is proposed during 2000–2003, and the work completion as a whole is scheduled to be 2004 for each ferry route.

8.2.3 Project Life

9. Taking into consideration the depreciation period of the main facilities of 30 years and the construction period (including detail design) of 4 years, the period of calculation (project life) in the economic analysis is assumed to be 34 years from the beginning of construction (2000–2033).

8.2.4 Foreign Exchange Rate

10. The exchange rate adopted for this analysis is US$1.00 = Rp.9,600, that is the same rate as used in the cost estimation for the short-term development plan.

8.2.5 Residual Values

11 The residual value such as ferry boat, equipment etc. are assumed to remain at the end of the project life.

8.3 With Case and Without Case

8.3.1 With Case

12 At the cost-benefit analysis of these projects, "With case" means implementation of the investments for the development of new ferry terminals and ferry boats. In this case, the proposed new ferry boats will be introduced according to increased traffic demands of projects, and the resulting investment, operation and maintenance costs related to the terminals and boats will be considered.

8.3.2 Without Case

13. "Without case" stands for the condition without such investment for the development of new ferry terminals and ferry boats. In this case, in order to meet the projected traffic demand, substitutional traffic means are assumed.

14. At present, there is no complete ferry service at the proposed four ferry service routes. However, in each area, there are existing passenger liner boat and cargo vessel or cargo-passenger liner boat in operation. Accordingly, in this study, the substitutional traffic means such as existing passenger boats and cargo vessels or cargo-passenger boats are assumed to be utilized.

15. The size and cruising speed of boat/vessel and operating route in the With and Without cases are as shown in Table 8.3.1 and Figure A8.3.1.

Table 8.3.1 Size and Cruising Speed of Boat/Vessel in Both Cases

Route	With case		Without case	
	Type of Boat (Boat Size)	Cruising Speed	Type of Boat (Boat Size)	Cruising Speed
Surabaya-Banjarmasin	Ferry boat (5,000GRT)	17knot	Passenger boat (5,600GRT)	14knot
			Cargo vessel (1,000 – 1,700DWT)	11knot
Selayar -Labuhan Bajo	Ferry bort (1,000GRT)	14knot	Cargo-passenger boat (500 -750 DWT)	8knot
Manokwari - Biak	Ferry bort (1,000GRT)	14knot	Passenger boat (14,000GRT)	20knot
			Cargo vessel (1,000 –1,700DWT)	11knot
Wahai - Babang	Ferry bort (1,000GRT)	14knot	Cargo-passenger boat (500DWT)	8knot

8.3.3 Traffic Demand of Projects

16. The traffic demands applied for this economic analysis are based on the results of studies for the future traffic demand. The traffic demands for each year are distributed and extrapolated from estimated traffic demand for target years 2004 and 2019.

17. In the With case, the traffic demands are adjusted by the operation capacity which can be transported by ferry operation using the newly constructed berth in the Short-term development plan. Thus when the traffic capacity volume will reach its limit, the traffic capacity at that time is assumed to be equivalent to the traffic demand volume for the subsequent years.

18. The traffic demands in Without case are assumed to be the same as those in With case. The traffic demands by year for each route are shown in Table A8.3.1.

8.4 *Benefits of the Projects*

19. The development of the ferry operation service will contribute to the strengthening of communication/transportation for passenger, vehicle and cargo inter region/island to island. Furthermore improvement of punctuality/regularity, and increased safety and comfort of transportation will stimulate passenger and commodities movement in inter/inner regions. And that will contribute to reducing regional disparity.

8.4.1 Benefit Items

20. Concerning the "With" and "Without" situation mentioned earlier, the following items are identified as the benefits of the development of the ferry service for each route.

[Direct benefit];

1) Reduction of cargo handling costs
2) Saving of transportation costs
3) Saving of travel time costs
4) Increase of punctuality/regularity and safety/comfort
5) Increase in employment opportunities of construction works
6) Improvement of the unfavorable transportation condition of passengers bringing large volumes of cargo by hand

[Indirect benefit];

a) Promotion of activation of passenger and commodities movement among regions
b) Promotion of regional economic and industrial activity
c) Promotion of social/cultural communication among regions
d) Promotion of educational opportunities for people in the region
e) Increase in employment opportunities
f) Promotion of improvement of regional economic disparity

21. Of the above, the monetary benefits of items 1), 2) and 3) are considered as benefits suitable for the cost-benefit analysis of these projects. Other benefits are also considered qualitatively in this study.

8.4.2 Calculation of Benefits

(1) Reduction of cargo handling cost

22. Ferry service enables quick loading/unloading of cargoes by taking advantage of the role-on role-off system. And the handling cost for loading/unloading of ferry service is considered to be equivalent to zero. Therefore, the cargo handling cost in Without case would be a benefit of the project.

23. Since the cargo handling costs according to the present port tariff are different among ports, the handling average cost for general cargo is estimated at Rp.8,635/ton/m^3. As a result, the estimation of cargo handling cost for each route is shown in Table A8.4.1.

(2) Saving of transportation cost

24. The Benefit is defined as the difference in the cost of "With Project Situation" and "the Existing Situation" for transporting passengers, goods and vehicles between origins and destinations. "With Project Situation" means transport by using ferry boat. On the other hand "the Existing Situation" means transport by using passenger boat/cargo vessel or cargo-passenger boat.

25. Since the transportation cost by using ferry boat is included as a cost item of the projects as mentioned later, here, the benefit is estimated by using existing passenger boat/cargo vessel or cargo-passenger boat.

26. The following unit freight costs are estimated based on data of DGSC etc.

[For passenger];

1) Passenger boat (5,600GRT) : Rp.146.32 /person/mile
2) Passenger boat (14,000GRT) : Rp.121.64 /person/mile
3) Cargo-passenger boat (500DWT) : Rp.63.5 /person/mile

[For cargo];

1) Cargo Vessel (1,000–1,700DWT) : Rp.96.4 /ton, m^3/mile
2) Cargo-passenger boat (500DWT) : Rp.57.2 /ton, m^3/mile

27. The estimation of sea transportation cost by year for each route is shown in Table A8.4.2.

28. Furthermore, in the Selayar-Labuhan Bajo route, the saving of land transportation cost is considered as a benefit. The land transportation cost can be estimated by using unit vehicle operating cost.

29. The estimation of unit vehicle operating cost was calculated based on a method of study included in "The Feasibility Study on Urban Arterial Road System Development Project in Jakarta Metropolitan Area, Ministry of Public Works Republic of Indonesia, January, 1995".

30. According to the method of the above study, calculated unit vehicle operating cost by vehicle type is shown in Table A8.4.3. Also, the estimation of land transport cost is shown in Table A8.4.4.

(3) Saving of travel time cost

31. In accordance with implementation of the project, a faster ferry boat will be introduced and the total distance of ferry operation routes will be shorter than that of existing routes. Therefore, the operational travel time will be reduced.

32. The benefit of travel time cost saving is considered as the difference of the travel time cost between "With case" and "Without case" for transportation of passengers, goods and vehicles. Additionally, the travel time cost saving for cargo and vehicle includes time lost for loading/unloading at the port.

33. The estimation of passenger time cost saving benefit is as follows;

Passenger time cost saving benefit

$$= \text{Number of passengers} \times \text{Difference of travel time between with and without case} \times \text{Unit passenger time value}$$

34. The unit passenger time value is estimated according to the following process:

1) The 1997 average value of per capita GRDP at current prices excluding oil and gas is estimated for the provinces related to each route.
2) The per capita GRDP for one day is estimated.
3) By using the trip purpose composition for ferry passenger obtained from the results of the OD data as of 1998, the share of passenger traveling at work is estimated.
4) As a result, the unit passenger time value for each route was estimated as shown in Table 8.4.1.

Table 8.4.1 Unit Passenger Time Value for Each Route

(Unit : Rp./day)

Route	Unit Passenger Time Value
Surabaya – Banjarmasin	7,606
Selayar – Labuhan Bajo	2,301
Manokwari – Biak	9,315
Wahai - Babang	3,104

35. The estimation process is shown in Table A8.4.5.

36. The estimation of cargo time cost saving benefit is as follows;

Cargo time cost saving benefit

$$= \text{Volume of cargo} \times \left(\text{Difference of transport time between with and without case} + \text{Time lost for loading/unloading} \right) \times \text{Unit cargo time value}$$

37. The unit cargo time value is estimated according to the following process;

1) The value added of cargo is assumed as average consumption goods value (Rp.1,547,000 /ton).
2) The unit cargo time value is estimated with the value added of cargo and interest rate (12%), as follows.

Rp.1,547,000 × 0.12 / 365days = Rp.509 /ton/day

38. The estimation of vehicle time cost saving benefit is as follows;

Vehicle time cost saving benefit

$$= \text{Number of vehicle} \times \left(\text{Difference of sea transport time between with and without case} + \text{Time lost for loading/unloading} \right) \times \text{Unit vehicle time value}$$

39. The unit vehicle time value is estimated according to the following process:

1) The market price of each vehicle is estimated based on the interview of dealers.
2) The economic price is estimated by deducting the transfer items such as import duties, value additional tax etc. from the market price.
3) The average service life of sedan, truck and bus is assumed to be 10 years, 7 years and 7 years respectively, from which the economic price of each

vehicle for per one day is considered as unit vehicle time value.

4) The unit vehicle time value is as shown in Table A8.4.6.

40. According to the method mentioned above, the estimated travel time cost saving benefits for each route are shown in Table A8.4.7.

(4) Operation and maintenance costs of existing port facilities in without case

41. The operation and maintenance costs of existing port facilities in without case are treated as benefits of saving in the operation and maintenance cost in the cashflow stream in the economic analysis.

42. The charge of port facilities for passenger is set at Rp.1,500 per person. Since it is considered this charge is applied to the operation and maintenance costs, the unit operation and maintenance costs of existing port facilities are assumed to be Rp.1,500 per person in this study.

8.5 Costs of the Projects

8.5.1 Cost Items

43. The items that should be considered as costs of the projects are as follows:

1) Investment costs for the proposed terminal facilities
2) Operation and maintenance costs for the proposed terminal facilities
3) Procurement costs for the proposed ferry boats
4) Operation and maintenance costs for the proposed ferry boats
5) Re-investment costs for facilities and equipment

(1) Investment costs for the proposed terminal facilities

44 The investment costs for the proposed terminal facilities follow the results of the study in the cost estimate in Chapter 4 of Part 3.

(2) Operation and maintenance costs for the proposed terminal facilities

45. Operation costs consist of personnel costs and administration costs. Personal cost and administration costs are based on the estimation in Chapter 9 "Financial

Analysis"

46. The costs of maintaining the terminal facilities are estimated as a fixed proportion (1%) of the original construction costs excluding the costs components of such maintenance-free items as reclamation works, etc.

(3) Procurement costs for the proposed ferry boats

47. The size, the number and the timing of proposed ferry boats to be introduced were set up for each route based on the study of the ferry operation planning in Chapter 6 of Part 3.

48. Procurement costs of ferry boats are assumed as follows;

1) New boat : 5,000GRT ; US$15 million
1,000GRT ; US$6.6 million
2) Used boat : 5,000GRT ; US$6.0 million
1,000GRT ; US$2.64 million

(4) Operation and maintenance costs for the proposed ferry boats

49. The operation and maintenance costs of proposed ferry boats are based on the estimation in Chapter 9 (See Table A8.6.5(1), (2)).

(5) Re-investment costs

50. The re-investment costs for facilities, equipment and ferry boat after their useful lifetimes are considered.

8.6 Economic Pricing

51. The economic prices of costs and benefits are estimated by applying the following method:

1) The costs and benefits are classified into categories of tradable goods, non-tradable goods, skilled labor, unskilled labor and transfer items.
2) The estimated conversion factors are applied to the above categories and the economic prices of costs and benefits are estimated.

52. The details of the estimation are referred to Appendix 8.6.

53. The results of calculated benefits and cost for each route are shown in Tables A8.7.1 - 4.

8.7 Economic Internal Rate of Return (EIRR)

8.7.1 Calculation of the EIRR

54. The economic internal rate of return (EIRR) based on a cost-benefit analysis is used to appraise the economic feasibility of the project. The EIRR is the discount rate which makes the costs and benefits of a project during the project life equal. It is calculated by using the following formula.

$$\sum_{i=1}^{n} = \frac{B_i - C_i}{(1+r)^{i-1}} = 0$$

where,

n	:	Period of economic calculation (project life)
Bi	:	Benefits in i-th year
Ci	:	Costs in i-th year
r	:	Discount rate

55. In the base case, we considered the following two patterns concerning project cost.

Pattern A : Introduction of new ferry boats
Pattern B : Introduction of used ferry boats

56. Pattern B is considered as one of the methods to reduce project cost. Also, the used ferry boats can be purchased in Indonesia.

57. The following is a summary of the economic analysis results (EIRR) for each route.

Table 8.7.1 Summary of Economic Analysis Results (Base Case)

Route	EIRR	
	Pattern A	Pattern B
Surabaya-Banjarmasin	9.2%	14.3%
Selayar-Labuhan Bajo	11.7%	17.1%
Manokwari-Biak	7.9%	12.1%
Wahai-Babang	3.5%	7.8%

8.7.2 Sensitivity Analysis

58. The Indonesian economy which developed fairly well until 1996 was attacked by currency crisis in the middle of 1997. Indonesian currency momentarily lost about 80% of its value, and the economy entered a recession. In 1997 the annual rate of economic growth, which registered 8.0% in 1996, fell to 4.7%, and hereafter a negative growth rate is expected. The currency is still unstable and the macroscopic economic prospects remain unclear.

59. Under these circumstances, it is very difficult to assess precisely the possible influences of the recent economic situation on these projects. Therefore, by setting up a bold assumption, a sensitivity analysis is carried out. In sensitivity analysis cases, the following items were considered.

(1) Increased project cost due to currency crisis

60. The construction cost for short-term development plan was estimated by using exchange rate of Rp.9,600/US$. In the present situation, it is very difficult to estimate at what level the currency will stabilize. Here, when the exchange rate is assumed to be Rp.12,000/US$ and Rp.17,000/US$, the resulting increase in the construction cost is estimated.

[Assumption for calculation]

1) The subject which is taken into account for this calculation is assumed to the foreign portion of construction cost regarded as tradable goods.
2) The local portion of construction cost is same as the base case.

61. As a result, the estimated construction cost increases by about 10% under an exchange rate of Rp.12,000/US$ and by about 40% under Rp.17,000/US$.

(2) Lower traffic demand forecast due to low economic growth

62. Although the macroscopic economic prospects is not clear, the decrease in traffic demand is roughly estimated. As a result, it is estimated that traffic demand would decrease by nearly 30% or 50%.

63. Considering above mentioned items, a sensitivity analysis is made for the following four alternatives.

Case A: The costs increase by 10%
Case B: The costs increase by 40%
Case C: The traffic demand decreases by 30%
Case D: The traffic demand decreases by 50%

64. The economic analysis results (EIRR) for each route are summarized in Tables 8.7.2 and 8.7.3. Also, in the case of Pattern B, the results of calculated EIRR by the fluctuation of the cost and the traffic demand are shown in Figure 8.7.1.

Table 8.7.2 Results of EIRR (Pattern A)

Route	Base Case	Sensitivity analysis			
		Case A	Case B	Case C	Case D
		Cost +10%	Cost +40%	Demand -30%	Demand -50%
Surabaya-Banjarmasin	9.2%	8.1%	5.0%	4.7%	0.7%
Selayar-Labuhan Bajo	11.7%	10.7%	7.8%	7.6%	3.8%
Manokwari-Biak	7.9%	6.8%	4.2%	4.0%	0.6%
Wahai-Babang	3.5%	2.5%	1.7%	--	--

Table 8.7.3 Results of EIRR (Pattern B)

Route	Base Case	Sensitivity analysis			
		Case A	Case B	Case C	Case D
		Cost +10%	Cost +40%	Demand -30%	Demand -50%
Surabaya-Banjarmasin	14.3%	12.8%	9.1%	8.8%	4.1%
Selayar-Labuhan Bajo	17.1%	15.6%	12.2%	12.0%	7.6%
Manokwari-Biak	12.1%	10.9%	7.9%	7.6%	3.6%
Wahai-Babang	7.8%	6.7%	3.7%	3.4%	--

8.8 Evaluation

65. There are various views concerning the critical percentage of EIRR to judge whether a project is feasible or not. The leading view is that the project is feasible if the EIRR exceeds the Opportunity Cost of Capital (OCC).

66. The value of the OCC adopted by the International Bank for Reconstruction and Development (IBRD) is 12%, for the United States Agency for International Development (USAID), 10%, and for the Asian Development Bank (ADB), 8% to 12%. In general, the OCC is considered to range from 8% to 10% according to the degree of

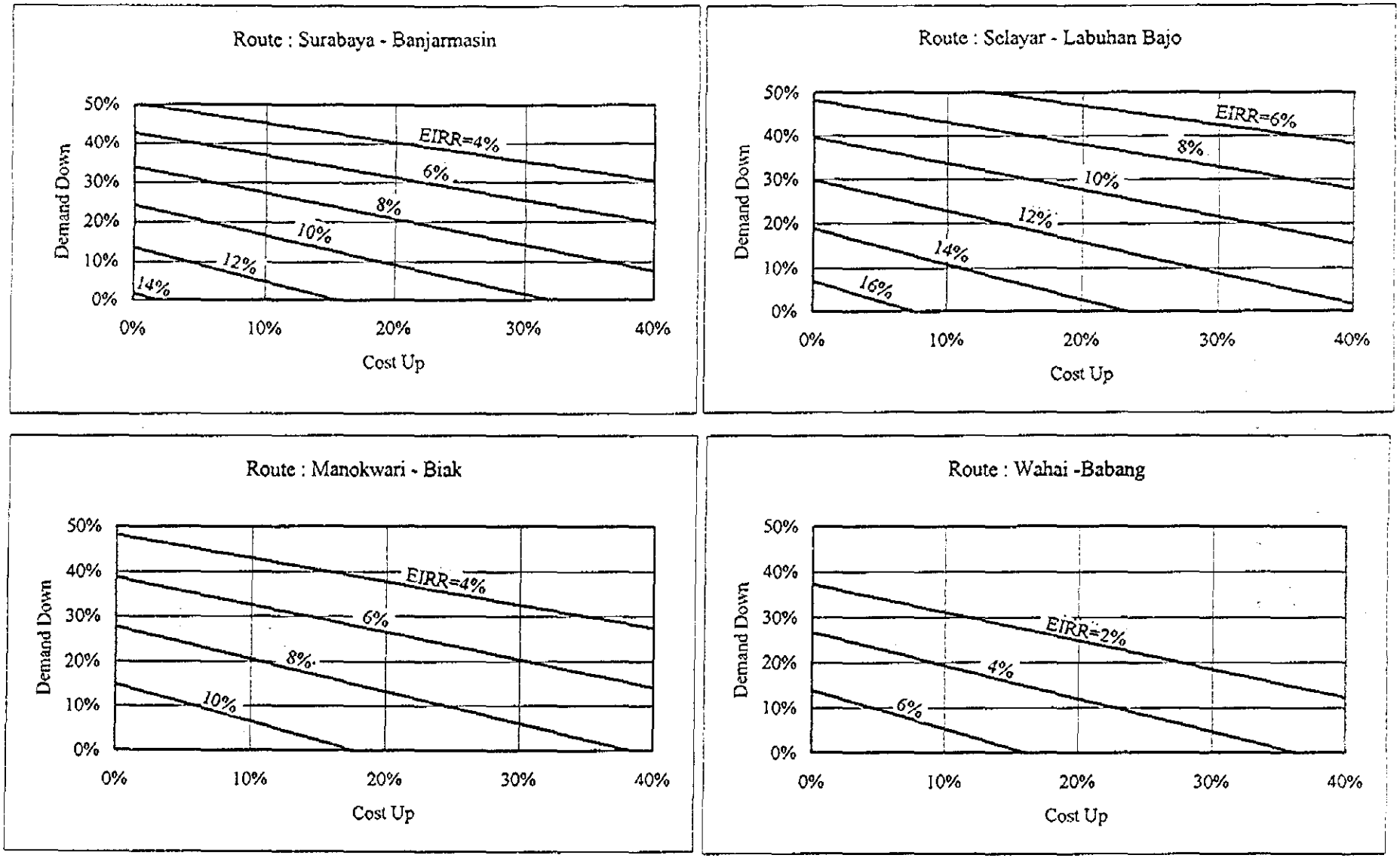

Figure 8.7.1 Results of EIRR by the Fluctuation of Cost and Demand (Pattern B)

development in each country. It is generally considered that a project with an EIRR of more than 10% is economically feasible for infrastructure or social service projects.

67. From this premise, in the case of new boats (base case), these results indicate that implementation of the development of Selayar-Labuhan Bajo route is economically feasible. On the other hand, in the case of used boats (base case), three projects i.e. Surabaya-Banjarmasin, Selayar-Labuhan Bajo and Manokwari-Biak are economically feasible.

68. The economic analysis result of Wahai-Babang route in term of quantified benefits is unfavorable. However, this route will be expected to play an important role as a direct trunk line connecting "Ambon economic influence area" with "Ternate economic influence area" in the future.

69. Also, with the implementation of new ferry service, additional traffic demand generation by increase of punctuality, regularity and comfort in ferry operation, promotion of activation of passenger and commodities movement among regions, promotion of social/cultural communication among regions, promotion of educational opportunities for people in the region and so on, will be expected. As a result, realization of "promotion of regional economic and industrial activity" and "improvement of regional economic disparity" will be expected. Taking the enormous unquantified effects for the related regions into consideration, we judge that these projects should be implemented to stimulate regional development.

70. Although it is very difficult to forecast the future Indonesian economic situation, judging from the results of sensitivity analysis, the four projects can be not necessarily evaluated highly. This is largely due to the decreased traffic demand. However, when the Indonesian economy recovers to the extent that the forecasted traffic demand can be ensured, the implementation of these projects will be feasible.