

CHAPTER 3
Existing Development Plans In The Study Area

3. EXISTING DEVELOPMENT PLANS IN THE STUDY AREA

3.1. EXISTING DEVELOPMENT PLANS

This study collected new data and additional information regarding the on-going projects and reviewed road and transport development in the BMA with specific attention to the following subjects:

- 1) The Macro-Drainage Project
- 2) Improvement of road system and bus terminal in Entroncamento
- 3) Water Transport Project

(1) Macro-Drainage Project

In order to improve the urban environment and inhabitant living conditions, the Macro-Drainage Project is being conducted. This project is to develop canals, a rainwater drainage system, a sewage system, and a drinking water supply system. The project commenced in 1984 and the construction itself commenced in 1994 and is still on-going by Para State and Belem Municipality. The project area is the Una Basin that is one of eight basins in Belem Municipality (see Figure 3.1-1). Table 3.1-1 shows the main components of the project, and the scale of each. The total project cost is approximately US\$271 million, of which the amount of US\$126 million is financed by the state government and US\$145 million by the IDB (Inter-American Development Bank). Until 2001, the amount of approximately US\$230 million, equivalent to 86% of the total cost, was spent. This project includes the construction of roads, bridges and overpasses which are closely related to one of the study roads: Av. Independencia. Therefore, it will be necessary to adjust the road plans of Av. Independencia to the road plans of this project.

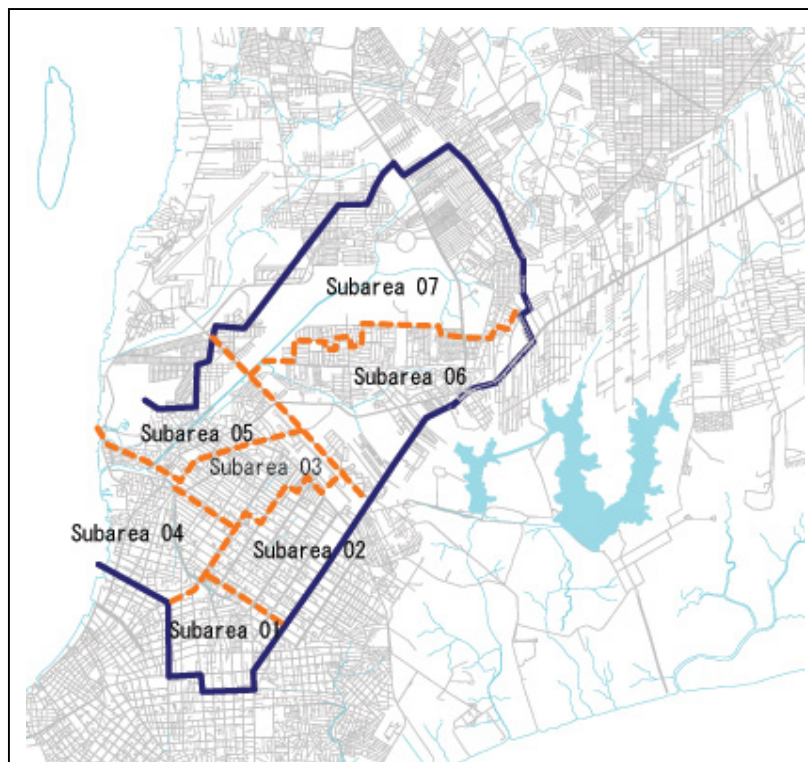


Figure 3.1-1 Project Area

Table 3.1-1 Main Components and Project Cost

Project Component	Unit	Amount
Canal/Gallery Development (refer Photo 7.5-2)	km	24.2
Bridge/Overpass Development	unit	79
Road Development	km	157.2
Rain Water Drainage System Development	km	16.3
Sewage System/Connection System Development	km	283.9
Installation of Cesspits	unit	26,656
Drinking Water Supply System Development	km	148.3

(2) Entroncamento Traffic Complex

At the intersection between Almirante Barroso, Augusto Montenegro and Pedro Alvares Cabral with BR-316, known as “Entroncamento”, the Entroncamento Traffic Complex Project is being conducted to improve the current traffic flows as shown in Figure 3.1-2. This project is to develop a road interchange system being implemented by the federal government. The system will organize the traffic coming from the various roads into “Entroncamento” and the integration bus terminal being built by Belem Municipality, which will serve the public bus transport system of Belem Municipality as shown in Figure 3.1-3. This project also includes construction of an underpass crossing below one of the sides of a circle that will link, without any obstruction, Almirante Barroso and BR-316.

This bus terminal will connect metropolitan and urban buses and will serve as a center of transport. The major functions of the terminal will be as follows:

- To connect with trunk bus lines and feeder bus lines
- To decrease waiting time by selling the bus tickets near the bus fleet
- To improve traffic safety through complete elimination of conflicts between bus passengers and vehicles
- To prepare comfortable equipment for the bus passengers inside the terminal
- To optimize access and exit circulation conditions of vehicles into and out of the terminal

(3) Project of Hydro Transport

A water transport project is to operate high-speed riverboats for public transport passengers between Icoaraci and the island of Cotijuba and also between Icoaraci and Centro/Federal University of Para (UFPA), both located in the Belem Municipality. The Para State Government would contract a specific consultant to carry out the "Feasibility Study of a Hydro Transport System" integrated to the urban transport system. However, due to being developing by BNDES, the project “Feasibility Study Technical-economical of Hydro Systems of Belem Passengers” and this study is being followed by the local counterpart team of “The Feasibility Study on the Improvement of Transport System in the Metropolitan Area of Belem”, it was decided for canceling the contract mentioned above. The BNDES work has national importance and also it will study alternatives of a system of hydro transport in BMA, defining characteristics of operation boat and the fare for this new system.

The contents of the feasibility study for water transport are as follows:

3.2. ON-GOING RELATED PROJECTS

There are four major on-going projects in the study area: (i) construction of Av. Independencia, (ii) construction of Primeiro de Dezembro, (iii) construction of Alca Viaria, and (iv) improvement of drainage canals (Macro Drainage Project). Figure 3.2-1 shows the location of these projects.

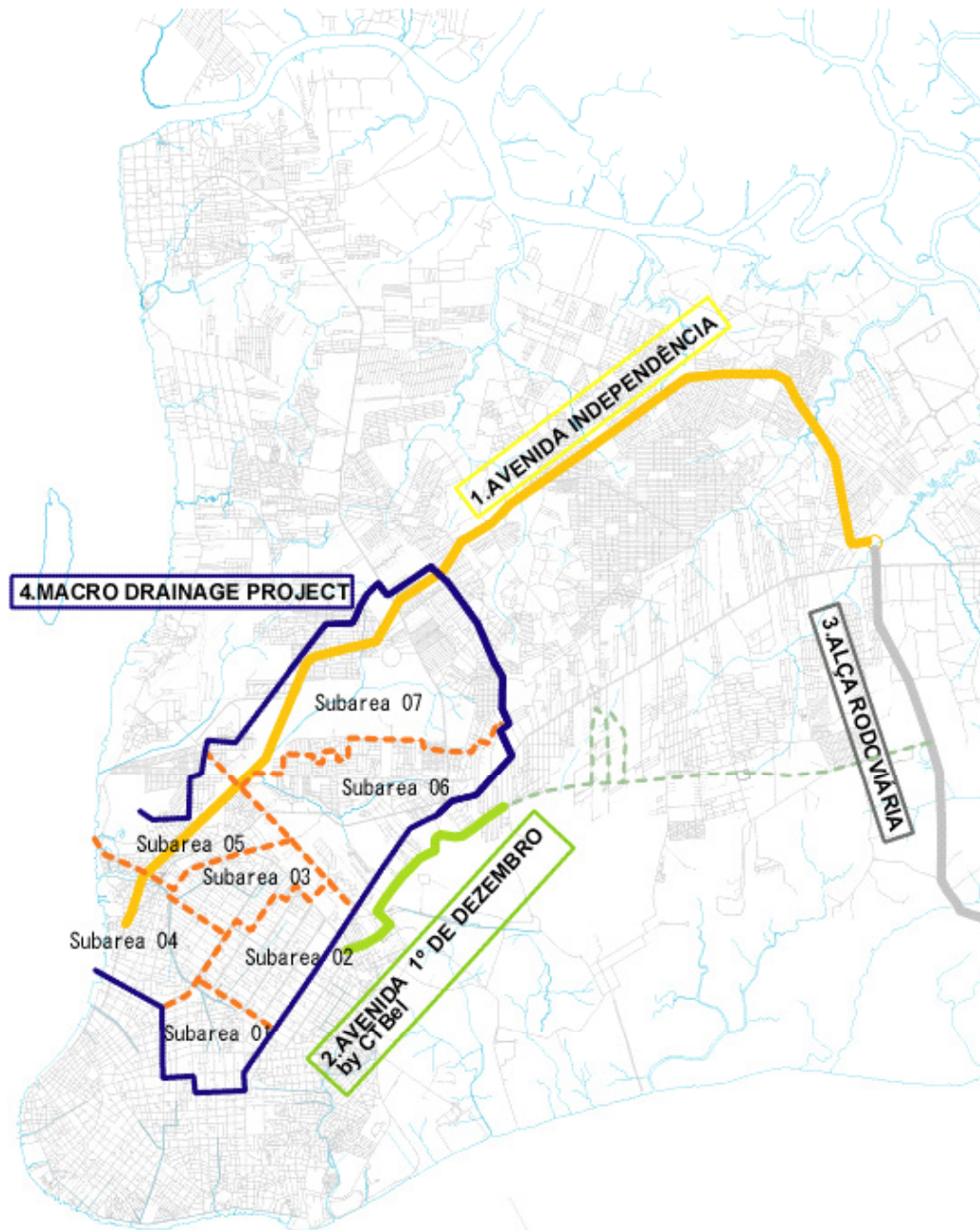


Figure 3.2-1 Location of On-going Projects

3.2.1. AVENIDA INDEPENDENCIA

Av. Independencia is a new road planned by Para State, and its construction has been underway. The road utilizes the ground level of the 250,000-volt electric transmission line

The Improvement of Transport System in the Metropolitan Area of Belem from the hydro power plant at Tucuruí to Belem City. It runs from the north end of Centro and passes on the north of and parallel to BR-316 to Cidade Nova, and then connects to BR-316 and Alca Viária. The segment from the Entroncamento intersection to Alca Viária is currently under construction. The segment from Rodovia Augusto Montenegro to Belem is now temporarily suspended because it is necessary to coordinate with Macro Drainage Project. Intersections on this road are at-grade crossing. The typical cross section of this road is shown in Figure 3.2-2.

Avenida Independencia

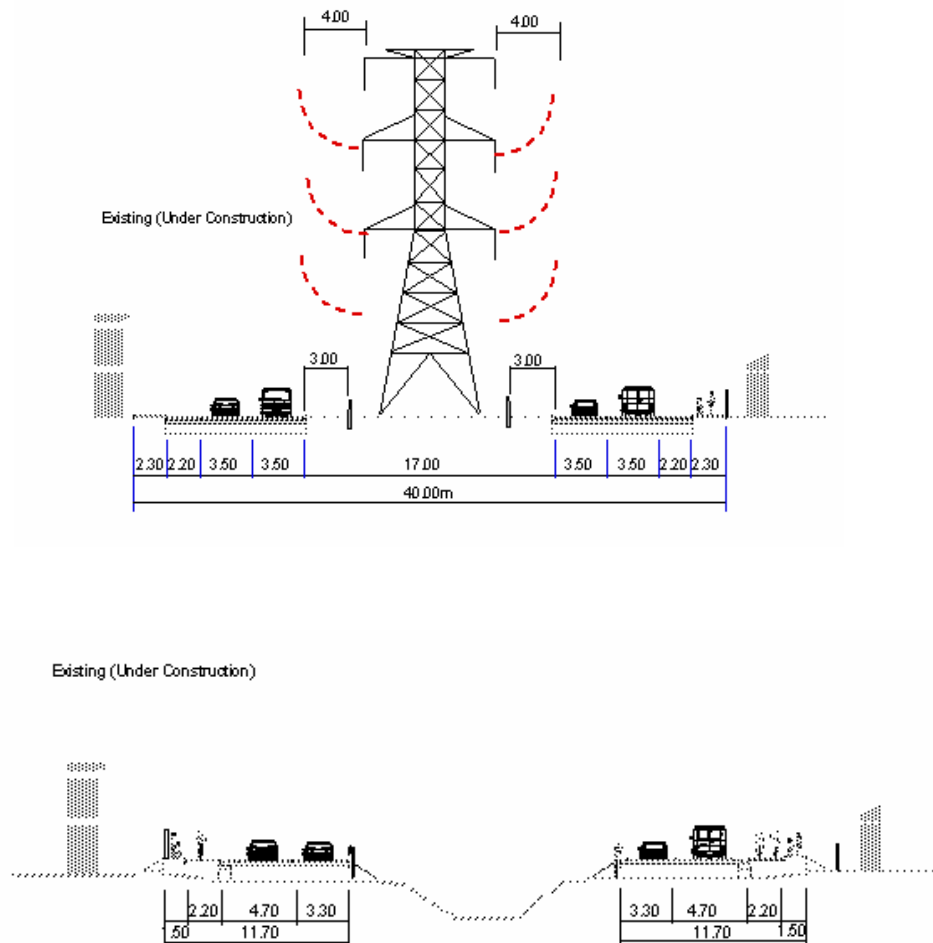


Figure 3.2-2 Typical Cross Section of Independencia Project

3.2.2. PRIMEIRO DE DEZEMBRO

This road runs 0.5 – 1.0 km south of and parallel to Av. Almirante Barroso. Belem City is currently constructing a segment of the planned road. The road extends from Belem Centro to the municipal border with Ananindeua City. The planned road has four lanes with the bikeway and the sidewalk on one side. The typical cross section of this road is shown in Figure 3.2-3.

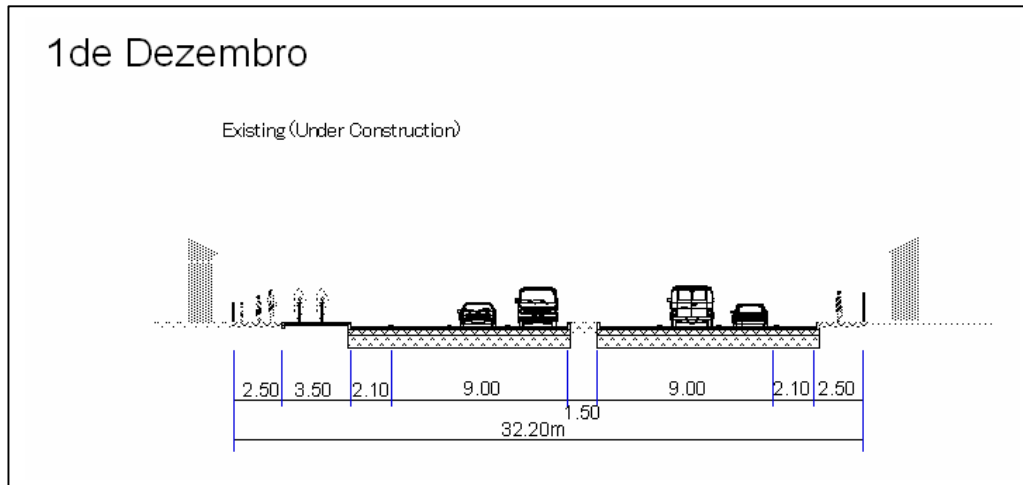


Figure 3.2-3 Typical Cross Section of Primeiro de Dezembro Project

3.2.3. ALCA VIARIA

This state road is planned to connect Belem to Port of Vila do Conde in Barcarena Municipality. The construction was completed in September 2002. The road crosses BR-316, Av. Independencia and Av. Primeiro de Dezembro. The road design is Class 1-B with two lanes of 3.6m each in width and the shoulder of 2.0m. The typical cross section of this road is shown in Figure 3.2-4.

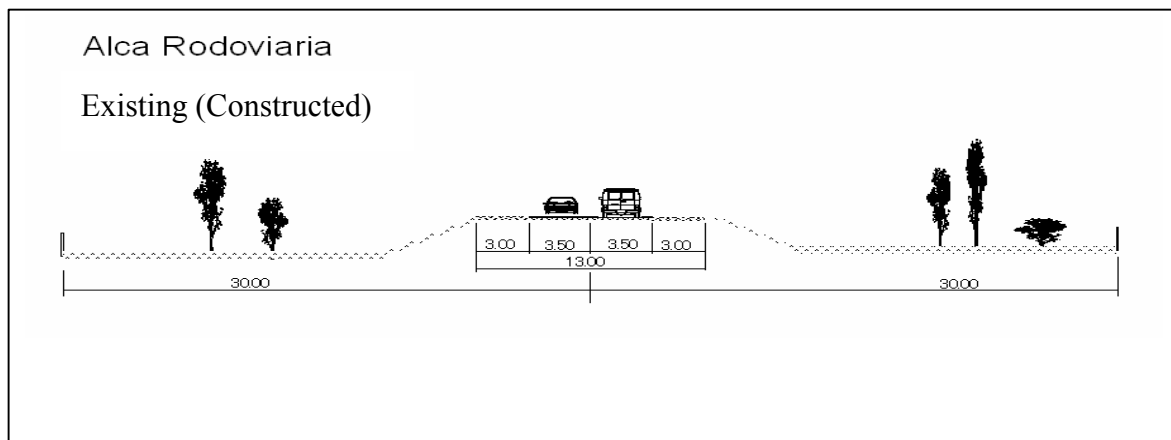


Figure 3.2-4 Typical Cross Section of Alca Viaria Project

3.2.4. MACRO DRAINAGE PROJECT

The project is financed by Inter American Development Bank (BID) to improve the canals and ditches in the north of Belem Centro. By increasing the cross sectional area of flow and constructing dike roads on both banks, the project will serve to reduce the area of inundation during the flood. There are a sizable number of communities at the site of proposed dike roads and the flood basin areas and their relocation is now going on for site clearance. The proposed dike roads will become part of Av. Independencia.

3.3. DEVELOPMENT CONDITIONS OF UTILITIES AND FACILITIES

Existing utilities and facilities developed under, on and/or above roads may be obstacles and affect future improvement of existing roads or construction of new ones. Therefore, it is necessary to grasp the location and type of developed utilities/facilities. The study team consulted related organizations and field surveys to collect data and information on utilities and facilities already developed in the study area.

3.3.1. PRESENT DEVELOPMENT CONDITIONS IN THE BELEM METROPOLITAN AREA

(1) Water supply

Surface water from the Guama River that is one of the tributaries of Para River and groundwater are sources of drinking water in the Belem Metropolitan Area.

COSANPA, which is a company of Para State and is responsible for developing the water supply system and sewage system. Twenty years ago, COSANPA had planned and implemented construction of a water supply network project using surface water to supply drinking water to the Belem Metropolitan Area including some parts of Icoaraci, Ananindeua and Marituba. This project was expected to be finished by the year 2000, however it has not been completed yet because of a deficit of the project funds.

Now, a part of Belem and Ananindeua municipalities are supplied with drinking water through this network. Water main and distribution pipes of the network had been constructed under roads. (Refer to Photo 3.3-1 and Figure 3.3-1.)

Remaining areas, including the Marituba and Ananindeua Municipalities, get drinking water from wells. Each well with a treatment plant has a service area.



Photo 3.3-1 Water Main Pipe in the Belem Municipality

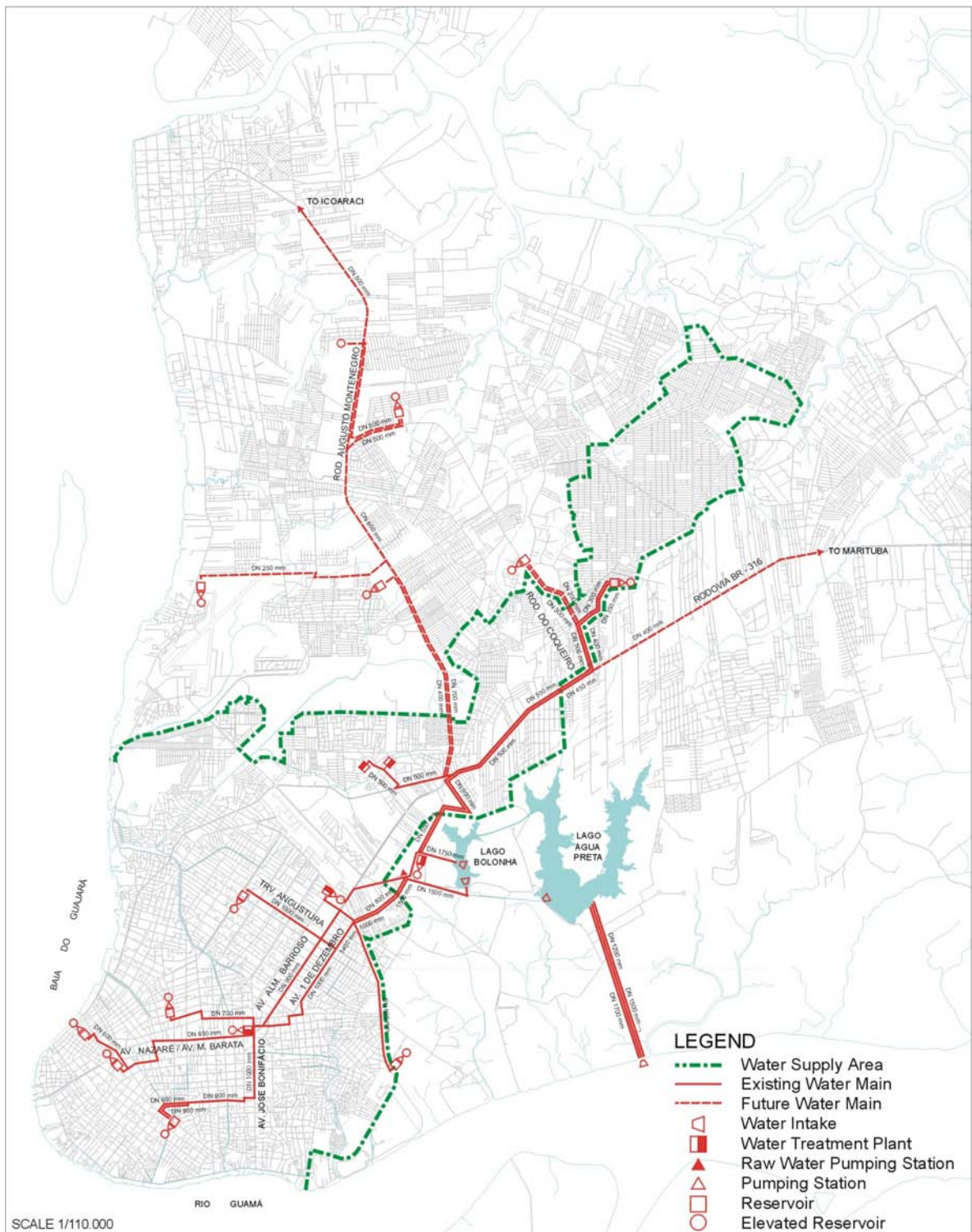


Figure 3.3-1 Water Supply Network

(2) Drainage

Many canals and rivers run through the metropolitan area and flow into the Guama River. Rainwater falling in the study area flows into these canals and rivers through drainage developed along roads. However, because of the gentle slope of roads and a shortage of drainage facilities (amount and capacity), drainage of rainwater in the metropolitan area is poor. Therefore, flooded areas on roads can be seen in many places during heavy rain.

The Macro-Drainage Project is now being implemented in the Una Basin in Belem Municipality to improve drainage.

(3) Sewage

There is no sewage treatment plant in the metropolitan area. Only six (6) percent of population in the study area have their domestic wastewater collected through pipes developed under roads. Sewage collected is discharged to the Guama River through canals without any treatment except taking relatively large waste by screens installed at canals.

Remaining houses and buildings have their own cesspits. Sewage is collected in a cesspit. Solid waste is deposited in the pit and fluid waste flows out to drains constructed at roads near houses and buildings without any treatment. Solid waste deposited is collected by a collecting vehicle and discharged to rivers.

(4) Electricity

Electricity is generated at Tucuruí Hydroelectric Power Station located about 300 km south of Belem, and is supplied not only to the study area but also to other cities in Brazil.

Power transmission lines with 230kv run from the power station through the study area. Several substations are also located within the study area. (Refer to Figure 3.3-2)

Electricity from substations is distributed to each consumer through distribution lines running above roads. Concrete poles for distribution lines are installed in sidewalks or shoulders on both sides of almost all roads. Poles are placed at intervals of about 40 ~ 45m. Not only electrical wires but also telephone lines and streetlights are attached to the poles.

(5) Telecommunication

Telephone wires attached to concrete poles for electricity are installed above almost all roads in the study area. Many public telephones are also installed in sidewalks or shoulders of roads. (Refer to Figure 3.3-3) The subterranean telephone network including optical fibers and this service are operated by private section.

The BMA is attended by recently privatized system of fix and movable telephone. The fix telephone system is operated by 4 concessionaries that have fixed aerial network on the electrical energy post and subterranean networks. Among these concessionaries, the Telemar has a higher percentage of the local and therefore administrate the more extensive network in the area. The TELEMAR is also the concessionary of the public telephone system notably present on the road system (sidewalks), public and commercial establishment.

(6) Streetlights

Roads/streets in the study area have streetlights at regular intervals. Most of them are attached to poles for electricity installed in sidewalks/shoulders on both sides of roads. Main/major roads with a median have streetlights mainly at the median.

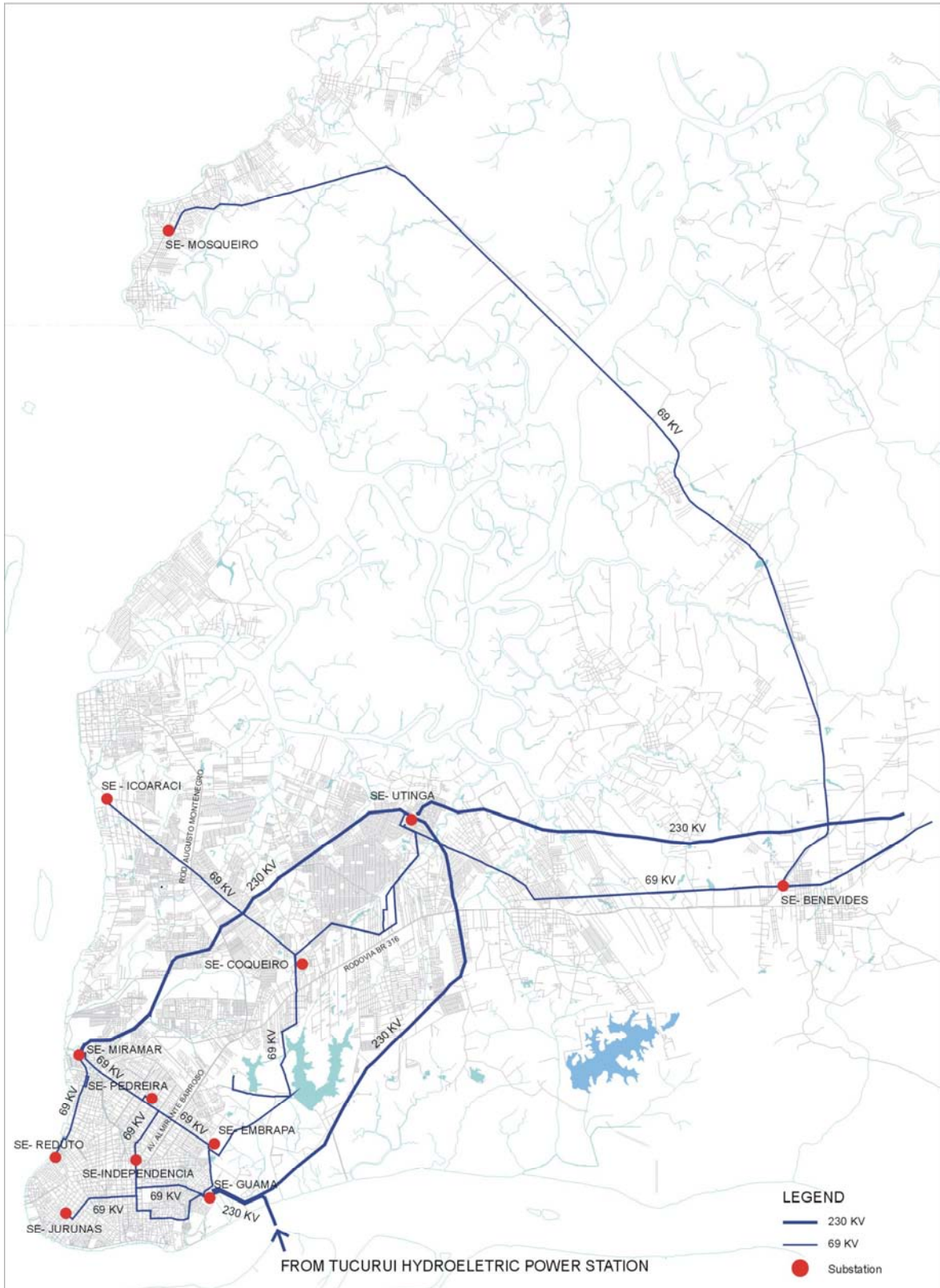


Figure 3.3-2 Power Transmission Line Network in the Study Area

Roads improved and/or constructed

- 1) Primeiro de Dezembro from Moça Bonita to Alça Viária
- 2) Extension of Av. Pedro Miranda from Av. Dr Freitas to Trav. Soledade in Icoaraci
- 3) Extension of Rua da Marinha from Av. Independencia to Rod BR-316
- 4) Av. Independencia from Rod. Arthur Bernardes to Alça Vária
- 5) Rua Ricardo from Rod BR-316 to Primeiro de Dezembro

Roads where the trunk bus system was introduced

- 1) Av. Almirante Barroso from Av. Jose Bonifacio to Rodovia BR-316
- 2) Rod. BR-316 from Av. Almirante Barroso to Alça Viária
- 3) Rodovia Augusto Montenegro from Almirante Barroso to Primeira Rua da Campina
- 4) Av. Pedro Alvares Cabral from Rod. Arthur Bernardes to Av. Dr Freitas
- 5) Av. Senador Lemos from Trav. Rosa Moreira to Av. Dr. Freitas
- 6) Rod Matio Covas, Av. Tres Corações, Trav. SN-3 and Trav. SN-17 in Cidade Nova
- 7) Trav S. Roque, Rua Cristovão Colombo, Rua Manoel Barata, Trav. Pe. Júlio Maria in Icoaraci

The study team investigated development conditions of existing utilities/facilities under/on these roads by road. Each road was divided into several small sections. (Refer to Figure 3.3-4.)

(1) Roads improved and/or constructed

Table 3.3-1 shows the result of investigation of infrastructure/facilities developed along the project roads.

Primeiro de Dezembro and Av. Independencia are roads newly planned and still constructed. Therefore, infrastructure/facilities do not exist except along some small part of existing narrow roads. Existing infrastructure/facilities along narrow roads should be removed and/or reconstructed at widening of existing roads.

Most parts of Av. Pedro Miranda, Rua da Marinha and Rua Ricardo Borges exist and have relatively wide road width. Almost all infrastructure/facilities have been constructed within the right of way of roads. Though these roads are wide, infrastructure/facilities should be removed and/or reconstructed if widening of existing roads is necessary.

Table 3.3-1 Existing Utilities and Facilities under/on Roads Improved/Constructed

No.	Name of Project Target Road	Section			Infrastructure existed			
		No.	Start / End	Length (Km)	Width (m)	Roadway	Sidewalk or Shoulder	Median
1	1.º de Dezenbro	1-1	Moca Bonita / Do.Fio	0.77	10.0	W, D	D, E, T, SL	-
		1-2	Do. Fio / Rua Ricardo Borges	1.24	-	D	-	-
		1-3	Rua Ricardo Borges / Rua Osvaldo	1.07	-	-	-	-
		1-4	Rua Osvaldo / Rua Lotm Aura	1.30	-	W	-	-
		1-5	Rua Lotm Aura / Est Aura	1.74	-	-	-	-
		1-6	Est Aura / Estrada Do Aura	1.06	10.0	-	D, E, T, SL	-
		1-7	Estrada Do Aura / Alca Viaria	0.92	-	-	-	-
2	Pedro Miranda	2-1	Fraitas, Dr / Julio Cesar	0.57	-	-	W, D, E, T, C, SL	-
		2-2	Julio Cesar / Pedro Alvares Cabral	0.98	-	-	C	-
		2-3	Pedro Alvares Cabral / Est Marinha	1.65	23.2	W, D	W, E, T, C, SL	-
		2-4	Est Marinha / Independencia	1.32	-	-	-	-
		2-5	Independencia / Rua Bento. S	0.71	15.0	-	E, T, SL	-
		2-6	Rua Bent0. S / Est Bengui. Do	0.94	14.5	W, D	E, T, SL	-
		2-7	Est Bengui. Do / Tapana, Do	2.54	29.3	C	E, T, SL	SL
		2-8	Est Yamada / Rua Clemente, S.	0.69	24.0	-	E, T, C, SL	-
		2-9	Rua Clemente, S. / Est Picarreira, Da	1.83	22.8	-	D, E, T, C, SL	-
		2-10	Est Picarreira, Da / Arthur Bernardes	1.30	22.0	C	D, E, T, SL	-
		2-11	Arthur Bernardes / Trv Soledade	2.19	21.0	-	E, T, C, SL	-
3	Rua Da Marinha	3-1	Independencia / Rua R Cherrmont	1.14	10.4	W, E, T, SL	-	-
		3-2	Rua R. Cherrmont / Augusto Montenegro	2.10	13.9	-	W, D, E, T, SL	-
		3-3	Augusto Montenegro / Rod BR-316	1.22	-	-	-	-
4	Independencia	4-1	Arthur Bernardes Road / Canal	4.46	-	-	-	-
		4-2	Canal / Avn Julio Cesar	2.61	10.0	W, D, E, P, T, SL	-	-
		4-3	Avn Julio Cesar / Rua Da Marinha	1.11	8.0	D	W, D, E, T	-
		4-4	Rua Da Marinha / Pedro Miranda	1.28	-	-	-	-
		4-5	Pedro Miranda / Augusto Montenegro	2.43	-	-	-	P
		4-6	Augusto Montenegro / Est 40 Horas, Dos	3.65	36.0~40.0	D	E	D, P
		4-7	Est 40 Horas, Dos / Est Curcamba	5.22	-	-	D	P
		4-8	Est Curucamba / Alca Rodovaria	3.74	-	-	D	P
5	Rua Ricardo	5-1	Rod BR-316 / Dezenbro (planned)	20.84	16.0	-	W, D, E, T, SL	-

Source) JICA Study Team

Note) W: Water Supply, D: Drainage, S: Sewage, E: Electric Distribution Line, P: Power Transmission Line, T: Telephon Line, C: Underground Cable, SL: Street Light, Tr: Roadside

(2) Roads Where the Trunk Bus System Will Be Introduced

Table 3.3-2 shows the result of investigation of infrastructure/facilities developed along roads where the trunk bus system will be introduced.

These seven (7) are the existing major roads in the study area and have wide road width. Therefore, it will not be necessary to widen these roads even though the trunk bus system will be introduced. However, existence of infrastructure/facilities must be considered if the cross section element of these roads is changed for the trunk bus system within the present road width. Especially, water mains 900, 500 and 400mm in diameter exist under Av. Almirante Barroso, Rod. BR-316 and Av. Mario Covas.

(3) Issues

It has been very difficult the data obtaining (gauge, depth, and precise localization, projects) of the ground network infrastructure as water, sewage and drainage. Due to the importance of this information, the study team, had to do some field survey, without, however, need such localizations, once that until this moment were no available the required data to the several institutions of these network.

Table 3.3-2 Existing Utilities and Facilities under/on Roads Where the Trunk Bus System Will Be Introduced

No.	Name of Project Target Road	Section			Infrastructure existed			Median
		No.	Start / End	Length (Km)	Width (m)	Roadway	Sidewalk or Shoulder	
A	Ave. Almirante Barroso	A-1	Avn Jose Bonifacio / Avn Freitas, Dr	3.09	43.7	D, C	W(900), W, D, E, T, C	SL, Tr
		A-2	Avn Freitas, Dr / Avn Julio Cesar	0.60	42.3	D, C	W(900), W, D, E, T, C	SL, Tr
		A-3	Avn Julio Cesar / Rodovia BR-316	2.50	44.7	D, C	W, D, E, T, C	SL, Tr
B	Rodovia BR-316			6.19				
		B-1	Avn. Almirante Barroso / Rod Mario Covas	3.66	39.6	D, C	W(500x2), W, D, E, T, C, SL	D, SL
		B-2	Rod Mario Covas / Alca Rodoviaria	5.87	45.5	C	W(500x2), W, E, T, SL	SL
C	Rodovia Augusto Montenegro	C-1	Ave. Almirant Barroso/ Rua Da Marinha	1.35	39.1	D	W(500, 400), D, E, T, C	SL, Tr
		C-2	Rua da Marinha / Independencia	2.75	48.0	C	W, D, E, T, C	SL, Tr
		C-3	Independencia / Est. Tapana, do	2.94	48.0	C	D, E, T, C	SL, Tr
		C-4	Est Tapana, do / Rua Primeira da Campina	6.34	39.8	-	D, E, T, C	SL, Tr
D	Av. Pedro Alvares Cabral	D-1	Rod. Authur Bernardes / Avn Freitas, Dr	13.38				
				2.58	18.4	W, D, C	W, D, E, T, C, SL	-
E	Av. Senador Lemos	E-1	Trv Rosa Moreira / Avn Julio cesar	2.74	180	W, D, C	W, D, E, T, C, SL	-
F	Rod Mario Covas and other three	F-1	Rod BR-316 / Av. 3 Coracoes	1.24	21.4	W, D, C	W, D, E, T	D, SL
		F-2	Rod Do Conqueiro / Trv Sn 3	1.22	23.9	W, D	W, D, E, T	D, P, SL, Tr
		F-3	Tres Coracoes / Avn Arterial Bl 18	1.74	13.1	W, D	W, D, E, T	-
		F-4	Tres Coracoes / Avn Arterial Bl 18	1.77	15.2	W, D	W, D, E, T	-
G	Trv Roque, S and other five			5.97				
		G-1	Rua Primeira da Campina / Rua Julio Maria	0.75	23.6	C	W, D, E, T, C	-
		G-2	Trv Roque,S / Trv Andradas	1.12	200	D	W, D, E, T	-
		G-3	Rua Julio Maria / Rua Manoel Barata	0.44	21.0	C	W, D, E, T	-
		G-4	Rua Andradas / Rua Cristovao Colombo	1.35	21.0	D	W, D, E, T, C	-
		G-5	Rua Manoel Barata / Rua Primeira da Campina	1.23	22.0	C	W, D, E, T	-
G-6	Trv Bom Jesus / Rod Augusto Montenegro	0.15	14.0	-	W, D, E, T	-		
				5.04				

Source) JICA Study Team

Note) W: Water Supply, D: Drainage, S: Sewage, E: Electric Distribution Line, P: Power Transmission Line, T: Telephon Line, C: Underground Cable, SL: Street Light, Tr: Roadside Trees