CHAPTER 4

Chapter 4 Project Evaluation and Recommendations

4-1 Pertinence of the Project in Terms of Present Situation and Beneficial Effects

The Angolan government has been concentrating on improving the traffic infrastructure of the capital Luanda through the Infrastructure Rehabilitation Engineering (IRE) policy, receiving assistance from the World Bank and other international agencies. 41.7 million dollars have been spent since 1992 on infrastructure rehabilitation alone. In particular, the Luanda provincial government has been implementing, in conjunction with the master plan, the reconstruction of high-priority roads and is improving the road network through maintenance and management.

This project is to be conducted in conjunction with the policy and aims to restore the function of urban roads while preventing further deterioration of the city's economy and citizen's quality of living by restoring the arterial and primary urban roads. The following direct effects are anticipated as a result of the project:

Rua Senado da Camara

This route forms the north-south part of a ring route which runs outside of the older section of the city and connects such major routes as Avenida Deolinda Rodrigues (Radial Route 3), Hoji Ya Henda (Radial Route 4), Ngola Kiluanji (Radial Route 5), Avenida Lueji Ankonda (Radial Route 6); therefore serving to connect important routes to one another, mitigating traffic congestion and economizing in travel time.

When Avenida Comandante Kima Kyenda to the north and Avenida 21 de Janeiro to the south (neither of which have been included with this project) are effectively connected with this route, the ring route will be complete, therefore this rehabilitation is an important step in that process. Upon completion, traffic between the airport in the south and port facilities in the north will not be required to travel through the middle of the city, benefiting especially heavy-vehicle traffic.

Aceso a ETA-Marçal

The access road to the reservoir from which the daily water supply for citizens of Luanda is transported by trucks, will be improved.

Quinta Avenida

This route is an important north-south road in the new city area in the east, connecting Avenida Deolinda Rodrigues (Radial Route 3), Hoji Ya Henda (Radial Route 4), and Ngola Kiluanji (Radial Route 5) to one another. Furthermore, it serves as an important access route for a number of factories along the route.

This route also serves as an important connecting road for traffic bound for the eastern suburb

Biana and northern Luanda industrial area without having to pass through the center of the city.

Estrada da Conduta

This route runs east and west through the new city area in the east, connecting Quinta Avenida and General Monteiro Libeiro. In this area, there are no other routes which serve as effective bypasses, therefore with the completion of this route traffic will no longer need to pass other arterial routes and interconnection of communities can be conducted more efficiently.

In addition, this route passes parallel with Ngola Kiluanji, a heavily-traveled and congested urban radial route and will serve as a bypass for it.

Rua Sanatorio-Barrio Popular

This route is an east-west road passing through the southeast of the new city area. At the eastern end of the route is a sanatorium, large factory, police academy, etc., and residences are built along the route. As there are no effective roads presently connecting these various facilities, the completion of this route will offer highly improved access to these and bring greater convenience to the lives of local citizens.

Estrada Golfe-Futungo

The official function of this route is as a ring route, and runs east and west south of the airport, which is south of the city. In the future, this will be part of a ring route outside of Quinta Avenida and will be classified as an arterial route. At present it is a primary road as part of the Luanda Sul Project, in which factories and residences are being constructed and population as well as vehicle volume is on the increase. Its improvement will have many favorable economic and social effects on the community.

The effects of each of the above-mentioned routes will benefit the economy as well as the lives of the citizens of Luanda in the following ways:

① Besides connecting the radial routes to one another, the routes will provide access to residential and commercial areas as well as bring about a reduction in shipping costs and time, thereby vitalizing the economic activities of Angola.
② Rehabilitation of sections of road which became impassable in the rainy season will prevent economic loss
③ Medical and other public facilities will become more easily accessible, improving the quality of life for citizens
④ The radial routes emanating from the center of Luanda run parallel to heavily-traveled routes, thereby serving as bypasses and mitigating congested traffic conditions.

⑤ The construction of these routes will improve on unfavorable present conditions such as trash dumping, dustiness, water puddles, etc. which degrade local living conditions and prevent passage of traffic.

Through this project, enormous beneficial effects are expected and it has been verified to be appropriate as a recipient of grant aid cooperation. Furthermore, the Angolan government has shown that it is capable of maintaining and operating the project routes in terms of personnel and budget. In light of these factors, the early realization of this project is anticipated.

4-2 Coordination with Other Technical Cooperation Projects and Donors

The following assistance is being carried out in the road sector by the World Bank.

The "Boavista Area Cliff Stabilization Project" is planned in an area which was removed from the project (north side of Rua da Camara densely inhabited by refugees) to be carried out with EU funds. As the project will be taking place next to the project in this report, and in view of the fact that a large number of residences will be removed, various considerations will need to be taken.

4-3 Issues

For the effective and efficient implementation of this project, residences which have been built upon planned road areas will need to be removed by the Luanda government. Furthermore, in order to maintain road function, maintenance must be carried out on a regular basis; therefore the Direcção de Serviços de Infraestructuras e Obras of the provincial government, which is in direct charge of maintenance, should carefully plan budgets as shown in item P3-18.

APPENDIX

Appendices

1. Member List of the Survey Team
2. Survey Schedule
   2-1 For Basic Design
   2-2 For Discussion of Draft Final Report
3. List of Party Concerned in Angola Govt.
4. Minutes of Discussion
5. Study Data
   5-1Site Inspection Result
   5-2Soil Survey Result(CBR Test)

Appendix 1 Member of Study Team and Organization

1-1 Basic Study Team

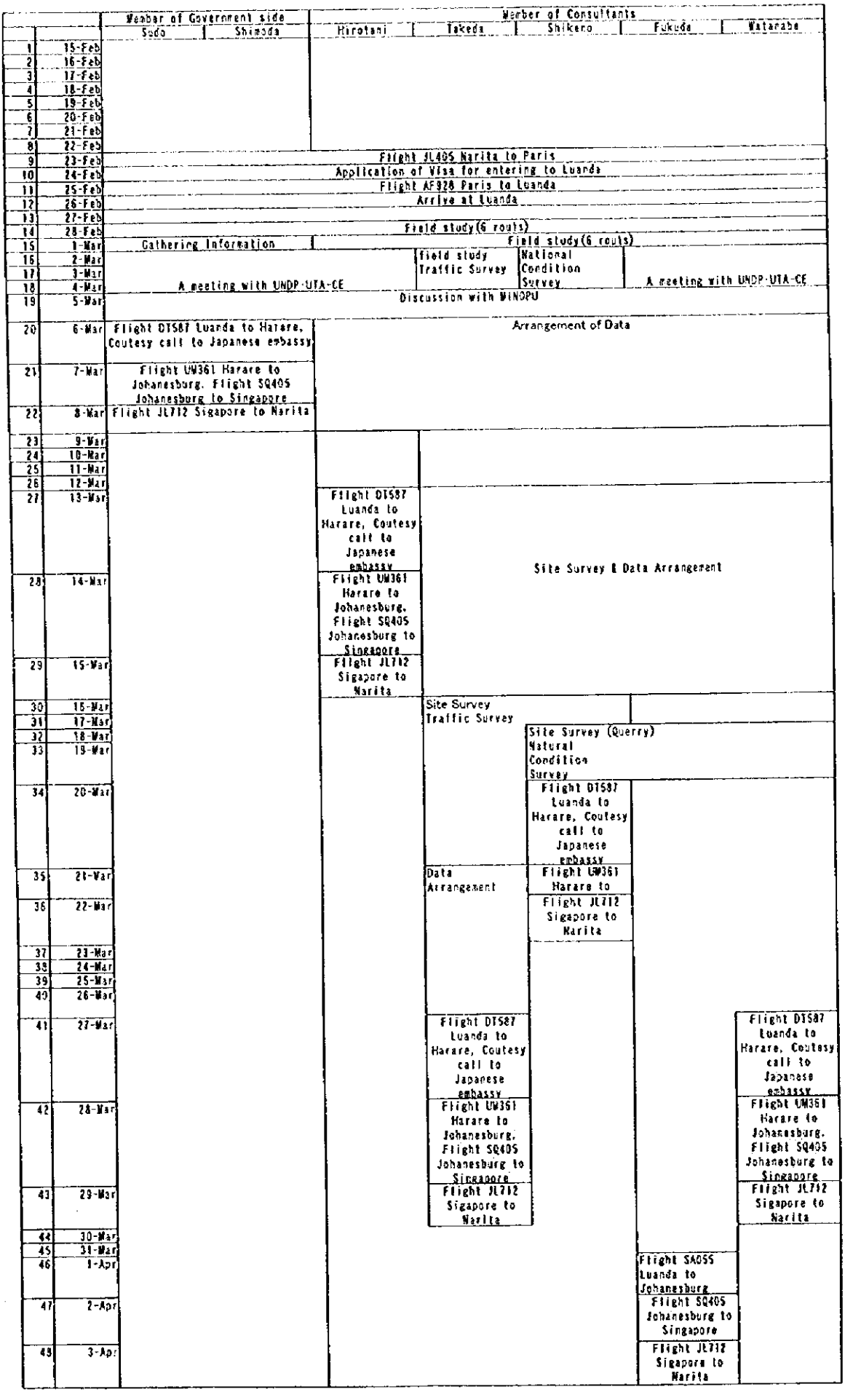
Name	Position	Organization
Mr. Katsuyoshi SUDO	Team Leader	Administrative Division, Training Affairs Department, Japan International Cooperation Agency
Mr. Toru Shimoda	Project Coordinator	Second Project Study Division, Grant Aid Project Study Department, Japan International Cooperation Agency
Mr. Akihiko Hirotani	Chief Consultant/ Transportation Planning	Executive Director, Oriental Consultants Co., Ltd.
Mr. Hiroo Takeda	Road Designer	Chief Engineer, Oriental Consultants Co., Ltd.
Mr. Akio Shikano	Natural Condition Surveyor	Chief Engineer, Oriental Consultants Co,. Ltd.
Mr. Masami Fukuda	Construction Planning/ Cost Estimator	Project Director, Oriental Consultants Co,. Ltd.
Mr. Hiroaki Watabe	Language Translator	Oriental Consultants Co., Ltd.

1-2 Draft Final Report meeting

Name	Position	Organization
Mr. Hayao Adachi	Team Leader	JICA expert, Japan International Cooperation Agency
Mr. Akihiko Hirotani	Chief Consultant/ Transportation Planning	Executive Director, Oriental Consultants Co., Ltd.
Mr. Masami Fukuda	Construction Planning/ Cost Estimator	Project Director, Oriental Consultants Co,. Ltd.
Mr. Hiroaki Watabe	Language Translator	Oriental Consultants Co., Ltd.

Appendix 2

2-1Basic Design Study



2-2 Schedule on Draft Final Report Discussion

No of days	Date	Transportation	Stay	Activities
1	8/6/98(Mon.)	Flight JL405 Narita – Paris	Paris	Transportation
2	8/6/98(Tue.)		Paris	Application for Visa
3	8/6/98(Wed.)	Flight AF928 Paris -	Airplane	Transportation
4	8/6/98(Thu.)	- Luanda	Luanda	/Courtesy call to Provincial Government of Luanda (Infrastructure & Works Service Directorate)
5	8/6/98(Fri.)		Luanda	/A meeting with Provincial Government of Luanda (Infrastructure & Works Service Directorate)
6	8/6/98(Sat.)		Luanda	/Site Inspection with an attendance from Infrastructure & Works Service Directorate
7	8/6/98(Sun.)		Luanda	/An In-house Meeting /Arrangement of Materials
8	8/6/98(Mon.)		Luanda	/A meeting with Provincial Government of Luanda (Infrastructure & Works Service Directorate) /Visiting and Meeting with UTACE A meeting with NTTI
9	8/6/98(Tue.)		Luanda	/Visiting to UNDP and hold a meeting /A meeting with Provincial Government of Luanda (Infrastructure & Works Service Directorate)
10	8/6/98(Wed.)		Luanda	/Signing on Minutes of Discussions
11	8/6/98(Thu.)			/A meeting with Provincial Government of Luanda (Infrastructure & Works Service Directorate) /A meeting with IBRD
12	8/6/98(Fri.)	Flight DT587 Luanda – Harare		/Transportation /A courtesy call to Japanese Embassy and JICA
13	8/6/98(Sat.)	Flight UM361 Harare - Johannesburg		/Transportation
14	8/6/98(Sun.)	Flight JL 712 Singapore – Narita		/Transportation

Appendix-3 List of Party Concerned in Angola Govt.

No.	Member	Position／Division／Ministry
1	Dr. Jose Alberto Puna Zau	Vice Ministro/ MINOPU(Ministerio das Obras Publicas e Urbanismo)
2	Dr. Manuel Antonio Paulo	Director/ Gabinete de Estudos e Analises/ MINOPU(Ministerio das Obras Publicas e Urbanismo)
3	Dr. Wola N'teni-a-Mambu	 Gabinete de Planeamento e Estudos/ MINOPU(Ministerio das Obras Publicas e Urbanismo)
4	Dr. Arquitecto Antonio Goma	Vice Governador/ Governo Provincial de Luanda
5	Dr. Afonso Luviluko	Director/ DSIO(Direccao dos Servicos das Infraestruturas e Obras)/ Governo Provincial de Luanda
6	Mr. Gabriel Nongo Likita	Eng./ DSIO(Direccao dos Servicos das Infraestruturas e Obras)/ Governo Provincial de Luanda
7	Mr. Virgilio Diedade Estote	Eng./ DSIO(Direccao dos servicos das Infraestruturas e Obras)/ Governo Provincial de Luanda
8	Mr. Jose A. de Sousa Mesquita	Eng. DSIO(Direccao dos Servicos das Infra-estruturas e Obras) Governo Provincial de Luanda
9	Ms. Dona Tereza Maola	Conselheira/ Direccao Asia e Oceania/ MIREX(Ministerio das Relacoes Exteriores)
10	Mr. Manimo Simao	Tecnico Superior/ Direccao Asia e Oceania/ MIREX(Ministerio das Relacoes Exteriores)
11	Mr. Faustino dos Santos Lourenco	Eng./ UTA-CE(Uniao Tecnica Administrativa)
12	Dr. Michel Balima	Deputy Representative/ UNDP
13	Mr. Waldemar Pires Alexandre	Director/ Construction Services Instituto de Estrada de Angola
14	Mr. Helder Eugenio da Silva Cruz	General De-Mining Project Manager INAROEE(Instituto Nacional de Remocao de Obstaclos e Engenhos Explosivos)
15	Mr. Carlos Baptista	Chefe, Departamentos de Contencioso e Ouviduria Governo de Luanda

Appendix 4 Minutes of Discussion

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY ON THE PROJECT FOR
IMPROVEMENT OF ROAD NETWORK IN LUANDA
IN
THE REPUBLIC OF ANGOLA
(Consultation on the Draft Basic Design)

The Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched to Angola the Basic Design Study Team on the Project for Improvement of Road Network in Luanda in the Republic of Angola (hereinafter referred to as "the Project") in February 1998. As a result of the series of discussions, field surveys in Angola and technical examination in Japan, JICA prepared the Draft Basic Design on the Project.

In order to explain and discuss with the Government of Angola the components of the Draft Basic Design, JICA sent to Angola the Draft Basic Design Explanation Team (hereinafter referred to as "the Draft Team"), headed by Hayao Adachi, Development Specialist, Institute for International Cooperation, JICA, and scheduled to stay in the country from June 11, 1998 to June 19, 1998.

As a result of discussions, both parties have confirmed the main items described on the attached sheets.

Luanda, June 17, 1998

Mr. Hayao Adachi
Leader
Draft Basic Design Explanation Team
Japan International Cooperation Agency

Mr. Carlos Mateus José
Director
Direcção Nacional de Infraestructuras
Ministério de Obras Públicas e Urbanismo

Mr. Afonso Luviluku
Director
Direcção de Serviços de
Infraestructuras e Obras
Governo Provincial de Luanda

ATTACHMENT

1. Major Components of the Draft Basic Design

The Government of Angola has agreed and accepted in principle the major components of the Draft Basic Design proposed by the Draft Team, including the following stages.

1st STAGE (7.3km)
- Rua Senado da Camara (2.5km)
- Acesso a ETA-Marçal (0.3km)
- Quinta Avenida (4.5km)

2nd STAGE (10.9km)
- Quinta Avenida (0.6km)
- Estrada da Conduta (1.3km)
- Rua Sanatorio-Bairro Popular (Rua Olimpio Makueria) (2.8km)
- Estrada Golfe-Futungo (6.2km)

2. Responsible Agency and Implementing Agency

Ministerio de Obras Publicas e Urbanismo (MINOPU) is the Responsible Agency, and Governo Provincial de Luanda (The Provincial Government of Luanda) is the Implementing Agency of the Project.

3. Management and Maintenance

Governo Provincial de Luanda (The Provincial Government of Luanda) will maintain and use properly the facilities constructed under the Project and assign the necessary staff for operation and maintenance of them.

4. Japan's Grant Aid System

1) The Government of Angola has understood the system of Japan's Grant Aid Program described in ANNEX-1 and explained by the Draft Team.

2) The Government of Angola will take necessary measures described in ANNEX-2 for smooth implementation of the Project on the condition that the Grant Aid from the Government of Japan is extended to the Project.

5. Further Schedule of the Study

The Draft Team will make the Final Report in accordance with the confirmed items and send it to the Government of Angola around August 1998.

6. Major Points of Discussions

Both sides agreed in principle the major points of discussions as follow;

1) As to the implementation of the 1st stage construction, the removal of houses and clearing of project sites shall be completed by the Angolan side by the beginning of December, 1998.
2) Relocation of houses for the 2nd stage construction shall be agreed by the people concerned by the beginning of December, 1998. Actual implementation shall be subject to removal of houses and clearing of project sites by the Angolan side.
3) The Angolan side will allocate enough budget to secure the proper operation and maintenance of roads and ancillary facilities such as street lightings, traffic signals and signs.
4) Concept of road drainage system proposed in the Draft Basic Design was explained and confirmed sufficient.
5) The height of kerb shall be 30cm in principle to prohibit vehicles driven over it.
6) The Angolan side shall conduct prior to this Project any necessary works on facilities such as sewage system, electric and telecommunication system, etc. to avoid damage on completed roads under this Project.
7)Footpath Width
Width of footpath at the standard cross section of the Draft Basic Design shows maximum and can be reduced to accommodate irregular boundary of housings.
8)Alignment of Roads
Horizontal alignment of roads in the Draft Basic Design shall be shifted slightly to avoid removal of some houses. Those houses which can not be avoided by these measures shall be removed by the Angolan side.

7.Training Request

The Angolan side made a strong request to JICA to accept a training program in Japan for this Project and the Draft Team promised to convey the request to the headquarters

ANNEX-1 JAPAN'S GRANT AID SYSTEM

1. Grant Aid Procedures

1) Japan's Grant Aid System is executed through the following procedures.

Application (Request made by a recipient country)
Study (Basic Design Study conducted by JICA)
Appraisal & Approval (Appraisal by the Government of Japan and Approval by the Japanese Cabinet)
Determination of Implementation (The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, a request for the Grant Aid submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for the Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using a Japanese consulting firm.

Thirdly, the Government of Japan appraises the project so as to see whether or not it is suitable for the Grant Aid, basing on the Basic Design Study report prepared by JICA, and then it is submitted to the Cabinet for approval.

Fourthly, once the project is approved by the Cabinet, its implementation is officially determined by signing the Exchange of Notes between the Governments of Japan and of the recipient country.

Finally, in the course of implementation of the project, JICA will take charge of expediting the execution of the project by assisting the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study, conducted by JICA on the requested project, is to provide basic documents necessary for the appraisal of the project by the Government of Japan. The contents of the study are as follows:

a) to confirm the background, objectives and benefits of the project and also institutional capacity of the agencies concerned of the recipient country necessary for the project implementation;
b) to evaluate the appropriateness of the project from the technical, social and economic points of view;
c) to confirm items agreed on by both parties concerning the basic concept of the project;
d) to prepare a basic design of the project; and,
e) to estimate costs of the project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the project. Such measures must be guaranteed even through they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the project. Therefore, the implementation of the project is confirmed by all relevant organizations of the recipient country in the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the study, JICA selects a consultant among those who registered at JICA by evaluating competitive proposals submitted by those consultants. The selected consultant carries out the Basic Design Study and prepare a report based on the terms of reference made by JICA.

At the beginning of the implementation after the Exchange of Notes, JICA recommends the same consultant who participate in the Basic Design Study to the recipient country for the services of Detailed Design and construction

supervision of the project in order to maintain the technical consistency between the Basic Design and the Detailed Design.

3. Japan's Grant Aid Scheme

1) What is the Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) Period

The period of the Grant Aid means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Purchase of Products and Services

Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely consulting, contracting or procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of Verification

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This verification is deemed necessary to secure accountability to Japanese taxpayers.

6) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

(1) to secure land necessary for the sites of the project prior to commencement of the construction;

(2) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;

(3) to secure buildings prior to the procurement in case the installation of the equipment;

(4) to ensure all the expenses and prompt execution for unloading, customs clearance at the ports of disembarkation and internal transportation of the products purchased under the Grant Aid;

(5) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts;

(6) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their works.

7) Proper Use

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for this operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.

8) Re-export

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority shall open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments to the Bank in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of recipient country or its designated authority.

ANNEX-2 UNDERTAKINGS REQUIERED OF THE GOVERNMENT OF ANGOLA

In addition to the undertakings mentioned in the section 3. 6) of ANNEX-1, following necessary measures shall be taken by the Government of Angola on condition that the Grant Aid by the Government of Japan is extended to the Project.

1. to secure construction areas (including removal of the occupying houses) necessary for the Project;

2. to remove the existing electric lines affecting the road construction;

3. to bear commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and other payment commissions;

4. to provide necessary permissions, licenses and other authorizations for implementing the Project, if necessary; and,

5. to bear all the expenses other than those covered by the Grant Aid, necessary for the Project.

Appendix 5 Study Data

5-1 Site Inspection Result

1. Rua Senado da Camara

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 4/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 1

ROAD NAME			start of			end of				
Senado da Camara			Rua de 19 I-L			Rua de 19 I-L				
DISTANCE			0	200	400	450	600	800	1000	1200
INTERSECTING ROAD		LEFT	Baovista							
		RIGHT	Baovista							
CROSS SECTION	LEFT	S/W	0.9m	0.9m	0.9m	0.9m	squater	squater	squater	squater
		SHLD								
		C/W	13.2m	13.2m	13.2m	13.2m				
	RIGHT	C/W								
		SHLD								
		S/W	0.9m	0.92m	0.9m	0.9m	passage width	passage width	passage width	passage width
RIGHT OF WAY WIDTH			about 15m	about 15m	about 15m	about 15m	7.5m	7.5m	7.5m	7.0m
ROAD SURFACE	TYPE		E	E	E	E	A	A	A	A
	CONDITION		B	B	B	B	B	B	B	B
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	F	F	F	F	F	F	F
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
DRAINAGE STRUCTURE			no	no	no	no	no	no	no	no
EXISTING UTILITIES		LEFT	service line	service line	service line	service line	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	no	no	no
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	industry	industry	industry	industry	squater house	squater house	squater house	squater house
		RIGHT	indystry	indystry	indystry	indystry	squater house	squater house	squater house	squater house

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 4/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 2

ROAD NAME			Senado da Camara		Cristano - dos Santos	start of Unduduma		end of Udunduma			
DISTANCE			1250	1400	1410	1600	1650				
INTERSECTING ROAD		LEFT	Houari-Boumedienne								
		RIGHT									
CROSS SECTION	LEFT	S/W		2.45m		1.15m					
		SHLD				2.50m					
		C/W		9.9m							
	RIGHT	C/W				14.90m					
		SHLD									
		S/W		2.50m		4.05m					
RIGHT OF WAY WIDTH				about 15m		22.6m					
ROAD SURFACE	TYPE			A		A					
	CONDITION			B		F					
ROAD ACCESSIBILITY											
EXISTING PROFILE				F		F					
DRAINGE SYSTEM	LEFT			no		no					
	RIGHT			no		no					
DRAINAGE STRUCTURE				no		no					
EXISTING UTILITIES	LEFT			service line		service line					
	RIGHT			no		no					
ROAD FURNITURE	SIGN			priority road		no					
	MARKING			no		no					
	LIGHTING			right side		both side					
	OTHER			no		no					
EXISTING LAND USE	LEFT			residence		commercial					
	RIGHT			residence		commercial					

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 4/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 3

ROAD NAME: Senado da Camara			start project section				access to ETA			
DISTANCE			0+1650	200+1650	400+1650	550+1650	600+1650	730+1650	800+1650	1000+1650
INTERSECTING ROAD		LEFT	Lueji Ankonda			Ngola				A Comandante
		RIGHT	Ndunduma			Kiluanji		Pasture		Valodia
CROSS SECTION	LEFT	S/W	squater	squater			squater		squater	squater
		SHLD								garbage
		C/W								
	RIGHT	C/W								
		SHLD								
		S/W								
RIGHT OF WAY WIDTH			24.3m	14.1m	about 30m		about 25m		24.8m	26.5m
ROAD SURFACE	TYPE		E	E	E		E		E	E
	CONDITION		F	F	F		F		F	F
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	B	B		F		F	B
DRAINGE SYSTEM		LEFT	no	no	no		no		no	no
		RIGHT	ditch	no	no		no		no	no
DRAINAGE STRUCTURE			no	MH	no		no		no	no
EXISTING UTILITIES		LEFT		no	no		no		no	no
		RIGHT	no	no	no		no		no	no
ROAD FURNITURE	SIGN		no	no	no		no		no	no
	MARKING		no	no	no		no		no	no
	LIGHTING		no	no	no		no		no	no
	OTHER		no	no	no		no		no	no
EXISTING LAND USE		LEFT	house	house	open space		house		house	apartment
		RIGHT	street	aprtment	aprtment		car park		house	apartment

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 4/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 4

ROAD NAME			at Hoji Ya			star of				
Senado da Camara					Henda	pavement				
DISTANCE			1200+1650	1400+1650	1450+1650	0+3100	200+3100	400+3100	600+3100	800+3100
INTERSECTING ROAD		LEFT			A Hoji Ya	Hoji Ya				
		RIGHT	local		Henda	Henda				
CROSS SECTION	LEFT	S/W	squater	squater	squater	car park	4.2m	1.5m	5.0m	4.5m
		SHLD								
		C/W				9.20m	8.10m	9.0m	9.2m	9.3m
	RIGHT	C/W								
		SHLD								
		S/W	squater	7.1m		3.0m	E (4.10m)	E (3.6m)	E (1.6m)	E (1.6m)
RIGHT OF WAY WIDTH			19.5m	28.9m	about 30m	uk	uk	uk	uk	uk
ROAD SURFACE	TYPE		E	E	E	A	A	A	A	A
	CONDITION		F	F	F	F	F	F	F	F
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	F	F	F	F	F	F	F
DRAINGE SYSTEM		LEFT	no	no	no	no	river	river	river	river
		RIGHT	no	ditch	no	no	no	no	no	no
DRAINAGE STRUCTURE			no	no	no	MH	no	no	no	no
EXISTING UTILITIES		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	no	no	no
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	apartment	house	house	parking lot	river	river	river	river
		RIGHT	apartment	house	aprtment	public office	super M	house	ware house	ware house

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 5/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 5

ROAD NAME			end of							
Senado da Camara			project section							
DISTANCE			1000+3100	1050+3100	0+4150	200+4150	400+4150	600+4150	800+4150	900+4150
INTERSECTING ROAD		LEFT		Deolinda -	Deolinda -					Estrada -
		RIGHT		Rodorigues	Rodorigues					Ngola Bamdi
CROSS SECTION	LEFT	S/W	2.2m, eroding							
		SHLD								
		C/W	7.3m							
	RIGHT	C/W								
		SHLD								
		S/W	E (2.4m)							
RIGHT OF WAY WIDTH			uk	randabout		open space	open space	open space	open space	
ROAD SURFACE	TYPE		A		A	E	E	E	E	
	CONDITION		F		B	B	B	B	B	
ROAD ACCESSIBILITY										
EXISTING PROFILE			F				F	F	F	
DRAINGE SYSTEM		LEFT	river		river	river	no	no	no	
		RIGHT	no		no	no	no	no	no	
DRAINAGE STRUCTURE			no		no	no	no	no	no	
EXISTING UTILITIES		LEFT	np		np	np	no	no	no	
		RIGHT	no		no	no	no	no	no	
ROAD FURNITURE	SIGN		no		no	no	no	no	no	
	MARKING		no		no	no	no	no	no	
	LIGHTING		no		no	no	no	no	no	
	OTHER		no		no	no	no	no	no	
EXISTING LAND USE		LEFT	river		river	river	open space	open space	open space	
		RIGHT	ware house		police HQ	police HQ	river	river	open space	

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 5/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 6

ROAD NAME			Senado da Camara							end of S. Camara
DISTANCE			900+4150	0+5050	200+5050	350+5050	400+5050	600+5050	800+5050	1000+5050
INTERSECTING ROAD		LEFT	Estrada -	Estrada -		corner				A.Dr.Moise
		RIGHT	Ngola Bamdi	Ngola Bamdi						Alves de Pinho
CROSS SECTION	LEFT	S/W		squater	squater	market	market	squater	squater	squater
		SHLD								
		C/W								
	RIGHT	C/W								
		SHLD								
		S/W		squater	squater	market	market	squater	squater	squater
RIGHT OF WAY WIDTH				11.7m	6.75m	about 7m	about 7m	about 7m	about 15m	about 15m
ROAD SURFACE	TYPE			E	E	E	E	E	E	E
	CONDITION			B	B	B	B	B	B	B
ROAD ACCESSIBILITY										
EXISTING PROFILE				F	F	F	F	F	F	F
DRAINGE SYSTEM		LEFT		no	no	no	no	no	no	no
		RIGHT		no	no	no	no	no	no	no
DRAINAGE STRUCTURE				no	no	no	no	no	no	no
EXISTING UTILITIES		LEFT		no	no	no	no	no	no	no
		RIGHT		no	no	no	no	no	no	no
ROAD FURNITURE	SIGN			no	no	no	no	no	no	no
	MARKING			no	no	no	no	no	no	no
	LIGHTING			no	no	no	no	no	no	no
	OTHER			no	no	no	no	no	no	no
EXISTING LAND USE		LEFT		house	house	house	house	house	house	house
		RIGHT		house	house	house	house	house	house	house

Ver.1.1 Mar/98

Detailed Inspection Sheet FOR PAVEMENT / ROAD

Inspection Date: 3/3/'98 No. 5

Engineer	Engineer	Inspector
S.Imai	H.Takeda	

General Information

Route:	Senado da Camara, Ndunduma		
Location:	1.4 km to	1.7 km	
Rd.Class:	Sec. Arteri	Nos. of C/W 1	Lanes: 4
Direction:	Bao vista to Ndunduma	Design Speed:	40km/h
Inspectors:		Constructed Year:	

Inspection Items

Damage type	3	(1)Settlement (2)Cracking (3)Pothole (4)Wave (5)Rutting (6)Ravellin
Pavement	1	(1)Asphalt (2)Surface treated (3)Gravel (4)Earth
Terrrain	5	(1)Mount (2)Hill (3)Flat (4)Swampy (5)Town
Soil	6	(1) Rock (2)Gravel (3)Sand (4)Silt (5)Clay (6)Other( )
Drainage pipe		Diameter = mm Concrete, Steel, Othe( )
Ground Water	4	(1)Flow (2)Seepage (3)Wet (4)None
Land Use and Environment		right: commercial
		left: commercial

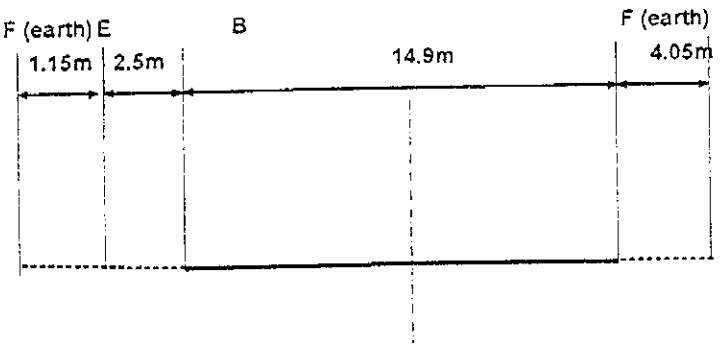
Cracking Ratio	30 %
Ruting Depth	D = 15 mm
Long Rough	σ = 5 mm
Potholes Nos.	3 Depth Ave. 50 mm
Diameter	2500 mm
Ave	2000 mm
General Remark	bad, almost broken

Judgement (Incl.subgrade)

remark	Grade	
	I	Reconstruction
O	II	Overlay
	III	Surface Treatment
	IV	no Repair needed

Cross Section

Survey Point 1 km + 410 m to 650 m



A:	Platform width	F:	Foot path width
B:	Carraigeway width	G:	Crossfall
C:D:	Traffic lane width	H:	Median width
E:	Shoulder width		

Photograph

Site Photograph

Road Name: Senado da Camara (1/3)

Date: 5/3/'98 Photograph taken by: H. Takeda

Station **0**

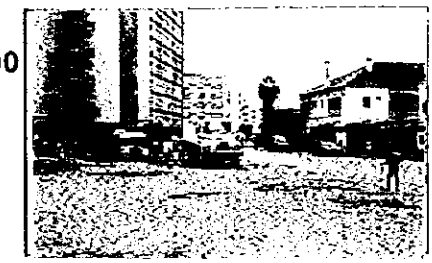
Station **1200**

Station **200**

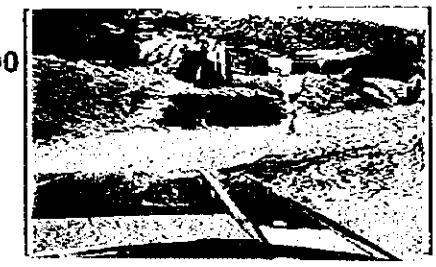
Station **1400**

Station **400**

Station **1600**



Station **600**



Station **0+1650**

Station **800**

Station **200+1650**

Station **1000**

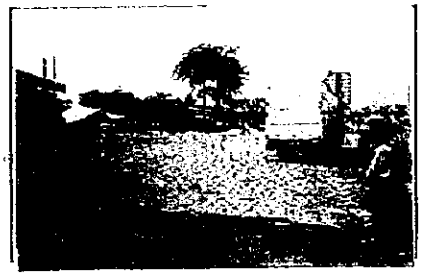
Station **400+1650**

Site Photograph

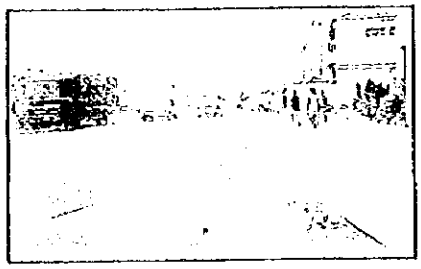
Road Name: Senato da Camara (2/3)

Date: 5/3/'98 Photograph taken by: H. Takeda

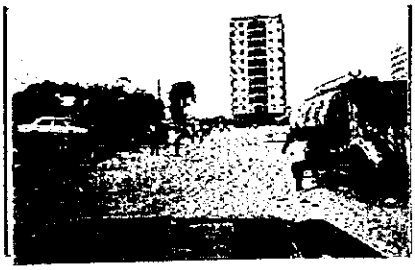
Station **600+1650**



Station **200+3100**



Station **800+1650**



Station **400+3100**

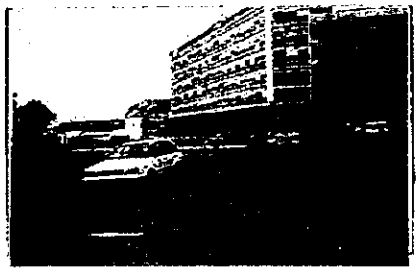
Station **1000+1650**

Station **600+3100**

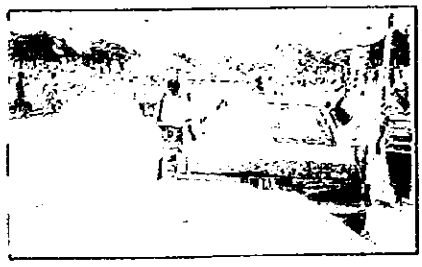
Station **1200+1650**

Station **800+3100**

Station **1400+1650**



Station **1000+3100**



Station **0+3100**

Station **0+4150**

Site Photograph

Road Name: Senato da Camara (3/3)

Date: 5/3/98 Photograph taken by: H. Takeda

Station **200+4150**

Station **400+5050**

Station **400+4150**

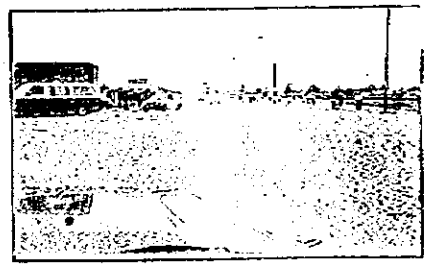
Station **600+5050**

Station **600+4150**

Station **800+5050**

Station **800+4150**

Station **1000+5050**



Station **0+5050**

Station

Station **200+5050**

Station

2 Quuinta Avenida

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 3/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 1

ROAD NAME			starting point							
Quinta Avenida										
DISTANCE			0	200	400	600	650	800	1000	1200
INTERSECTING ROAD		LEFT	Ngola Kiluanji	no	no	no	Avenida	no	no	local
		RIGHT	Ngola Kiluanji	no	no	no	Conduta	no	no	no
CROSS SECTION	LEFT	S/W						E (3.0m)	E (3.0m)	E (3.0m)
		SHLD								
		C/W	railway					9.25m	9.25m	9.25m
	RIGHT	C/W	crossing							
		SHLD								
		S/W		squater				E (3.0m)	E (3.0m)	E (3.0m)
RIGHT OF WAY WIDTH			about 15m	about 15m	14.2m	15.0m		15.25m	15.25m	15.25m
ROAD SURFACE	TYPE		E	E	E	E	E	A	A	A
	CONDITION		B	B	B	B	B	F	F	F
ROAD ACCESSIBILITY										
EXISTING PROFILE			slope	F	F	F	F	F	F	F
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
DRAINAGE STRUCTURE			no	no	no	no	no	no	no	no
EXISTING UTILITIES		LEFT	service line	no	no	no	no	no	no	no
		RIGHT	service line	service line	service line	service line	service line	service line	service line	service line
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	on the left	no	on the left
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	house	house	house	house	industry	industry	industry	market
		RIGHT	house	house	house	house	house	house	house	market

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 3/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 2

ROAD NAME			start of							
Quinta Avenida			bad pavement							
DISTANCE			1400	1600	1800	2000	2200	2300	2400	2600
INTERSECTING ROAD		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
CROSS SECTION	LEFT	S/W	E (3.0m)	E (3.0m)	E (3.0m)	E (3.0m)	E (3.5m)	E (3.5m)	E (3.5m)	E (3.5m)
		SHLD								
		C/W	9.10m	9.10m	9.15m	9.15m	8.00m	8.00m	8.50m	8.50m
	RIGHT	C/W								
		SHLD								
		S/W	E (3.0m)	E (3.0m)	E (3.0m)	E (3.0m)	E (3.5m)	E (3.5m)	E (3.5m)	E (3.5m)
RIGHT OF WAY WIDTH			15.10m	15.10m	15.10m	15.00m	15.00m	15.00m	15.50m	15.50m
ROAD SURFACE	TYPE		A	A	A	A	A	A	A	A
	CONDITION		G	G	G	G	B	B	B	F
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	F	F	F	F	F	F	F
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
DRAINAGE STRUCTURE			no	no	no	no	no	no	no	no
EXISTING UTILITIES		LEFT	no	no	no	no	no	no	no	no
		RIGHT	service line	service line	service line	service line	service line	service line	service line	service line
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	no	no	no
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	industry	house	industry	house	house	house	market	house
		RIGHT	industry	industry	industry	house	house	house	industry	industry

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 3/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 3

ROAD NAME			former							
Quinta Avenida			end of project							
DISTANCE			2650	2800	3000	3200	3250	3400	3600	3800
INTERSECTING ROAD		LEFT	no	no	no	no	Rua 11	no	no	no
		RIGHT	Rua de Brazil	local	no	no	Rua 11	no	no	no
CROSS SECTION	LEFT	S/W		E (5.0m)	E (5.0m)	E (3.9m)				garbage
		SHLD								
		C/W		7.30m	7.30m	7.30m				
	RIGHT	C/W								
		SHLD								
		S/W				E (5.1m)				
RIGHT OF WAY WIDTH				about 16m	about 16m	16.30m		17.70m	uk	uk
ROAD SURFACE	TYPE			A	A	A		E	E	E
	CONDITION			F	F	F		F	F	F
ROAD ACCESSIBILITY										
EXISTING PROFILE				F	F	F		F	F	F
DRAINGE SYSTEM		LEFT		no	no	no		no	no	no
		RIGHT		no	no	no		no	no	no
DRAINAGE STRUCTURE				no	no	no		no	no	no
EXISTING UTILITIES		LEFT		no	no	no		no	no	no
		RIGHT		service line	service line	service line		service line	service line	service line
ROAD FURNITURE	SIGN			no	no	no		no	no	no
	MARKING			no	no	no		no	no	no
	LIGHTING			no	no	no		no	no	no
	OTHER			no	no	no		no	no	no
EXISTING LAND USE		LEFT		house	house	house		house	house	house
		RIGHT	house	house	house	river		house	house	house

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 3/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 4

ROAD NAME									
Quinta Avenida								ending point	
DISTANCE			4000	4200	4400	4600	4800	5000	5100	
INTERSECTING ROAD		LEFT	no	no	no	no	no	no	Deolinda	
		RIGHT	no	no	no	no	no	no	Rodorigues	
CROSS SECTION	LEFT	S/W		garbage	garbage		squater	squater		
		SHLD								
		C/W							railway	
	RIGHT	C/W							crossing	
		SHLD								
		S/W					squater	squater		
RIGHT OF WAY WIDTH			15.3m	12.0m	11.2m	about 12m	about 12m	about 12m		
ROAD SURFACE	TYPE		E	E	E	E	E	E	E	
	CONDITION		B	B	B	B	B	B	B	
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	F	F	F	F	slope	slope	
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	
		RIGHT	no	no	no	no	no	no	no	
DRAINAGE STRUCTURE			no	no	no	no	no	no	no	
EXISTING UTILITIES		LEFT	no	no	no	no	no	no		
		RIGHT	no	no	no	no	no	no		
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	
	MARKING		no	no	no	no	no	no	no	
	LIGHTING		no	no	no	no	no	no	no	
	OTHER		no	no	no	no	no	no	no	
EXISTING LAND USE		LEFT	house	house	house	house	house	house		
		RIGHT	house	house	house	house	house	house		

Ver.1.1 Mar/98

Detailed Inspection Sheet FOR PAVEMENT / ROAD Inspection Date: 3/3/'98 No. 4

	Engineer	Engineer	Inspector				
	S.Imai	H.Takeda					

General Information

Route:	Quinta Avenida			
Location:	1.2 km to	1.4 km		
Rd.Class:	Collector	Nos. of C/W 1	Lanes:	2
Direction:	Conduta to	D.Rodorigu	Design Speed:	40km/h
Inspectors:		Constructed Year:		

Inspection Items

Damage type	6	(1)Settlement (2)Cracking (3)Pothole (4)Wave (5)Rutting (6)Ravelli
Pavement	1	(1)Asphalt (2)Surface treated (3)Gravel (4)Earth
Terrrain	5	(1)Mount (2)Hill (3)Flat (4)Swampy (5)Town
Soil	6	(1) Rock (2)Gravel (3)Sand (4)Silt (5)Clay (6)Other( )
Drainage pipe		Diameter = mm Concrete, Steel, Othe( )
Ground Water	4	(1)Flow (2)Seepage (3)Wet (4)None
Land Use and Environment		right: industry
		left: industry

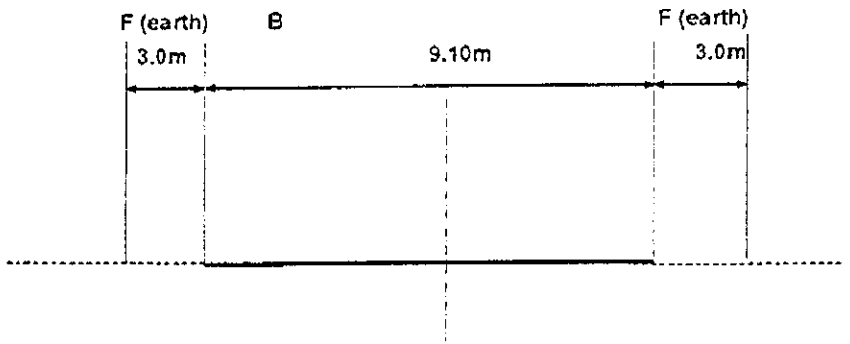
Cracking Ratio	15 %
Ruting Depth	D = 10 mm
Long Rough	σ = 3 mm
Potholes Nos.	Depth Ave. mm
Diameter	mm
Ave	mm
General Remark	fair

Judgement (incl.subgrade)

remark	Grade	
	I	Reconstruction
O	II	Overlay
	III	Surface Treatment
	IV	no Repair needed

Cross Section

Survey Point 1.0 km + 200 m to 400 m



Photograph

A:	Platform width	F:	Foot path width
B:	Carraigeway width	G:	Crossfall
C:D:	Traffic lane width	H:	Median width
E:	Shoulder width		

Site Photograph

Road Name: Quinta Avenida (1/3)

Date: 3/3'98 Photograph taken by: H. Takeda

Station **0**

Station **200**

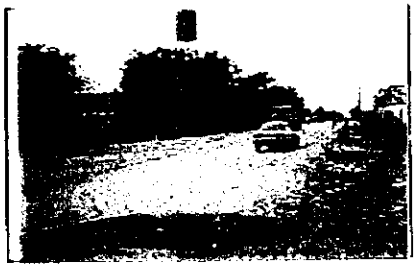
Station **400**

Station **600**

Station **800**

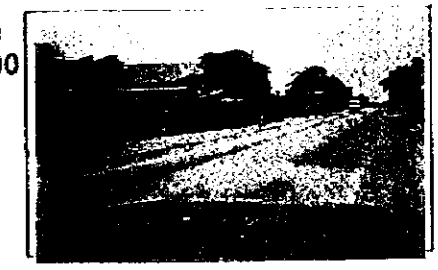
Station **1000**

Station **1200**

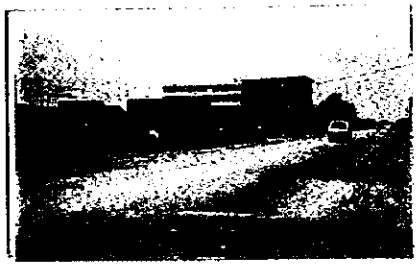


Station **1400**

Station **1600**

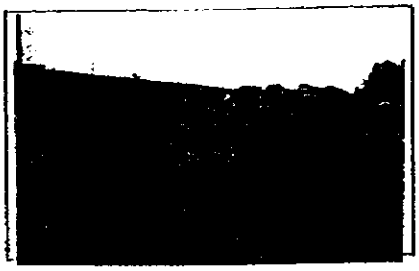


Station **1800**



Station **2000**

Station **2200**



Site Photograph

Road Name: Quinta Avenida (2/3)

Date: 3/3'98 Photograph taken by: H. Takeda

Station **2400**

Station **3600**

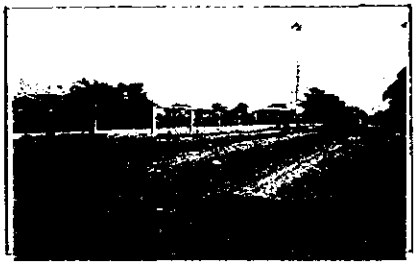
Station **2600**

Station **3800**

Station **2800**

Station **4000**

Station **3000**



Station **4200**

Station **3200**

Station **4400**

Station **3400**

Station **4600**

Site Photograph

Road Name: Quinta Avenida (3/3)

Date: 3/3'98 Photograph taken by: H. Takeda

Station **4800**

Station

Station **5000**

Station

Station **5100**

Station

Station

Station

Station

Station

Station

3. Avenida Conduta

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 3/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 1

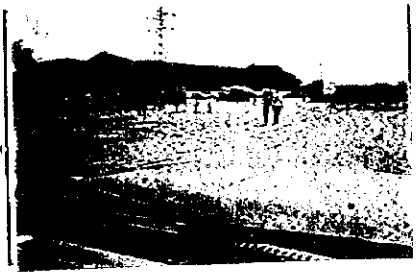
ROAD NAME			starting							ending
Avenida Conduta			poin							point
DISTANCE			0	200	400	600	800	1000	1200	1300
INTERSECTING ROAD		LEFT	G.Monterio	no	local	no	no	no	no	Quinta Avenida
		RIGHT	Liberio	local	local	no	no	no	no	Quinta Avenida
CROSS SECTION	LEFT	S/W	squater							
		SHLD								
		C/W								
	RIGHT	C/W								
		SHLD								
		S/W		water						
RIGHT OF WAY WIDTH			uk	about 27m	about 27m	about 27m	about 27m	27.5m	about 27m	about 27m
ROAD SURFACE	TYPE		E	E	E	E	E	E	E	E
	CONDITION		F	B	F	F	B	B	B	B
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	F	F	F	F	F	F	F
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	ditch on earth	ditch on earth	ditch on earth	ditch on earth	no	no
DRAINAGE STRUCTURE			MH	no	no	no	no	no	no	no
EXISTING UTILITIES		LEFT	high V line	high V line	high V line	high V line	high V line	high V line	high V line	high V line
		RIGHT	low V line	low V line	low V line	low V line	low V line	low V line	low V line	low V line
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	no	no	no
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	house	house	house	house	house	house	house	house
		RIGHT	house	house	house	house	house	house	house	house

Site Photograph

Road Name: Avenida Conduta (1/1)

Date: 3/3/98 Photograph taken by:

Station **0**



Station **1200**

Station **200**

Station **1300**

Station **400**

Station

Station **600**

Station

Station **800**

Station

Station **1000**

Station

4. Rua Sanatorio – Bairro Popular

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 4/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 1

ROAD NAME			starting	crossing				no passage		
Sanatorio Bairro-Popular			point	small river				mount of garbage		
DISTANCE			0	200	300	400	600	770	800	1000
INTERSECTING ROAD		LEFT	Machado	no		no	no	no	no	no
		RIGHT	Saldanha	local		no	no	no	no	no
CROSS SECTION	LEFT	S/W	squater			squater	squater	squater	squater	squater
		SHLD								
		C/W								
	RIGHT	C/W								
		SHLD								
		S/W								
RIGHT OF WAY WIDTH			18.0m	17.4m		9.9m	12.7m	about 12m	10.0m	9.85m
ROAD SURFACE	TYPE		E	E		E	E	E	E	E
	CONDITION		B	B		B	B	B	B	B
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	F		F	F	F	F	F
DRAINGE SYSTEM		LEFT	no	no		no	ditch	no	no	no
		RIGHT	no	no		ditch	no	no	no	no
DRAINAGE STRUCTURE			MH	no		no	no	no	no	MH
EXISTING UTILITIES		LEFT	no	no		no	no	no	no	no
		RIGHT	service line	service line		service line	service line	service line	service line	service line
ROAD FURNITURE	SIGN		no	no		no	no	no	no	no
	MARKING		no	no		no	no	no	no	no
	LIGHTING		no	no		no	no	no	no	no
	OTHER		no	no		no	no	no	no	no
EXISTING LAND USE		LEFT	house	house		house	house	house	house	house
		RIGHT	house	house		house	house	house	house	house

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 4/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 2

ROAD NAME									
Sanatorio Bairro-Popular									
DISTANCE			1200	1400	1600	1800	2000	2200	2400	2600
INTERSECTING ROAD		LEFT	local	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
CROSS SECTION	LEFT	S/W	squater	squater	garbage					
		SHLD	garbage	garbage						
		C/W				E	E	E	E	E
	RIGHT	C/W				ditch	ditch	ditch	ditch	ditch
		SHLD								
		S/W		garbage	2.9m					
RIGHT OF WAY WIDTH			11.8m	13.8m	19.9m	14.7m	20.2m	18.5m	26.6m	25.0m
ROAD SURFACE	TYPE		E	E	E	E	E	E	E	E
	CONDITION		B	B	B	B	B	B	B	B
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	F	F	F	F	F	F	F
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	ditch on E	ditch on E	ditch on E	ditch on E	ditch on E
DRAINAGE STRUCTURE			MH	MH	no	no	MH	no	no	MH
EXISTING UTILITIES		LEFT	no	no	no	no	no	no	no	no
		RIGHT	service line	service line	service line	service line	service line	service line	service line	service line
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	no	no	no
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	house	house	house	house	house	house	house	house
		RIGHT	house	house	house	house	house	house	church	house

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE | INSPECTOR S.Imai | INSPECTOR H.Takeda | SHEET No. 3

ROAD NAME			ending							
Sanatorio Bairro-Popular			point							
DISTANCE			2800							
INTERSECTING ROAD		LEFT								
		RIGHT								
CROSS SECTION	LEFT	S/W								
		SHLD								
		C/W								
	RIGHT	C/W								
		SHLD								
		S/W								
RIGHT OF WAY WIDTH			uk							
ROAD SURFACE	TYPE		E							
	CONDITION		B							
ROAD ACCESSIBILITY										
EXISTING PROFILE			F							
DRAINGE SYSTEM		LEFT	no							
		RIGHT	no							
DRAINAGE STRUCTURE			no							
EXISTING UTILITIES		LEFT	no							
		RIGHT	service line							
ROAD FURNITURE	SIGN		no							
	MARKING		no							
	LIGHTING		no							
	OTHER		no							
EXISTING LAND USE		LEFT	market							
		RIGHT	car park							

Site Photograph

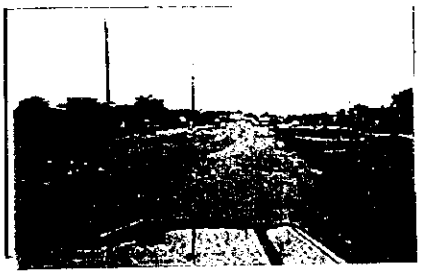
Road Name: Sanatorio Bairro-Popular (2/2)

Date: 4/3/'98 Photograph taken by: H. Takeda

Station **2200**

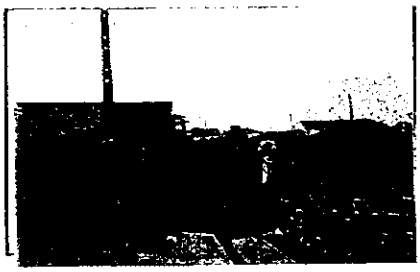
Station

Station **2400**



Station

Station **2600**



Station

Station **2800**

Station

Station

Station

Station

Site Photograph

Road Name: Sanatorio Bairro-Popular (1/2)

Date: 4/3/98 Photograph taken by: H. Takeda

Station **0**

Station **1000**

Station **200**

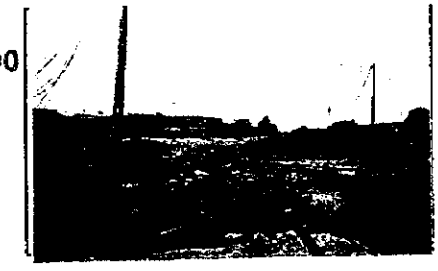
Station **1200**

Station **400**

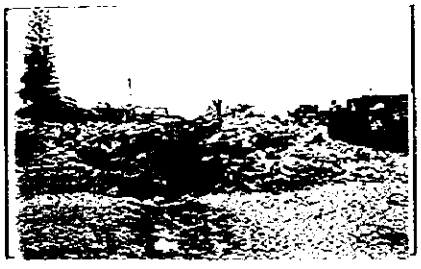
Station **1400**

Station **600**

Station **1600**



Station **770**



Station **1800**

Station **800**

Station **2000**

Site Photograph

Road Name: Golfe Futungo (1/3)

Date: 2/3/'98 Photograph taken by: H. Takeda

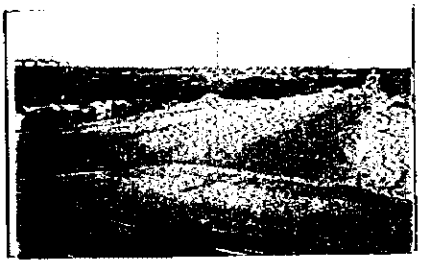
Station **0**

Station **1200**

Station **200**

Station **1400**

Station **400**

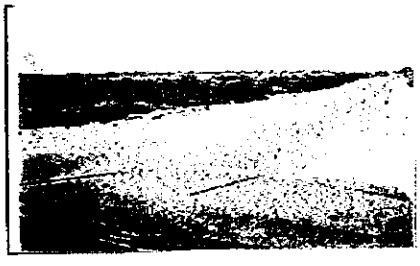


Station **1600**

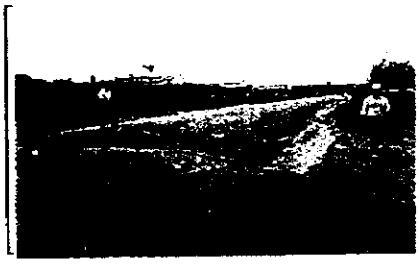
Station **600**

Station **1800**

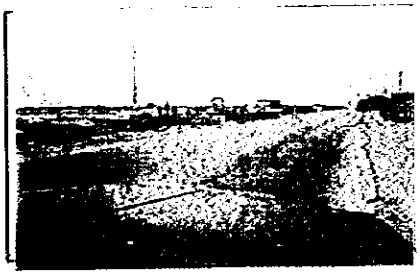
Station **800**



Station **2000**



Station **1000**



Station **2200**

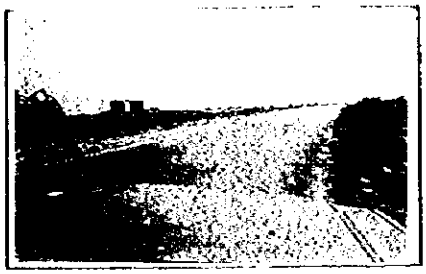
Site Photograph

Road Name: Golfe Futungo (2/3)

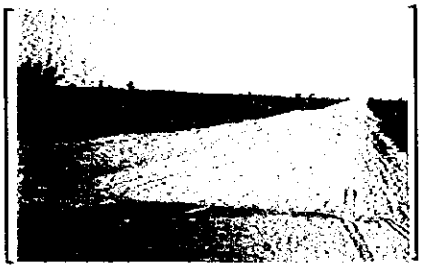
Date: 2/3/'98 Photograph taken by: H. Takeda

Station **2400**

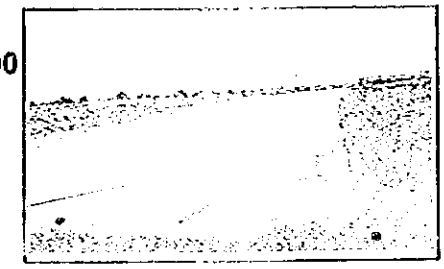
Station **3600**



Station **2600**

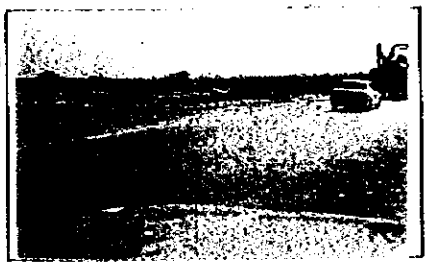


Station **3800**



Station **2800**

Station **4000**



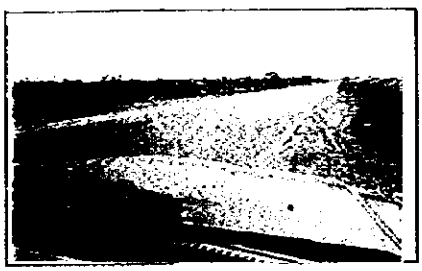
Station **3000**

Station **4200**

Station **3200**

Station **4400**

Station **3400**



Station **4600**

5. Estrada Golfe - Futungo

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 2/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 1

ROAD NAME			starting			on bridge			
Golfe Futungo			point						
DISTANCE			0	200	400	600	790	800	1000	1200
INTERSECTING ROAD		LEFT		no	no	no		no	no	no
		RIGHT		no	no	no		no	no	no
CROSS SECTION	LEFT	S/W		E (1.5m)	E (1.5m)	E (1.5m)		E (1.5m)	E (1.5m)	E (1.5m)
		SHLD								
		C/W	8.4m	9.25m	9.35m	9.50m	9.25m	9.30m	9.45m	9.35m
	RIGHT	C/W								
		SHLD								
		S/W		E (1.5m)	E (1.5m)	E (1.5m)		E (1.5m)	E (1.5m)	E (1.5m)
RIGHT OF WAY WIDTH			about 12.5m	about 12.5m	about 12.5m	about 12.5m		about 12.5m	about 12.5m	about 12.5m
ROAD SURFACE	TYPE		A	A	A	A	A	A	A	A
	CONDITION		B	F	F	F	F	F	B	B
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	F	F	slope	slope	slope	slope	F
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
DRAINAGE STRUCTURE			no	no	no	no	no	no	no	no
EXISTING UTILITIES		LEFT	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line
		RIGHT	no	no	no	no	no	no	no	no
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	no	no	no
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	field	field	field	field	field	field	field	field
		RIGHT	house	house	house	house	house	house	house	house

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 2/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 2

ROAD NAME									
Golfe Futungo			on culvert						
			unpaved						
DISTANCE			1400	1600	1800	2000	2200	2400	2600	2800
INTERSECTING ROAD		LEFT	no	no	no	access road	no	no	no	no
		RIGHT	local road	no	no	no	no	no	no	no
CROSS SECTION	LEFT	S/W	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)		E (1.5m)	E (1.5m)
		SHLD								
		C/W	9.35m	9.30m	9.10m	9.30m	9.90m	11.30m	9.30m	9.35m
	RIGHT	C/W								
		SHLD								
		S/W	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)		E (1.5m)	E (1.5m)
RIGHT OF WAY WIDTH			about 12.5m	about 12.5m	about 12.5m	about 12.5m	about 12.5m		about 12.5m	about 12.5m
ROAD SURFACE	TYPE		A	A	A	A	A	E	A	A
	CONDITION		F	F	B	F	B	B	B	B
ROAD ACCESSIBILITY										
EXISTING PROFILE			F	F	F	F	F	slope	slope	F
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
DRAINAGE STRUCTURE			no	no	no	no	no	no	no	no
EXISTING UTILITIES		LEFT	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line
		RIGHT	no	no	no	no	no	no	no	no
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	no	no	no
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	field	market	apartment	apartment	apartment	apartment	field	field
		RIGHT	house	house	house	house	house	house	house	field

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 2/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 3

ROAD NAME									
Golfe Futungo									
DISTANCE			3000	3200	3400	3600	3800	4000	4200	4400
INTERSECTING ROAD		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	no	no
CROSS SECTION	LEFT	S/W	no	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)
		SHLD								
		C/W	9.20m	9.30m	9.15m	9.65m	9.40m	9.30m	9.30m	9.40m
	RIGHT	C/W								
		SHLD								
		S/W	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)
RIGHT OF WAY WIDTH			about 12.5m	about 12.5m	about 12.5m	about 12.5m	about 12.5m	about 12.5m	about 12.5m	about 12.5m
ROAD SURFACE	TYPE		A	A	A	A	A	A	A	A
	CONDITION		B	B	F	F	F	F	F	F
ROAD ACCESSIBILITY										
EXISTING PROFILE			slope	slope	F	F	slope	slope	F	F
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	no	no	no	V ditch	V ditch
DRAINAGE STRUCTURE			no	no	no	no	no	no	no	no
EXISTING UTILITIES		LEFT	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line
		RIGHT	no	no	no	no	no	no	no	no
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	no	no	no
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	field	field	field	garbage depot	garbage depot	field	field	field
		RIGHT	field	field	field	field	garbage depot	field	field	field

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 2/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 4

ROAD NAME			on culvert	Project Nova Vida					unpaved
Golfe Futungo			unpaved						section
DISTANCE			4600	4650	4800	5000	5200	5400	5600	5650
INTERSECTING ROAD		LEFT	no		access road	no	no	no	no	no
		RIGHT	no		no	no	no	no	no	no
CROSS SECTION	LEFT	S/W	E (1.5m)		E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)	E (1.5m)
		SHLD								
		C/W	8.50m	11.2m	9.30m	8.70m	9.75m	10.60m	9.15m	
	RIGHT	C/W								
		SHLD								
		S/W	0		E (1.5m)	E (1.5m)	E (1.5m)	0	0	0
RIGHT OF WAY WIDTH			about 12.5m		about 12.5m	about 12.5m	about 12.5m	about 12.5m	about 12.5m	about 12.5m
ROAD SURFACE	TYPE		A	E	A	A	A	A	A	E
	CONDITION		B	B	B	F	F	F	F	B
ROAD ACCESSIBILITY										
EXISTING PROFILE			slope	slope	slope	slope	F	slope	slope	F
DRAINGE SYSTEM		LEFT	no	no	no	no	no	no	no	no
		RIGHT	no	no	no	V ditch	V ditch	no	no	V ditch
DRAINAGE STRUCTURE			no	no	no	no	no	no	no	no
EXISTING UTILITIES		LEFT	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line	med. V line
		RIGHT	no	no	no	no	no	no	no	no
ROAD FURNITURE	SIGN		no	no	no	no	no	no	no	no
	MARKING		no	no	no	no	no	no	no	no
	LIGHTING		no	no	no	no	no	no	no	no
	OTHER		no	no	no	no	no	no	no	no
EXISTING LAND USE		LEFT	field	field	field	field	field	field	field	field
		RIGHT	field	field	field	field	field	field	field	field

ROAD INVENTORY INVESTIGATION DATA SHEET

DATE 2/3/'98 INSPECTOR S.Imai INSPECTOR H.Takeda SHEET No. 5

ROAD NAME			on bridge	paved	ending					
Golfe Futungo				section	point					
DISTANCE			5800	5850	6000	6200				
INTERSECTING ROAD		LEFT	no	no	no	no				
		RIGHT	no	no	no	no				
CROSS SECTION	LEFT	S/W	no		E (1.5m)	E (1.5m)				
		SHLD								
		C/W		7.17m	9.2m	9.2m				
	RIGHT	C/W								
		SHLD								
		S/W	no		E (1.5m)	E (1.5m)				
RIGHT OF WAY WIDTH			about 12.5m		about 12.5m	about 12.5m				
ROAD SURFACE	TYPE		E	E	A	A				
	CONDITION		B	B	F	F				
ROAD ACCESSIBILITY										
EXISTING PROFILE			F		slope	slope				
DRAINGE SYSTEM		LEFT	no		no	V ditch				
		RIGHT	V ditch		V ditch	V ditch				
DRAINAGE STRUCTURE			no		no	no				
EXISTING UTILITIES		LEFT	med. V line	med. V line	med. V line	med. V line				
		RIGHT	no		no	no				
ROAD FURNITURE	SIGN		no	no	no	no				
	MARKING		no	no	no	no				
	LIGHTING		no	no	no	no				
	OTHER		no	no	no	no				
EXISTING LAND USE		LEFT	field	field	field	house				
		RIGHT	field	field	field	house				

Ver.1.1 Mar/98

Detailed Inspection Sheet FOR PAVEMENT / ROAD

Inspection Date: 2/3/'98 No. 8

Engineer	Engineer	Inspector
S.Imai	H.Takeda	

General Information

Route:	E.Golfe-Futungo			
Location:	1.2 km to	1.4 km		
Rd.Class:	Sec.Artl	Nos. of C/W 1	Lanes:	2
Direction:	Kianbaki to Futungo	Design Speed:	70km/h	
Inspectors:		Constructed Year:		

Inspection Items

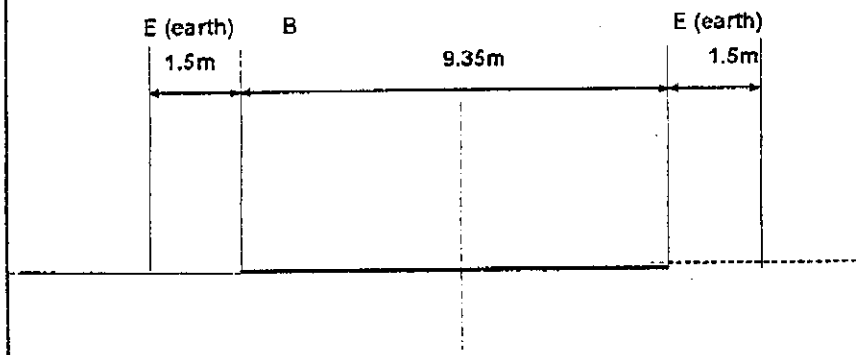
Damage type	3,6	(1)Settlement (2)Cracking (3)Pothole (4)Wave (5)Rutting (6)Ravellin
Pavement	1	(1)Asphalt (2)Surface treated (3)Gravel (4)Earth
Terrrain	3	(1)Mount (2)Hill (3)Flat (4)Swampy (5)Town
Soil	6	(1) Rock (2)Gravel (3)Sand (4)Silt (5)Clay (6)Other( )
Drainage pipe		Diameter = mm Concrete, Steel, Othe( )
Ground Water	4	(1)Flow (2)Seepage (3)Wet (4)None
Land Use and Environment		right: house
		left: field

Cracking Ratio	10 %
Ruting Depth	D = 10 mm
Long Rough	σ = 3 mm
Potholes Nos.	Depth Ave. mm
Diameter	mm
Ave	mm
General Remark	fair: damaged by catapillar

Judgement (Incl.subgrade)	remark	Grade	
		I	Reconstruction
	O	II	Overlay
		III	Surface Treatment
		IV	Unnecessary to Repair

Cross Section

Survey Point 1 km + 200 m to 400 m



A:	Platform width	F:	Foot path width
B:	Carraigeway width	G:	Crossfall
C:D:	Traffic lane width	H:	Median width
E:	Shoulder width		

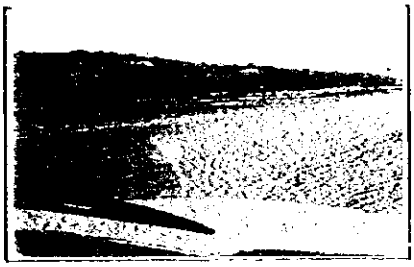
Photograph

Site Photograph

Road Name: Golfe Futungo (3/3)

Date: 2/3/'98 Photograph taken by: H. Takeda

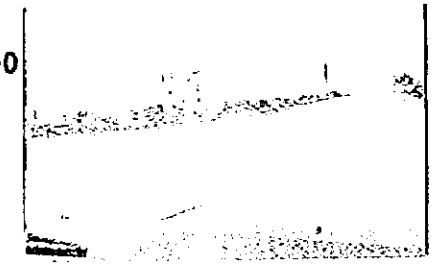
Station **4800**



Station **6000**

Station **5000**

Station **6200**



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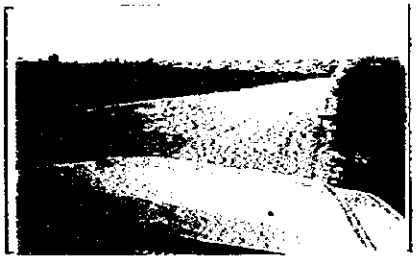
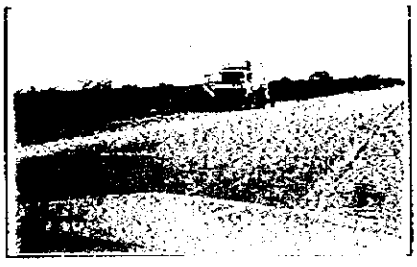


Station

Station **5400**

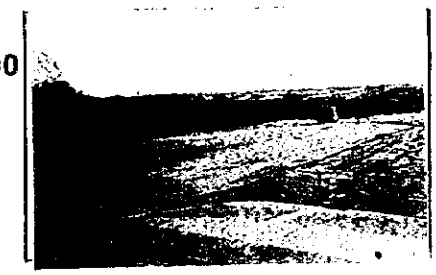
Station

Station **5600**



Station

Station **5800**



Station

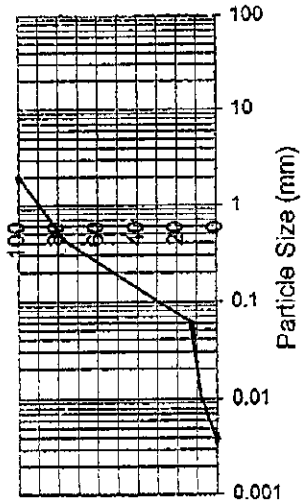
5-2 Soil Survey Result (CBR Test)

Soil Test Results and Existing Pavement Structure Observation

Route	Ru Senado da Camara	Location 1-7	1+900 km (Direction Boav. to Jane)	Engineer	Engineer	Inspector
				J.S.SILVA	A. Shikano	

Sampling Depth	1.00m
CBR (California Bearing Ratio)%	11%
Specific Gravity gf/m^3	2.61
Natural Moisture Content%	5.0%
Atterberg Limit	
・Liquid Limit%	NP
・Plastic Limit%	NP
・Shrinkage Limit%	NP
・Plasticity Index	NP
Filling Soil	
・Optimum moisture content(%)	−
・Maximum dry density(%)	−

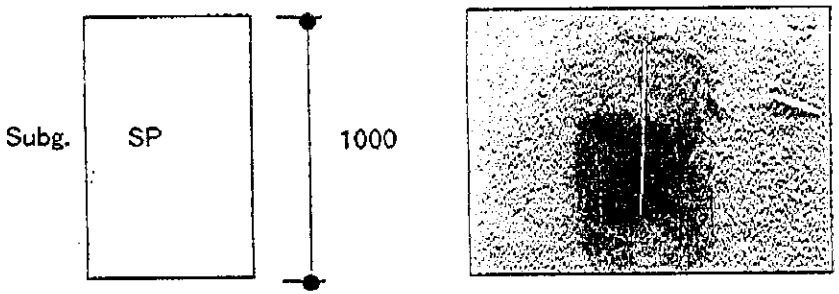
GRADING CURVE



Existing Pavement Structure Observation

Pavement Structure	Thickness (mm)	Material	Observation
Surface Course	−	−	
Base Course	−	−	
Upper Subbase	−	−	
Lower Subbase	−	−	
Subgrade	1,000	SP	

Sketch



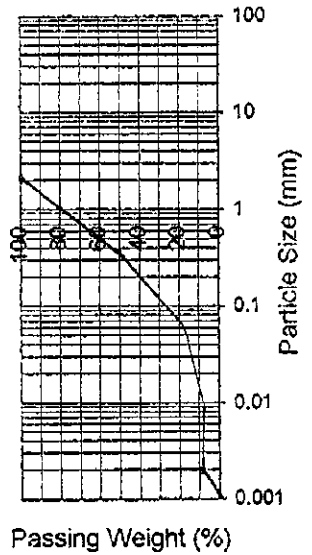
Soil Test Results and Existing Pavement Structure Observation

Route	Quinta Avenida	Location 2-4	1+750 km (Direction Kilua to Rodr.)

Engineer	Engineer	Inspector
J.S.SILVA	A. Shikano	

Sampling Depth	1.00m
CBR (California Bearing Ratio)%	18%
Specific Gravity gf/m^3	2.63
Natural Moisture Content%	6.8%
Atterberg Limit	
・Liquid Limit%	NP
・Plastic Limit%	NP
・Shrinkage Limit%	NP
・Plasticity Index	NP
Filling Soil	
・Optimum moisture content(%)	–
・Maximum dry density(%)	–

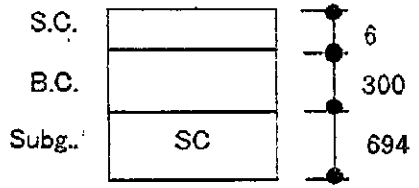
GRADING CURVE



Existing Pavement Structure Observation

Pavement Structure	Thickness (mm)	Material	Observation
Surface Course	6	Asphalt	
Base Course	300	Soil cement	
Upper Subbase	–	–	
Lower Subbase	–	–	
Subgrade	694	SC	

Sketch

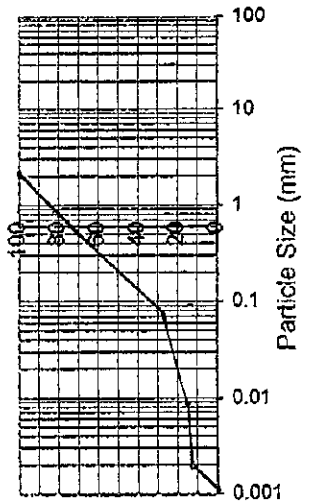


Soil Test Results and Existing Pavement Structure Observation

Route	Estrada da Conduta	Location 3-3	1+000 km (Direction Cond. to 5)	Engineer	Engineer	Inspector
				J.S.SILVA	A. Shikano	

Sampling Depth	1.00m
CBR (California Bearing Ratio)%	14%
Specific Gravity gf/m^3	2.65
Natural Moisture Content%	6.9%
Atterberg Limit	
・Liquid Limit%	20
・Plastic Limit%	14
・Shrinkage Limit%	12
・Plasticity Index	6
Filling Soil	
・Optimum moisture content(%)	−
・Maximum dry density(%)	−

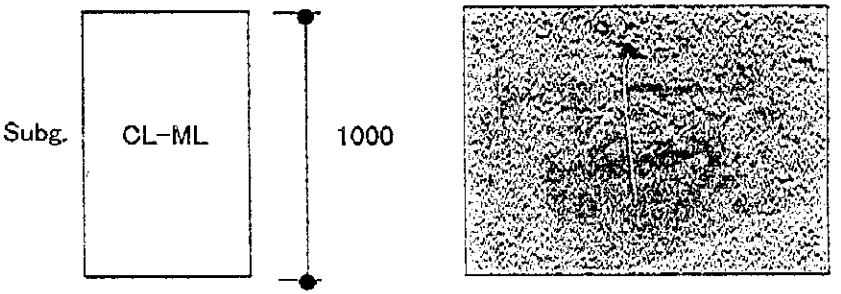
GRADING CURVE



Existing Pavement Structure Observation

Pavement Structure	Thickness (mm)	Material	Observation
Surface Course	−	−	
Base Course	−	−	
Upper Subbase	−	−	
Lower Subbase	−	−	
Subgrade	1000	CL-ML	

Sketch



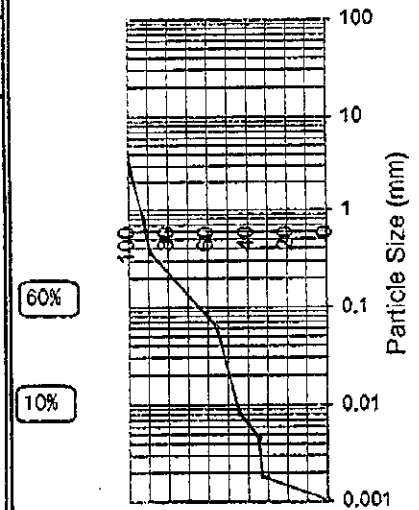
Soil Test Results and Existing Pavement Structure Observation

Route	Rua Sanatorio Bairro Polar	Location 4-5	1+900 km (B.P. to S..)

Engineer	Engineer	Inspector
J.S.SILVA	A. Shikano	

Sampling Depth	1.00m
CBR (California Bearing Ratio)%	9%
Specific Gravity gf/m^3	2.68
Natural Moisture Content%	18.6%
Atterberg Limit	
・Liquid Limit%	38
・Plastic Limit%	17
・Shrinkage Limit%	15
・Plasticity Index	21
Filling Soil	
・Optimum moisture content(%)	–
・Maximum dry density(%)	–

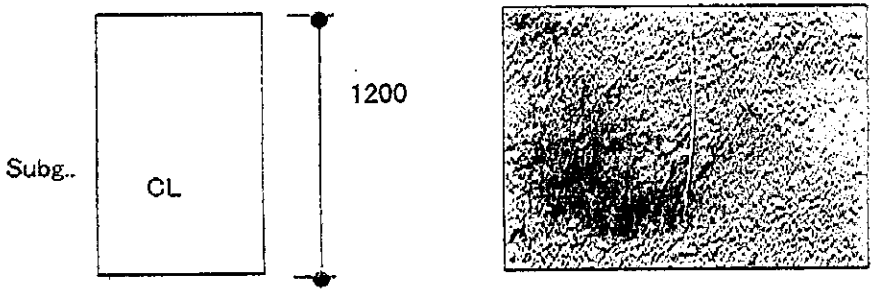
GRADING CURVE



Existing Pavement Structure Observation

Pavement Structure	Thickness (mm)	Material	Observation
Surface Course	–	–	
Base Course	–	–	
Upper Subbase	–	–	
Lower Subbase	–	–	
Subgrade	700	CL	

Sketch



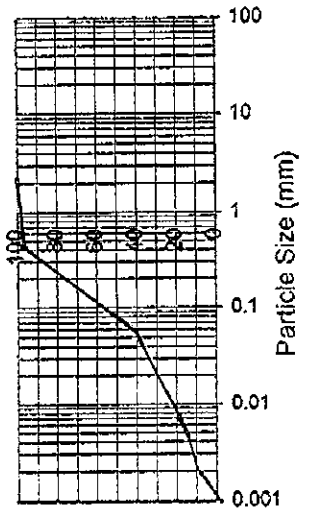
Soil Test Results and Existing Pavement Structure Observation

Route	Golf-Fudungo	Location 5-7	3+050 km (Direction Golfe to Funt)

Engineer	Engineer	Inspector
J.S.SILVA	A. Shikano	

Sampling Depth	1.00m
CBR (California Bearing Ratio)%	14%
Specific Gravity gf/m^3	2.65
Natural Moisture Content%	6.7%
Atterberg Limit	
・Liquid Limit%	20
・Plastic Limit%	18
・Shrinkage Limit%	16
・Plasticity Index	2
Filling Soil	
・Optimum moisture content(%)	–
・Maximum dry density(%)	–

GRADING CURVE



Existing Pavement Structure Observation

Pavement Structure	Thickness (mm)	Material	Observation
Surface Course	6	Asphalt	
Base Course	250	Soil Cement	
Upper Subbase	450	–	
Lower Subbase	–	–	
Subgrade	294	CL	

Sketch