

CHAPTER 8  
Transport Development Plan by  
Government of Peru

## **8. TRANSPORT DEVELOPMENT PLAN BY GOVERNMENT OF PERU**

### **8.1. URBAN DEVELOPMENT PLANS**

#### **8.1.1. REVIEW OF EXISTING DEVELOPMENT PLANS**

This chapter reviews existing development plans for the metropolitan area of Lima and Callao formulated by the central or local government. A particular emphasis is given to the Metropolitan Development Plan for Lima and Callao 1990-2010, which was the latest development plan formulated by the metropolitan municipality of Lima (MML) in 1989.

##### **(1) Historical Perspective**

The development plans for the metropolitan area of Lima and Callao were formulated four (4) times in the past: 1948, 1956, 1967 and 1989. Historically, the formulation of a development plan for the city of Lima, the nation's capital, was responsibility of the national government. In fact, the first three plans formulated in 1948, 1956, and 1967 were prepared by the national government, the Ministry of Development and Public Works. Under the recent decentralization policy, the fourth plan "Metropolitan Development Plan for Lima-Callao 1990-2010" (hereinafter referred to as the "Metropolitan Development Plan"), was formulated by the provincial government of Lima (it is often referred to as the metropolitan municipality of Lima or "MML"). This is the latest and official plan<sup>1</sup> to recommend a future direction and development policy for the metropolitan area.

The Metropolitan Institute of Planning (IMP) was established in 1991, based on the recommendation proposed by the Metropolitan Development Plan in 1989. The IMP is a public agency in the MML, and it has been responsible for the formulations of urban planning and development policies in the metropolitan area of Lima and Callao. In 1993, the IMP prepared the "Urban Development Plan for the Province of Callao 1995-2010." This plan followed the basic concepts prepared by the Metropolitan Development Plan of 1989, and made detailed recommendations of urban developments in the province of Callao. Since 1997, the IMP has formulated integral development plans at a district level, but the plans are still on going processes and have not yet been finalized until now. More recently, the IMP implemented the study, entitled "Protection of the Historical Center of Lima" in 2004, which focused on preservation of historical monuments and revitalization in the central area of Lima and Callao.

The history of the major urban development plans and relevant studies in the metropolitan area of Lima-Callao, including the provinces of Lima and Callao is summarized in Table 8.1-1.

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<sup>1</sup> The Ministry of Housing recently prepared a study, entitled "Regional Plan of Urban Development in Lima Region" in 2002. It emphasized development policies of housing mainly outside of the Provinces of Lima and Callao.

Table 8.1-1 Major Urban Development Plans and Relevant Studies in the Metropolitan Area of Lima and Callao

1948	“Pilot Plan of Lima,” prepared by the National Office of Planning and Urbanism, Ministry of Development and Public Works
1956	“Regulating Plan of Lima,” prepared by the National Office of Planning and Urbanism, Ministry of Development and Public Works
1967	“Plan of Metropolitan Development,” prepared by the National Office of Planning and Urbanism, Ministry of Development and Public Works
1987	“Metropolitan Development Plan for Lima-Callao 1990-2010,” prepared by Special Task Force of PLAN-MET, Metropolitan Municipality of Lima (MML)
1995	“Urban Development Plan for Callao 1995-2010,” prepared by the Metropolitan Institute of Planning (IMP) and the Province of Callao

## (2) Law and Regulation in Urban Planning and Development

Under the Constitution, municipalities are defined as local governments with economic and administrative autonomy.<sup>2</sup> The municipal administration has been executed at provincial and district levels. In other words, there are two types of municipal governments: one is the provincial government<sup>3</sup> and other is the district government<sup>4</sup>. Both levels of local governments are competent for regulating and managing the public services for the people living in their jurisdictions. More specifically, the provincial government is responsible for the provisions of public services, including elementary education, parks and recreation facilities, and conservation of historical and archeological monuments. It is also responsible for the provisions of development policies in urban and rural areas and zoning of land use in the jurisdiction. The district government, on the other hand, represents the neighborhoods, and it is responsible for the provisions of local public services, such as construction and maintenance of local streets, maintenance of drainage, collection of garbage in the neighborhoods, and authorization of development in the jurisdiction.

The provincial governments needed to formulate several plans to show future development policies and orientations in the jurisdiction, according the Law<sup>5</sup>. They are: a) integral plan of provincial development, b) plan of territorial organization, and c) urban plan. The integral plan of provincial development establishes overall policies, strategies, and programs for socioeconomic and physical-spatial development. The plan of territorial organization is an instrument to achieve the policies proposed in the integral plan of provincial development. The urban plan is technical and regulates instruments to prevent

<sup>2</sup> Article 252 of the Political Constitution of Peru

<sup>3</sup> There are two provincial governments in the Metropolitan Area of Lima Callao. One is the provincial government of Lima or the Metropolitan Municipality of Lima (MML) and the other is the provincial government of Callao.

<sup>4</sup> There are 43 districts in the province of Lima and 6 districts in the province of Callao.

<sup>5</sup> Organic Law of Municipalities No. 23853 and Supreme Decree 007-85-VC

and to promote specific actions of each area in the province. The Metropolitan Development Plan prepared by the MML was characterized as an urban plan, and it was a technical and regulating instrument to prevent and to promote specific land use or actions of each area in the metropolitan area.

The future land use is regulated by the zoning regulation. In the metropolitan area of Lima-Callao, the IMP prepared zoning maps in each district at a scale of 1:10,000. Although the zoning classification is different in each district, the general classification is shown as follows:

- 1) Residential zone
- 2) Commercial zone
- 3) Industrial zone
- 4) Mixed use zone
- 5) Agricultural zone
- 6) Recreational zone
- 7) Special facility zone
- 8) Urban equipment zone

According to the actual zoning maps, each zone is further divided into more specific land use. For example, residential zones are divided into five categories: R-1 semi-rural residential with low density, R-2 residential for one family with low density, R-3 residential for one family with medium density, R-4 residential for one or two families with medium density, and R-5 residential for multi-families with high density. In the same token, the industrial zone is divided into four categories: I-1 elementary and complementary industry, I-2 light industry, I-3 large industry and I-4 basic heavy industry. Furthermore, mixed-use zones are a combination of each category of land use, for example, mixed use of residential (e.g. R-2) and industrial (e.g. I-1). It can be said that the zoning regulation defines too many types of land use and that it will not work effectively without strong control measures by local government.

### **(3) Metropolitan Development Plan for Lima and Callao 1990-2010**

The Metropolitan Development Plan for Lima and Callao 1990-2010 (Plan de Desarrollo Metropolitano de Lima y Callao 1990-2010) was formulated by the MML in 1989. It proposed physical-spatial structures and future socioeconomic projections in the mid-term (1996) and long-term (2010). This section reviews the Metropolitan Development Plan, as a basis for consideration of future urban structure in the metropolitan area.

#### **1) Objectives**

The Metropolitan Development Plan was a strategic plan to promote a progressive and effective administration of urban development and political decentralization in local governments. The major objectives were described as follows:

##### **-Metropolitan Decentralization**

- a) Establishment of four major urban centers: existing metropolitan center and three (3) new sub-centers in the north, east and south of Lima.
- b) Development of ring roads to promote decentralization of urban activities
- c) Implementation of integral services in urban sub-centers

##### **-Decongestion and Revitalization of the Historical Center of Lima**

- a) Reorganization of transit systems in the central area
- b) Redistribution of activities from the central area to strategic sub-centers
- c) Revaluation of the archeological monuments

-Intensification of Urban Land Use

- a) Optimization and/or renovation of the infrastructure of public services
- b) Liberalization of real state market

-Incorporation of Urban Expansion Areas

- a) Programmed urban expansion in the areas close to the central area
- b) Formation of informal housing

-Environmental Organization and Ecological Recovery of the City

- a) Protection of agriculture areas
- b) Treatment, reuse and/or evacuation of mining areas
- c) Environmental recovery of river basins and coastal areas
- d) Recovery and conservation of natural environments

**2) Basic Concepts of Future Urban Structure**

The Metropolitan Development Plan identified that the global characterization of the urban problems in the metropolitan area was a monocentric, ramified and low-density urban structure, and this pattern had historically been produced, based on the economic, social, political and geographic characteristics. If these trends of urban growth shall continue, the current critical levels of urban disorder would worsen in the medium and long-terms, which would a further deterioration of the quality of life and the environment in the metropolitan area.

In order to resist the negative trends of disordered urban growth, the Metropolitan Development Plan proposed a transformation from the existing “monocentric” urban structure to a “polycentric” urban structure. The polycentric urban structure will be achieved by the concepts of de-concentration of the existing central area and the development of three (3) new sub-centers. The concept of the new sub-centers is illustrated in Figure 8.1-1. In the proposed polycentric urban structure, the existing central area will be characterized as the service center at a national and metropolitan level, and the three new sub-centers will be characterized as the service centers at inter-district level.

The Metropolitan Development Plan proposed so-called Territorial Units of Metropolitan Planning (UTPM), which is a technical instrument to define the basic orientation of future development. The UTPM classified the Metropolitan Area into the following four areas according to the schedule and characteristics of urbanization Figure 8.1-2.

-Metropolitan Central Area

The metropolitan central area is defined as the existing urbanized area with provision of infrastructure and public services, such as water, sewage, electricity, transport, roads, and education facilities. It can be used more intensively in a short and medium-term.

-Immediate Territorial Area

The immediate territorial area is the urban expansion of the metropolitan central area, which will be urbanized in a short and medium-term, with provision of infrastructure and public services.

-Mediate Territorial Area

The mediate territorial areas are defined as the future urban expansion areas in the long-term, by 2010. Generally, they are located in the north and south far away from the metropolitan central area and have feasibility of public service provision only in the long-term. The mediate territorial areas include informal settlements with some productive activities.

## -Extra-Urban Area

The extra-urban areas are composed of the following 4 specific uses:

- a) Intangible agriculture areas to advocate agricultural use, allowing in some cases, the establishment of rural centers and/or complementary activities for recreation.
- b) Ecological reserves to protect the natural environment of river basins and lakes.
- c) Metropolitan recreation areas to be used for public use and recreation, including parks, beaches and rivers.
- d) Areas for non-urban use, including mountains and mining exploitation, with a high level of danger and contamination.

### **3) Specific Directions of Land Use and Urban Development**

The Metropolitan Development Plan proposed specific directions of future land use and urban development, which are summarized as follows:

- a) The central metropolitan area, a triangle formed by Cercado de Lima, Miraflores and Callao, will strengthen its functions as political, administrative, cultural, commercial and business centers at a metropolitan and national level. The axis from Cercado de Lima to Miraflores will concentrate commercial and business activities. The axis from Cercado de Lima to Callao will promote light and small industries. The coastal zone will promote recreational and cultural activities to attract domestic and international tourists. Archeological monuments in Cercado de Lima should be preserved as a historical and cultural heritage.
- b) To reinforce the new sub-centers, commercial and service activities at inter-district level will be promoted. In addition, intensive residential development with medium-high density should be encouraged around the sub-centers,
- c) The existing industrial areas will be consolidated and strengthened. They are mainly located in areas such as Av. Panamericana Norte, Av. Chillón and Puente Piedra in the north, Ventanilla and Gambetta in Callao, the Carretera Central, Zárata and Cajamarquilla in the east, and Av. Panamericana Sur, and Conchán, Atocongo and Villa El Salvador in the south.
- d) The informal settlements will be located in the north and south far away from the central metropolitan area. The areas to be considered for the informal settlements are: Ancón, San Bartolo, Caballero, Gallinazos, Canto Grande, Huachipa, Tinajas, and Perros. In these areas, the informal settlements are encouraged to be of mixed use with industrial-agricultural activities.

### **4) Population Projection in 2010**

The Metropolitan Development Plan projected a future population as a framework for the year 2010. The total population was estimated to be 10,337,000 habitants in 2010, and the average annual growth rate was 2.4 percent<sup>6</sup> during the period between 1990 and 2010. Table 8.1-2 shows the population projection made by the Metropolitan Development Plan.

According to the distribution of future population by geographical areas (see Figure 8.1-1 and Table 8.1-3), northern Lima was estimated to have the largest population growth with 1,028,000 habitants between 1990 and 2010, followed by southern Lima with 896,000 habitants and eastern Lima with 839,000 habitants during the same period. Central Lima and Callao was estimated to increase its population with 647,000 habitants and 514,000 habitants respectively during the same period. In terms of percentage share of the population by geographical area, the central area decreased its share in the metropolitan area from 34.8% in 1990 to 27.7% in 2010. These figures clearly showed that the

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<sup>6</sup> According to the recent population trend in the Metropolitan Area, the average growth rate of 2.4 percent between 1990 and 2010 estimated by the Metropolitan Development Plan is too high.

Metropolitan Development Plan proposed an intensive decentralization policy through future population distribution.

Table 8.1-2 Population Projection in the Metropolitan Development Plan for Lima-Callao 1990-2010

Distribution by Area	1990		2010		1990-2010	
	Population (1,000)	Share (%)	Population (1,000)	Share (%)	Increased Population (1,000)	Average Annual Growth Rate
Central Lima	2,221	34.6%	2,867	27.7%	647	1.29%
North Lima	1,349	21.0%	2,377	23.0%	1,028	2.87%
South Lima	1,106	17.2%	2,002	19.4%	896	3.10%
East Lima	1,087	16.9%	1,926	18.6%	839	2.90%
Callao	651	10.2%	1,165	11.3%	514	2.95%
Total	6,414	100.0%	10,337	100.0%	3,923	2.41%

Source: The MML, Metropolitan Development Plan for Lima-Callao 1990-2010, p. III-27.

### 5) Major Issues of the Metropolitan Development Plan

Fifteen years have passed since the formulation of the Metropolitan Development Plan in 1989. The Study Team identified the following issues regarding the proposals in the Metropolitan Development Plan, in comparison with the reality of 2004.

- a) Further Concentration of Urban Activities in the Central Area. The Metropolitan Development Plan proposed a polycentric urban structure with the development of new sub-centers in the north, south and east of Lima. There was, however, no concrete measure and public investment to promote the development of the new sub-centers. The creation of employments in the new sub-centers has not progressed successfully, and major urban activities are still concentrated in the central area, which causes further traffic congestion and environmental pollution in the central area.
- b) Lost of Agricultural Lands. The Metropolitan Development Plan proposed the preservation of agricultural lands in the river basins of Chillón, Rimac and Lurin. The reality is, however, that the agricultural lands have been rapidly lost, especially in the Rimac River basin, where many agricultural lands have been transformed to urban use over the last decade. If this situation continues, the agricultural lands in the Metropolitan Area will completely disappear in a near future.
- c) Weak Urban Management. The Metropolitan Development Plan proposed polycentric urban structure through urban development policies and strategies. One of the instruments to encourage polycentric urban structure is the zoning regulation of land use. The zoning regulation is, however, too theoretical and not effective in practice. It should be a technical instrument to control urban activities with strong institutional measures.
- d) Lack of Collaboration between Central, Provincial and District Governments. The theoretical framework of the Metropolitan Development Plan was prepared by the initiative of the provincial government (MML), and it was supported by institutional measures, such as Laws, Decrees and Agreements, stipulated by the central and local governments. There is, however, no concrete system of collaboration in urban development between the central, provincial and district governments. For example, zoning of land use is regulated by the provincial government, but the actual authorization of development is issued by the district government. An institutional collaboration system is essential for an effective implementation of the policies proposed in the Metropolitan Development Plan.

- e) **Obsolete Population Projection.** The population projection prepared by the Metropolitan Development Plan is already obsolete, because its projection was conducted before the implementation of the latest population census of 1993. Therefore, there are big gaps of population data between the INEI and the Metropolitan Development Plan. According to the recent trend of the population in the Metropolitan Area, the projected population of 10,337,000 habitants in 2010 seems to be too large, and revision and update of the population projection will be necessary.

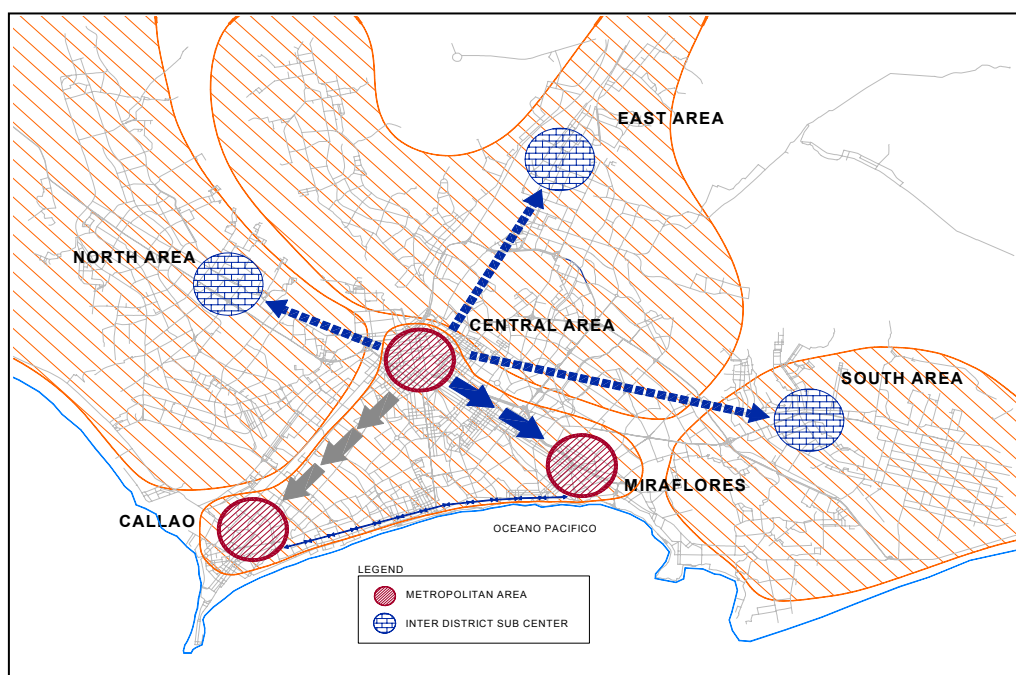


Figure 8.1-1 Concept of Decentralization of Urban Activities



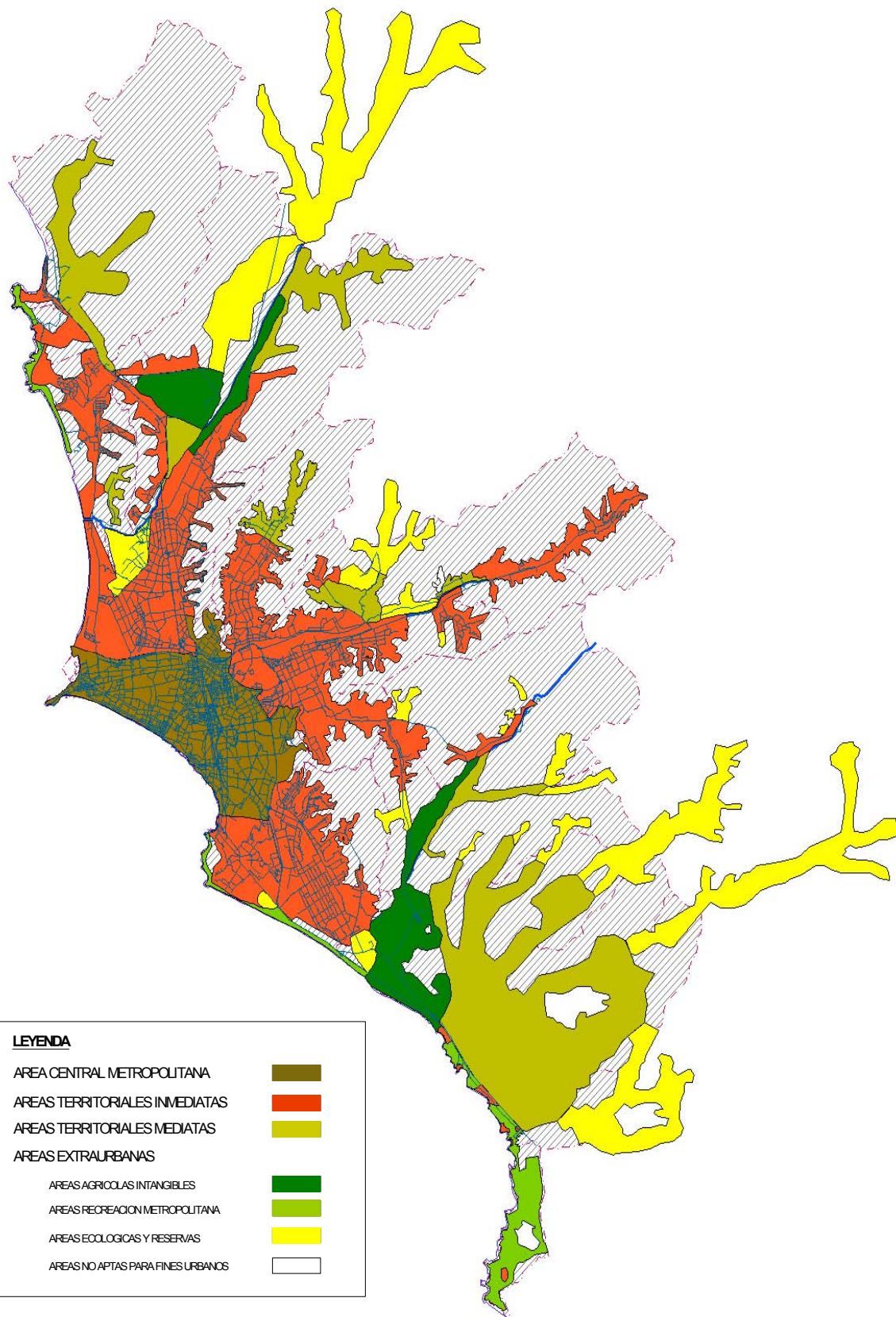


Figure 8.1-2 Territorial Units of Metropolitan Planning (UTPM)

Table 8.1-3 Populations Trends by District in the Metropolitan Area of Lima and Callao, 1972-2004

DISTRICT	AREA (ha)	Population				Annual Growth Rate		
		1972	1981	1993	2004	1972-1981	1981-1993	1993-2004
LA VICTORIA	874	274,948	284,798	230,063	237,284	0.39	-1.76	0.28
SANTIAGO DE SURCO	3,475	70,953	146,236	203,569	262,985	8.37	2.79	2.36
CERCADO DE LIMA	2,198	366,763	390,447	345,233	350,712	0.70	-1.02	0.14
RÍMAC	1,187	178,638	194,092	192,418	216,953	0.93	-0.07	1.10
SURQUILLO	346	64,330	99,176	89,714	102,274	4.93	-0.83	1.20
SAN MIGUEL	1,072	65,361	104,388	119,148	135,609	5.34	1.11	1.18
SAN BORJA	996	36,776	59,404	101,359	133,341	5.47	4.55	2.52
SAN LUIS	349	22,328	53,141	49,600	62,452	10.11	-0.57	2.12
BREÑA	322	116,151	118,251	91,244	98,193	0.20	-2.14	0.67
MIRAFLORES	962	103,317	108,841	88,344	98,122	0.58	-1.72	0.96
PUEBLO LIBRE	438	80,906	88,359	75,101	83,372	0.98	-1.35	0.95
JESÚS MARÍA	457	87,089	87,511	66,483	70,368	0.05	-2.26	0.52
LINCE	303	85,988	84,646	63,827	74,209	-0.17	-2.33	1.38
SAN ISIDRO	1,110	63,794	72,704	63,894	72,989	1.46	-1.07	1.22
MAGDALENA DEL MAR	361	58,888	58,427	49,655	56,133	-0.09	-1.35	1.12
BARRANCO	333	50,819	48,898	41,234	47,912	-0.43	-1.41	1.37
<b>CENTRAL LIMA</b>	<b>14,783</b>	<b>1,727,049</b>	<b>1,999,319</b>	<b>1,870,886</b>	<b>2,102,908</b>	<b>1.64</b>	<b>-0.55</b>	<b>1.07</b>
SAN MARTÍN DE PORRES	3,691	179,664	310,426	385,759	479,532	6.26	1.83	2.00
COMAS	4,875	183,358	304,548	410,066	502,669	5.80	2.51	1.87
INDEPENDENCIA	1,456	115,788	159,919	186,526	210,682	3.65	1.29	1.11
PUENTE PIEDRA	7,118	19,525	35,689	104,261	177,935	6.93	9.35	4.98
CARABAYLLO	34,688	28,827	55,550	108,049	153,595	7.56	5.70	3.25
ANCÓN	29,864	5,777	8,864	19,968	22,316	4.87	7.00	1.02
SANTA ROSA	2,150	225	518	3,962	16,304	9.71	18.48	13.72
LOS OLIVOS	1,825	53,061	93,762	231,367	310,217	6.53	7.82	2.70
<b>NORTH LIMA</b>	<b>85,667</b>	<b>586,225</b>	<b>969,276</b>	<b>1,449,958</b>	<b>1,873,250</b>	<b>5.75</b>	<b>3.41</b>	<b>2.36</b>
DISTRICT	AREA (ha)	Population				Annual Growth Rate		
		1972	1981	1993	2004	1972-1981	1981-1993	1993-2004
SAN JUAN DE MIRAFLORES	2,398	110,512	174,398	287,353	384,065	5.20	4.25	2.67
VILLA MARÍA DEL TRIUNFO	7,057	106,550	182,981	267,278	341,963	6.19	3.21	2.27
VILLA EL SALVADOR	3,546	80,778	147,679	258,239	344,439	6.93	4.77	2.65
CHORRILLOS	3,894	93,807	149,270	220,066	278,325	5.30	3.29	2.16
LURÍN	18,026	13,239	17,834	34,752	51,943	3.37	5.72	3.72
PUNTA HERMOSA	11,950	940	1,063	3,327	5,476	1.38	9.97	4.63
CIENEGUILLA	24,033	2,616	4,783	9,120	14,572	6.93	5.53	4.35
PUCUSANA	3,166	2,935	4,318	4,293	4,706	4.38	-0.05	0.84
SAN BARTOLO	4,501	1,509	3,065	3,350	3,646	8.19	0.74	0.77
PUNTA NEGRA	13,050	770	582	2,406	4,468	-3.06	12.55	5.79
PACHACAMAC	16,023	4,694	7,133	20,131	34,917	4.76	9.03	5.13
SANTA MARÍA DEL MAR	981	46	101	185	303	9.13	5.17	4.59
<b>SOUTH LIMA</b>	<b>108,625</b>	<b>418,396</b>	<b>693,207</b>	<b>1,110,500</b>	<b>1,468,823</b>	<b>5.77</b>	<b>4.01</b>	<b>2.57</b>
SAN JUAN DE LURIGANCHO	13,125	89,206	272,898	591,213	775,554	13.23	6.65	2.50
EL AGUSTINO	1,254	93,214	135,200	156,204	169,162	4.22	1.21	0.73
ATE VITARTE	7,772	48,822	118,865	270,162	365,176	10.39	7.08	2.78
LURIGANCHO	23,647	53,174	68,531	101,656	129,915	2.86	3.34	2.25
CHACLACAYO	3,950	22,143	33,237	36,502	42,510	4.62	0.78	1.39
LA MOLINA	6,575	6,160	15,422	79,341	142,575	10.73	14.63	5.47
SANTA ANITA	1,069	41,835	75,525	120,336	161,773	6.78	3.96	2.73
<b>EAST LIMA</b>	<b>57,392</b>	<b>354,554</b>	<b>719,678</b>	<b>1,355,414</b>	<b>1,786,665</b>	<b>8.18</b>	<b>5.42</b>	<b>2.54</b>
CALLAO	4,565	205,370	270,626	374,298	424,477	3.11	2.74	1.15
BELLA VISTA	456	41,084	69,181	72,543	87,800	5.96	0.40	1.75
LA PERLA	275	34,554	48,386	59,885	69,526	3.81	1.79	1.37
CARMEN DE LA LEGUA	212	26,935	39,516	38,616	46,524	4.35	-0.19	1.71
VENTANILLA	7,352	17,359	20,186	95,654	175,803	1.69	13.84	5.69
LA PUNTA	75	6,926	6,418	6,569	7,480	-0.84	0.19	1.19
<b>CALLAO</b>	<b>12,935</b>	<b>332,228</b>	<b>454,313</b>	<b>647,565</b>	<b>811,610</b>	<b>3.54</b>	<b>3.00</b>	<b>2.07</b>
<b>TOTAL</b>	<b>279,402</b>	<b>3,418,452</b>	<b>4,835,793</b>	<b>6,434,323</b>	<b>8,043,256</b>	<b>3.93</b>	<b>2.41</b>	<b>2.05</b>

## **8.2. ROAD DEVELOPMENT PROJECTS**

### **8.2.1. EXECUTION OF ROAD FACILITY PROJECTS**

Although Lima and Callao have independent administrations, the integral planning of the metropolitan area is developed by the Metropolitan Planning Institute (IMP) of Lima, in coordination with the Municipality of Callao. The IMP develops projects of expressways, arterial roads and collector roads, and the Municipality of Lima is responsible for their management. Maintenance and small scale improvements are executed by the Municipal Direction of Urban Transport (DMTU).

The Municipal Administration Company (EMAPE) executes large scale road facility projects. EMAPE is also responsible for highways maintenance and toll collection; the collected amount is employed in the payment of loans to international institutions such as the Inter-American Development Bank (IDB) and to develop projects approved by the Municipality.

Presently, EMAPE has 16 toll collection points distributed along Av. Pan Americana and other locations inside Metropolitan Lima. About 30 Million dollars of the collected amount is assigned to road development.

The budget for the transport sector in the Municipality of Lima is channeled through the DMTU for road maintenance and administrative expenses while income originated from toll collection is used in the development of road facilities through EMAPE. In any case, road facility developments are very limited because the amount assigned for transport investment is not significant. The Municipality of Lima created the Special Committee to Promote Private Investment (CEPRI-LIMA) in order to promote the participation of private companies in the development of transport projects.

### **8.2.2. CURRENT SITUATION OF THE MAIN PROJECTS**

The main projects that have been evaluated are shown in Figure 8.2-1.

#### **(1) Projects with the Participation of Private Companies ( CEPRI - LIMA )**

##### **1) *Perforce Vial Norte***

Peripheral road to interconnect the Port of Callao to Av. Panamericana Norte, passing through the hills of the North side of Rimac River for cargo transport within the city and between other cities, at the same time a reduction of cargo traffic is expected. The present project would affect around 2,000 housings that would have to be moved out, and its concession process is not advancing.

##### **2) *Circuito de Playas Costa Verde***

The Costa Verde in Lima's West coast is separated from the urbanized area by an accentuated cliff. The present road project aims to construct an expressway to interconnect Callao and the District of Miraflores along the coast line. It would alleviate traffic congestion in the city. The concession project is not progressing due to limited access points because of the topography, necessity to avoid falling rocks and flood tides and the low quantity of users if a toll expressway is constructed.

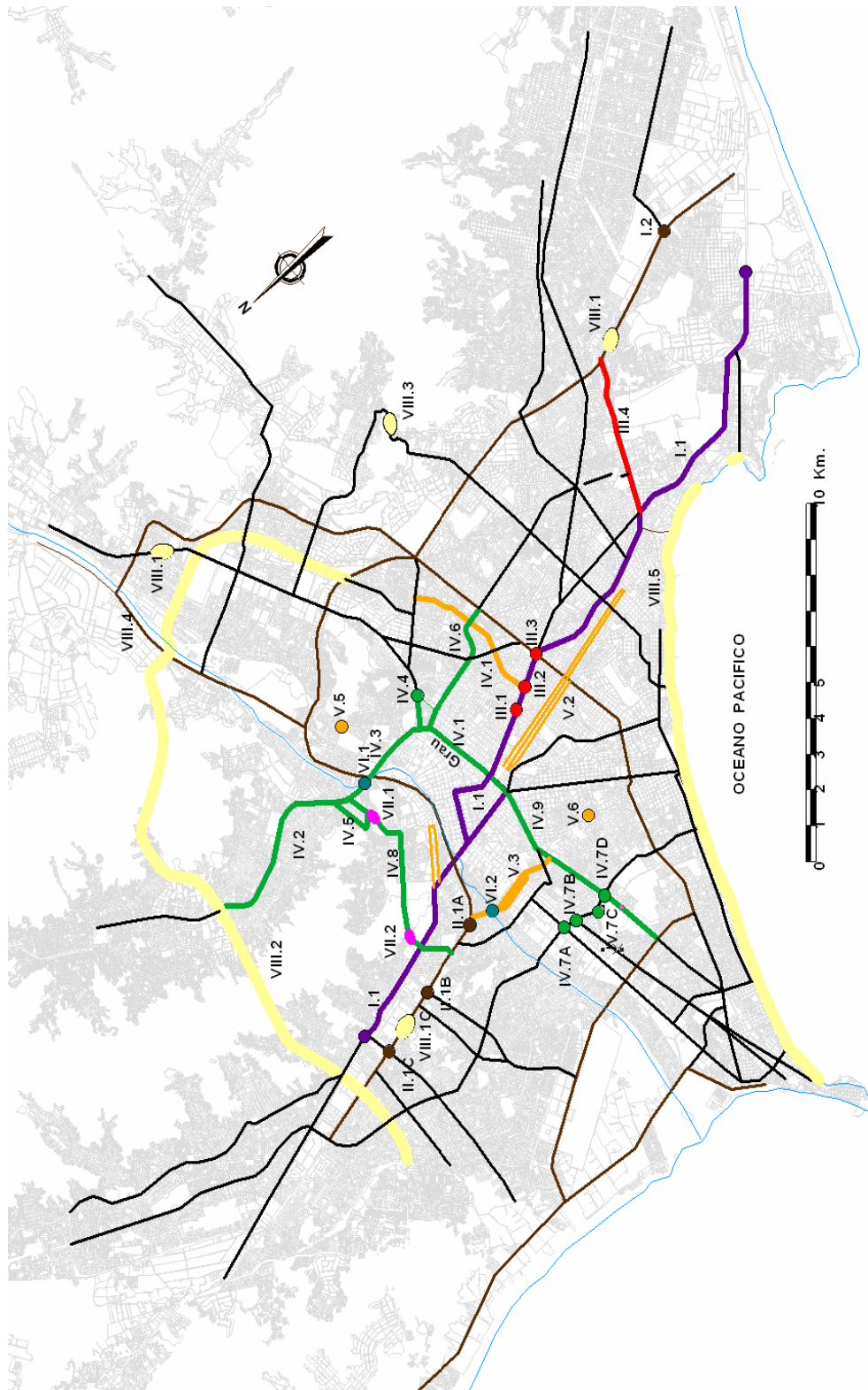


Figure 8.2-1 Main Projects that have been Evaluated

### **3) *Ramiro Prialé***

The present road project is an extension of the existing inter-municipal road. A four lane road, meaning the Carretera Central, runs parallel so the volume of demand is not significant and concession has not advanced.

## **(2) Participation of Private Companies in Callao**

### **1) *Implementation of Avenida Faucett Expressway Project***

Project to link the Airport to Av. Javier Prado at the central area of Lima by an expressway at the section corresponding to the municipality of Callao. It is expected to mitigate the heavy traffic at Av. Faucett and to alleviate congestion at intersections with other roads. The concessionaire has been selected already and the works are under progress.

## **(3) EMAPE**

### **1) *Santa Rosa Tunnel Construction Project***

Road to connect San Juan de Lurigancho District to the Rimac district constituting in access road to the center of Lima for the almost 800 thousand people living in San Juan de Lurigancho. Works are expected to start in the present year.

### **2) *San Francisco Tunnel Construction Project***

Road to interconnect La Molina District to the central area of the city, significantly reducing the trip distance. Presently under evaluation to see the possibilities of starting the works next year.

### **3) *Grade-Separated Intersection Plan for Av. La Marina***

Project to improve Av. La Marina road structure interconnecting the airport to Av. Javier Prado at the central area of the city. There is nothing concrete about the project yet.

### **4) *Paseo de la República Extension***

Extension of the existing expressway to connect it to Av. Panamericana Sur. There is nothing concrete about the project yet.

## **8.3. BUS TRANSPORT DEVELOPMENT PLANS**

### **8.3.1. DEVELOPMENT PLAN IN THE LAST 30 YEARS**

#### **(1) Urban Transport Master Plan**

There are the following two important urban transport studies in Lima.

- 1) Metropolitan Roadway Plan, 1971
- 2) Transport Plan: INVERMET, Lima, 1989

Figure 8.3-1 shows a flowchart of past transport studies related to the above two studies. These are key studies of the urban transport master plan in Lima. Those studies were succeeded by posterior studies and some projects from among them were implemented. The “Plan Vial Metropolitano, 1971” was studied by the Ministry of Transport and Communications and the Municipality of Lima. The projects proposed in the “Plan Vial Metropolitano” were approved by the Municipality of Lima and were enacted into RS-No 293-71-VI-VU, 06/July/1971.

After 20 years, since 1971 when the first urban transport master plan was carried out in Lima, the Municipality of Lima carried out the “Transport Plan” which included person trip surveys, travel demand forecasts, a public transport plan, and a road plan. The road projects proposed in the study were followed by present road construction.

In the study, the network of busways exclusive of private vehicles was proposed under the bus transport oriented plan (see Figure 8.3-2). The busway project did not proceed and then it was followed by the “PROTUM” project in 1998.

The “Metropolitan Development Plan of Lima and Callao”, in which land use and development plans for the metropolitan area of Lima and Callao were made, was also carried out in 1990. The urban transport projects in the “Transport Plan” were planned based on the land use and development plans in the “Metropolitan Development Plan of Lima and Callao”.

## **(2) Public Bus Transport Projects**

In 1997, the Transport Council of Lima and Callao (CTLIC) was established as a coordinating organization with the national government and the municipalities, composed by the Ministry of Transport and Communications, the Ministry of the Environment, the Municipality of Lima and the Municipality of Callao. The “Metropolitan Urban Transport Project- PROTUM” was carried out between 1997 and 2000 by the CTLIC. This study is composed of the following three sub-studies, which include a current problem, a public transport plan, a rehabilitation plan of road pavement in a suburb, and an organization and financial plan to implement the projects proposed in the studies.

- 1) Technical Assistance in the Urban Transport Study for the Metropolitan Area of Lima and Callao
- 2) Operational Design of the Integrated Transport Network (RIT) of the Vitrina Corridor
- 3) Basic Engineering Project of the Vitrina Proceres de la Independencia – 9 de Octubre – Abancay – Manco Cápac – Paseo de la Republica Corridor (Vitrina Corridor), February 2000

In PROTUM, the proposed public transport plan was a trunk-feeder bus system which is composed of seven (7) mass transport networks (see Figure 8.3-3) and feeder bus networks. (see Figure 8.3-4). Moreover, out of seven mass transport networks, a feasibility study for one segregated busway on the Vitrina Corridor was carried out in 2000 (above substudy No. 3: Vitrina Corridor), which is an original plan of the COSAC-1 project, which is a rapid bus transport project operated under a trunk-feeder bus system financed by the World Bank and Inter-American Development Bank (IDB). Figure 8.3-5 shows the proposed busway route locations in PROTUM and COSAC-1, which are different in the route location in the north area. The bus operation system in the original plan was planned in an “open system” in which a bus operates on the segregated busway under the existing bus route system, not under the trunk-feeder bus system.

After that, the Municipality of Lima established PROTRANSPORTE, which is an organization to conduct the COSAC-1 project. This project is now under progress.

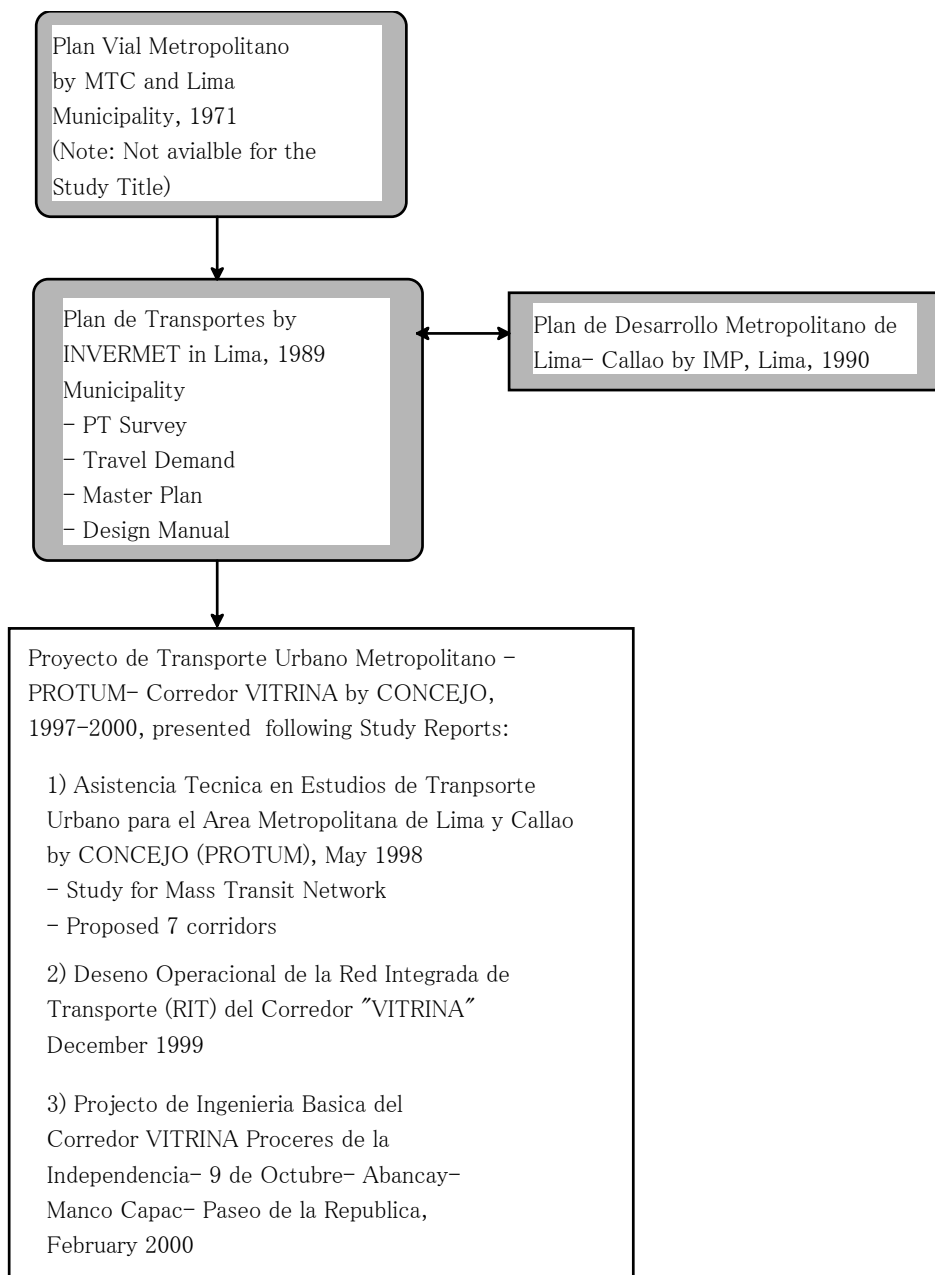


Figure 8.3-1 Flowchart of Past Transport Studies

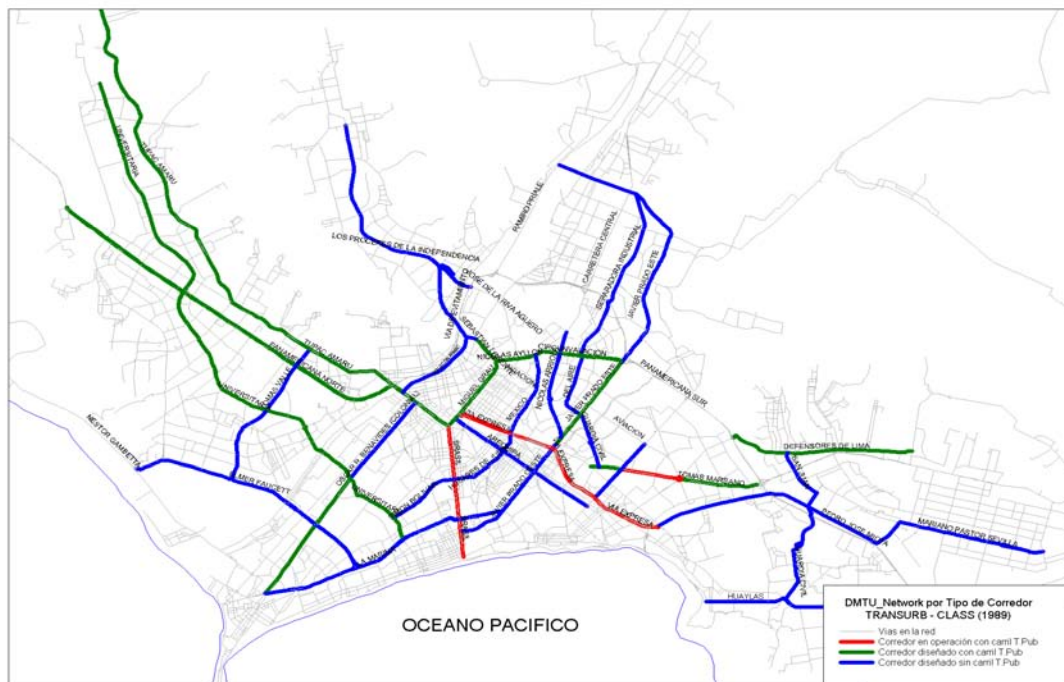


Figure 8.3-2 Bus Transport Network Proposed in the “Transport Plan” in 1989

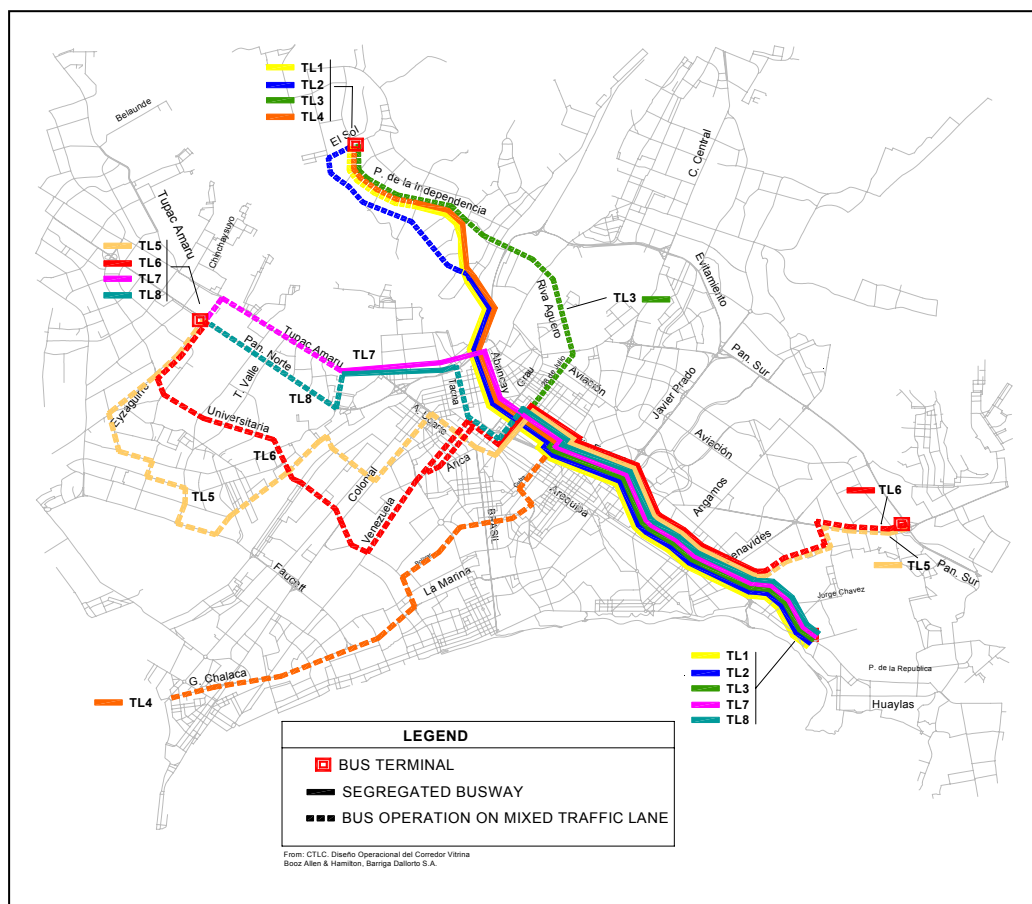


Figure 8.3-3 Seven (7) Mass Transit Networks Proposed in PROTUM



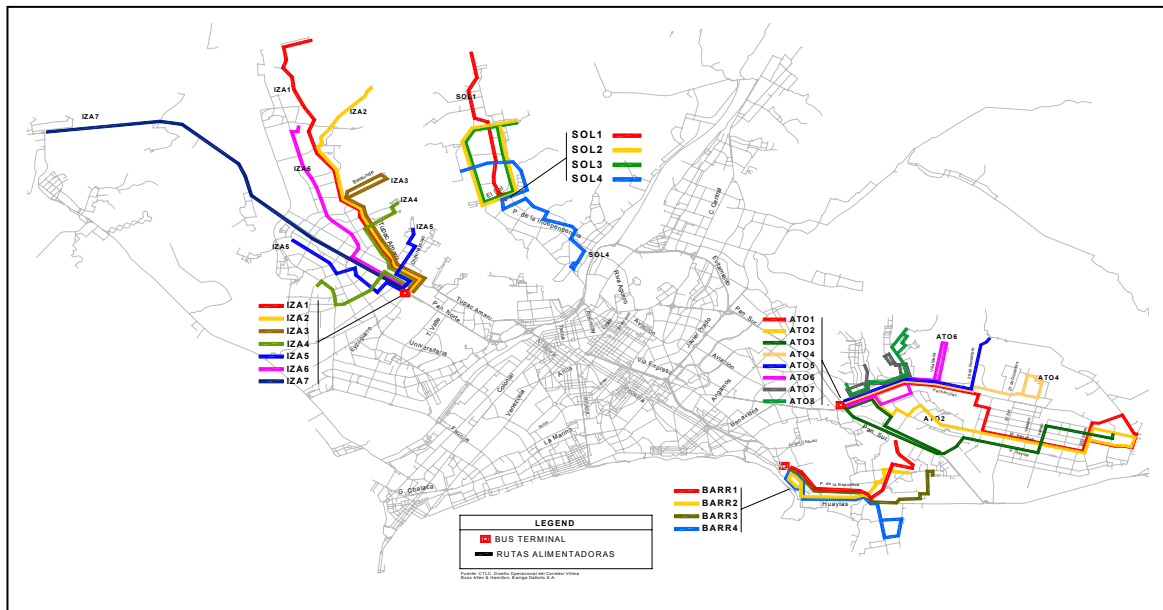


Figure 8.3-4 Bus Feeder Networks Related to Seven Mass Transit Networks in PROTUM

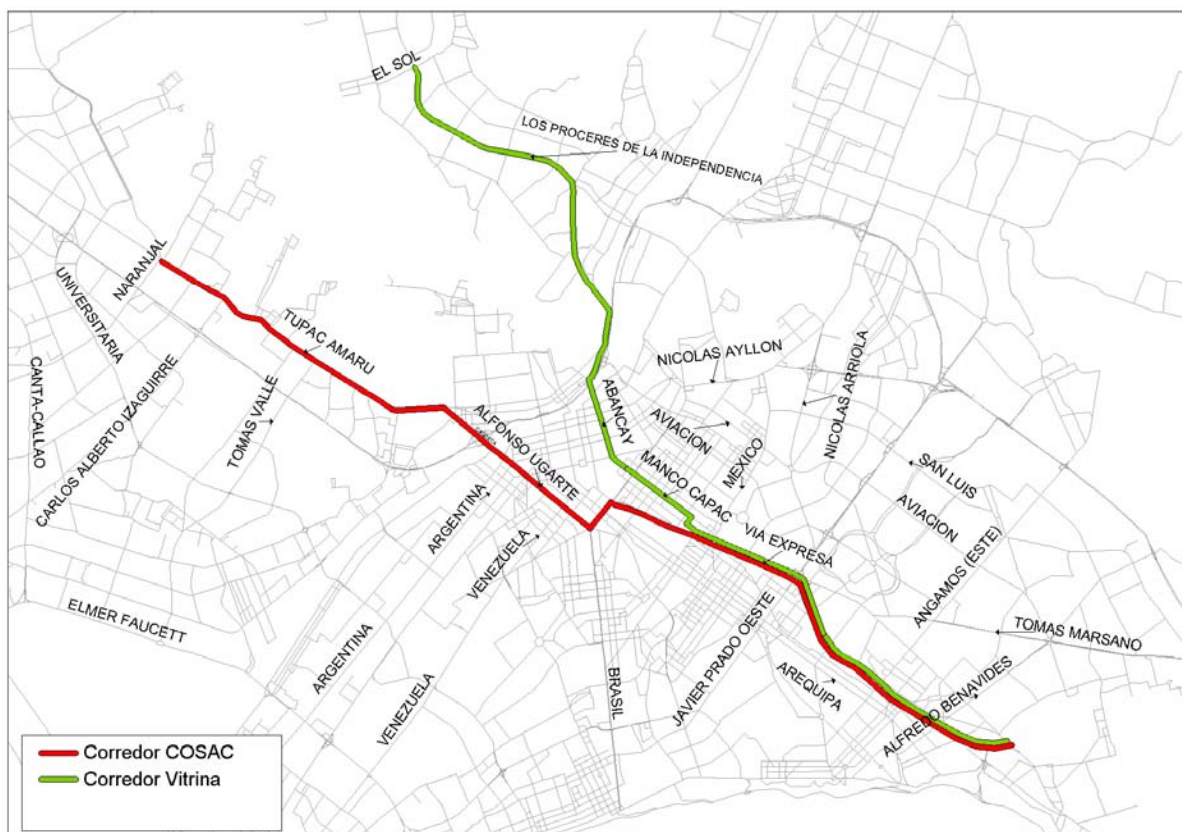


Figure 8.3-5 Proposed Busway in PROTUM and COSAC-1

### **8.3.2. ON-GOING RELATED PROJECTS IN LIMA**

The DMTU, of the Municipality of Lima, carries out a comprehensive public transport plan in a medium term as shown in following, which is composed of the rerouting of a bus route, the improvement plan of a bus fare system, and the facility plan of a bus stop and bus terminals on nine (9) major study roads. Together with the COSAC-1 and urban train projects; the improvement of the urban public transport system will be made.

“Study for the Concession of Routes on 9 Metropolitan Roadway Axels, 2004, DMTU, Lima”

The following section shows the outline of the study in which the nine (9) project roads are already selected, and the improvement plans were commenced in 2004 and will be completed 2 or 3 years later. Figure 8.3-6 shows the nine (9) study roads selected for the DMTU project.

#### **(1) Purpose of the Project**

Incorporate the on-going COSAC-1 project with the urban train projects, it is forecasted that the share of public transport mode by those projects is approximately 10% of the total public transport. The remain 90% is shared by the current bus system. Since the concession of the bus routes authorized by the DMTU expires in 2003, the implementation plan will be carried out until a time limit of the concession.

A planning policy of the project is to improve the quality of life. The objectives of the project are the following.

- 1) Alleviate traffic congestion
- 2) Improve bus operations
- 3) Abide traffic regulations
- 4) Obligate buses to stop at bus stops

The outline of the project is the following.

- 1) New concessions will be given after a rerouting of the bus routes on 9 major roads.
- 2) The selected nine (9) roads do not directly impact the COSAC-1 and urban train projects.
- 3) Integration of three (3) projects: the DMTU, the COSAC-1 and the urban train projects cover almost all of the public transport trips.

#### **(2) Contents of the Project**

The contents of the project are the following.

- 1) Bus operation plan
  - a) Bus route location plan
  - b) Bus fare system plan to introduce an integrated bus fare system
  - c) Design of bus stop facilities
  - d) Plan and design of bus terminal facilities
- 2) Economic and financial evaluation
- 3) Improvement plan for the organization of bus companies

The rerouting of bus routes on one major road, out of 9 roads, was completed in July 2004. The bidding for the concession of the bus routes will begin between September and October 2004.

Table 8.3-1 Bus Operation Characteristics of Nine (9) Roads

No.	Corridors	Road Section	Length (km)	No. of Routes	No. of Bus Companies	No. of Required Buses/ day				Passengers/ direction/hour
						Omnibus	Microbus	Rural Truck	Total	
1	Av. Tacna, Av. Garcilazo de la Vega, Av. Arequipa	Puente Tacna - Ovalo Miraflores	8.90	44	37	2,969	592	129	3,690	17,000
2	Av. Javier Prado, Av. La Marina	Av. La Marina/Av. Universitaria - Av. Javier Prado/Av. Las Palmeras	12.80	80	69	3,810	1,799	464	6,073	9,800
3	Av. Próceres de la Independencia, Av. Abancay, Vía Expresa	Av. Wiesse/Av. El Sol - Av. Abancay/Av. Grau	9.80	153	122	8,697	2,644	1,209	12,550	16,000
4	Panamericana Sur, Vía de Evitamiento, Av. Zarumilla, Panamericana Norte	Panamericana Sur/Av. Pumacahua - Pan. Norte/Av. Izaguirre	31.80	131	110	5,313	3,548	2,872	11,733	14,000
5	Carretera Central, Av. Nicolás Aylón, Av. Grau, Av. 9 de Diciembre, Av. Brasil	Ovalo Santa Anita - Av. Del Ejército	13.90	201	171	8,608	4,809	3,660	17,077	14,000
6	Carretera Central, Av. Nicolás Aylón, Av. Grau, Av. 9 de Diciembre, Av. Arica, Av. Venezuela	Plaza Bolognesi - Av. Faucett	5.70	201	174	8,194	4,627	3,531	16,352	9,200
7	Todo Av. Universitaria	Intercambio Vial Norte - Av. La Marina	14.00	115	103	4,356	2,692	1,771	9,089	-
8	Todo Av. Riva Agüero	Av. Riva Agüero/ Vía de Evitamiento - Av. Riva Agüero/ Av. Nicolás Aylón	3.70	51	51	1,406	1,993	1,146	4,545	-
9	Todo Av. Angamos	Av. Angamos/ Av. La Encalada - Av. Angamos/ Av. Paz Soldán	8.30	51	53	1,681	1,268	1,356	4,305	-
<b>TOTAL (erasing the routes which cover two or more corridors)</b>			<b>108.90</b>	<b>380</b>	<b>289</b>	<b>15,185</b>	<b>8,975</b>	<b>7,365</b>	<b>31,525</b>	

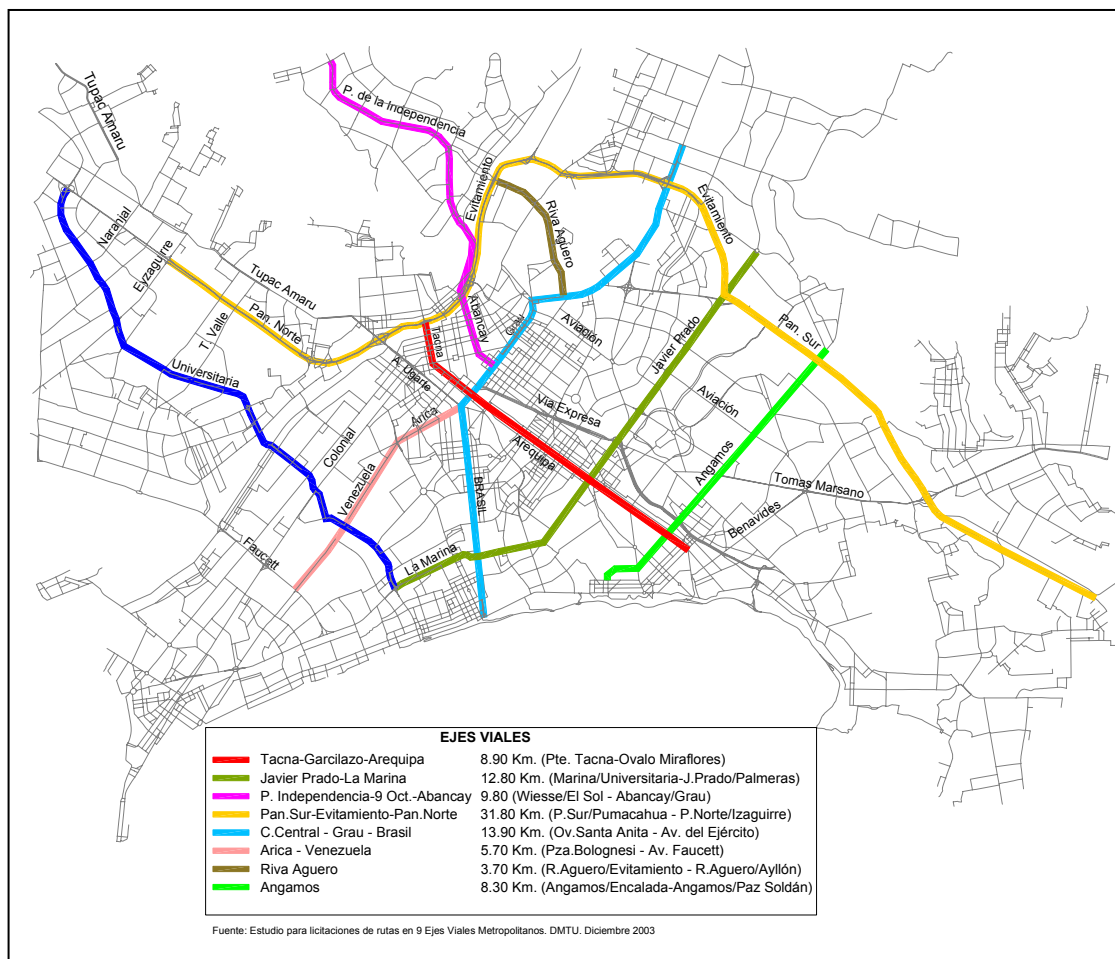


Figure 8.3-6 Nine (9) Study Roads Selected for the DMTU Project

### 8.3.3. ON-GOING RELATED PROJECTS IN CALLAO

The Municipality of Callao does not have a bus transport improvement plan. An urgent issue is a reciprocal bus route between Lima and Callao. Since the bus operation regulation that was agreed under the proposal for reciprocal routes is not kept by each party, there is an urgent need to elaborate new regulations regarding reciprocal routes.

### 8.3.4. PROTRANSPORTE'S PROJECT (COSAC PROJECT)

#### (1) Organization of PROTRANSPORTE

The Special Project PROTRANSPORTE of LIMA (PROTRANSPORTE), created by means of Municipal Decree N° 35 dated March 18, 2002, is an agency with economic and administrative autonomy that depends on the Municipality of Lima. PROTRANSPORTE is the agency responsible for the coordination, with all the levels of the Municipal Corporation, of the actions and the execution of studies and projects related to COSAC-1: High capacity Corridors. Figure 8.3-7 shows the organization chart of PROTRANSPORTE.

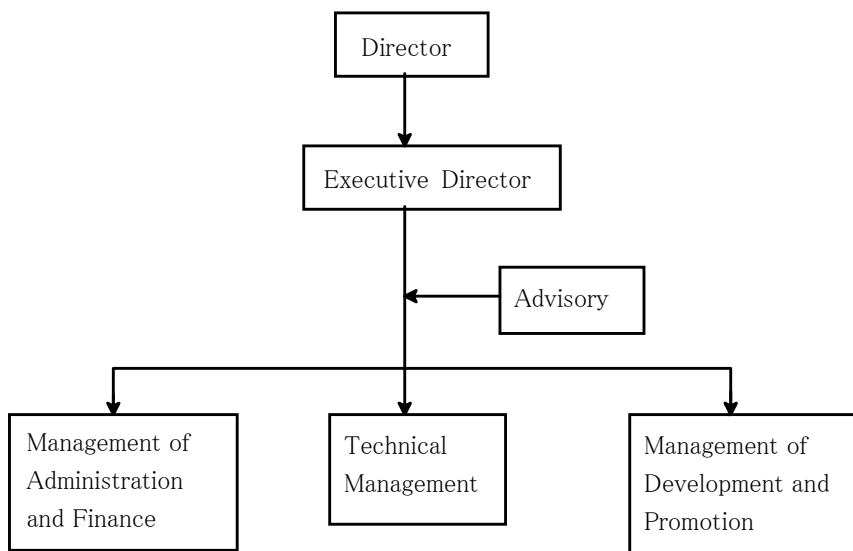


Figure 8.3-7 Organization Chart of Protransporte

#### (2) World Bank Project

COSAC-1 (High Capacity Segregated Corridor) is a rapid bus transport project operated under a trunk-feeder bus system financed by the World Bank and Inter-American Development Bank (IDB) based on the exclusive busway project proposed in PROTUM. The busway location proposed by PROTUM is Av. Proceres de la Independencia in the segment of the north area, while COSAC-1 proposes Av. Tupac Amaru (see Figure 8.3-5). The busway project totals a length of 28.6 km in which the existing busway on Paseo de la República is used as part of the project. The Project Appraisal Report of the COSAC-1 project was submitted to the World Bank and IDB in November 2003. The total project cost is approximately US\$ 124.4 million of which US\$ 45 million are financed by the World Bank and US\$ 45 million by IDB and the remaining US\$ 34.4 million by the Municipality of Lima. The IDB loan was agreed in February 2004. The execution of the project will be commenced between July and December 2004 and the operation will be commenced in March 2006.

### **(3) COSAC-1 Project**

#### **1) Purpose and Strategy**

The purpose of the project is the following.

- 1) Integration of the Bus System
- 2) Profitability
- 3) Efficiency

The strategy of the project is the following.

- 1) Strengthening the competence and control of the administration
- 2) Conducting a public transport priority policy
- 3) Planning a public transport system
- 4) Maintaining the sustainability of the proposed public transport system

#### **2) Action Plans**

The action plans to achieve the strategy are the following.

- 1) Integration of bus routes on major roads
- 2) Rerouting of bus routes on nine (9) major roads proposed by the DMTU
- 3) Control of the excessive number of buses that operate the bus routes
- 4) Improve the proceeds of the bus companies
- 5) Strengthen the competence and control of the administration, and recover the safety and reliability of the bus service
- 6) Conserve the environment conditions by introducing a large bus fleet
- 7) Implement the World Bank/IDB project, which is composed of the construction of a total length of 29.4 km (it was modified from the original length of 28.6 km due to a change in the location of the bus terminal), purchase of a large fleet of 250 buses, and an ordinary fleet of 164 buses.
- 8) Propose a new public transport system in cooperation with the urban train project.

#### **3) Contents of the Project**

The contents of the exclusive busway and bus facility plans are the following.

- 1) Construction of an exclusive busway of 29.4 km
- 2) Construction of two bus terminals
- 3) Construction of 35 bus stops
- 4) Construction of a U-turn bus facility at 2 locations
- 5) Introduction of the bus feeder route with a total length of 40 km
- 6) Construction of a bikeway of 30 km
- 7) Construction of a bus facility with a bus fare collection system
- 8) Construction of a bus stop facility for express buses and ordinary buses

## 8.4. EXISTING RAILWAY PROJECTS

### 8.4.1. EVOLUTION CONDITION OF RAILWAY TYPE TRANSPORTATION PROJECTS

Lima is one of the largest cities in South America and, to alleviate vehicular congestion, the existing tram system of the city was eliminated in 1965. The Municipality of Lima requested a Swedish consultant to elaborate a Pre-feasibility Study for a subway based public transport system as a strategy to replace said service but the fund raising plan was not concentered and the project could not be executed.

In 1973 a German-Swiss company elaborated the “Preliminary Design of the Passenger Rapid Transport System in the Metropolitan Area of Lima and Callao”. According to said study, in 20 years the railway network for public transport would be completed, and four routes with a total extension of 125 Km. (Figure 8.4-1, Plan of 125 Km length) was proposed. Later, they concentrated on 70 Km they considered as a feasible extension. (Figure 8.4-2, Plan of 70 Km length).

Line 1 : Comas-Villa El Salvador	37.0 Km
Line 2 : San Borja- Maranga	13.0 Km
Line 3 : Rimac- San Isidro	10.0 Km
Line 4 : La Victoria – Carmen de la Legua	10.0 Km

However, at the referred period the forth war in the middle east started, causing the first oil shock in the world, and Peru also suffered its economic consequences and the above Project could not be materialized. Later, more projects were executed and a summary of their contents are presented in Table 8.4-1.

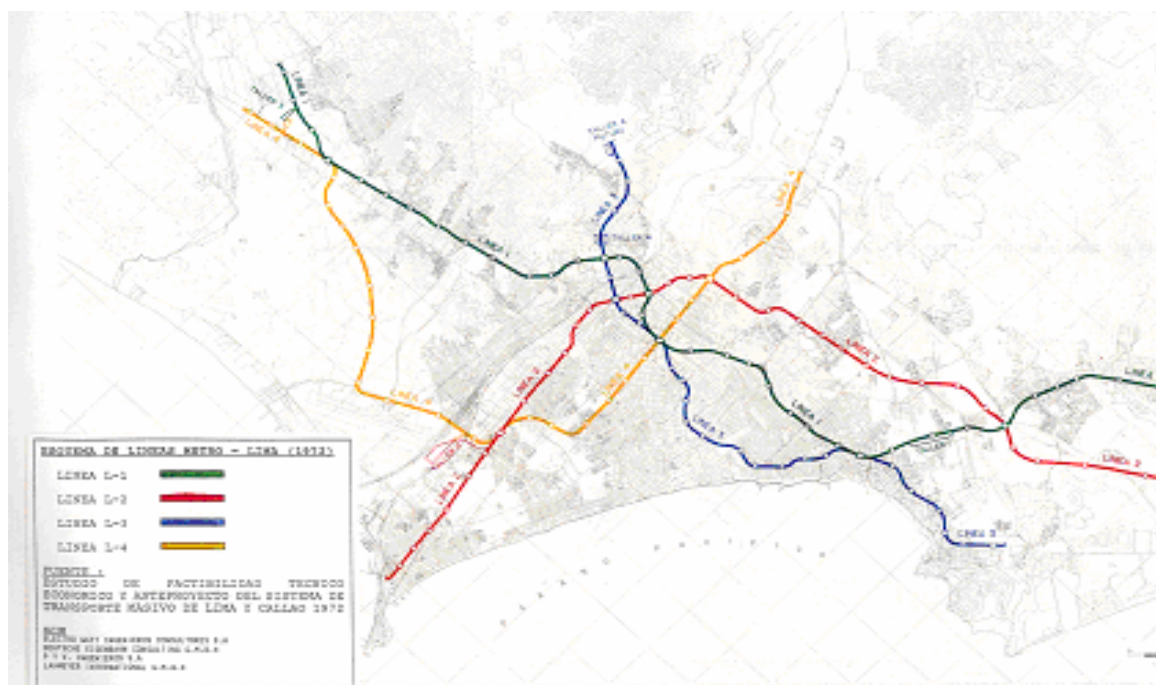


Figure 8.4-1 125 Km Plan



Figure 8.4-2 Plan of 70 Km

Table 8.4-1 Existing Railways Projects – List of the Last 30 years

Project Name <sup>o</sup>	Project Type <sup>o</sup>	Budget Source <sup>o</sup>	Total Budget <sup>o</sup>	Outline of Project <sup>o</sup>	Implementation Period <sup>o</sup>	Project Progress <sup>o</sup>	Problems or Issues <sup>o</sup>
Preliminary Design of the Passenger Mass Rapid Transport System in the Metropolitan Area Lima – Callao <sup>o</sup>	M/P <sup>o</sup>	GOP <sup>o</sup> MVC <sup>o</sup>	Approx. US\$ 3 million <sup>o</sup>	Examination of viability of mass transit network based on demand forecasting in Lima. Four railway routes were prepared and 2 route recommended to implement urgently. Final route length was proposed 70km length. <sup>o</sup>	1973 <sup>o</sup>	Done <sup>o</sup>	This study was not realized due to oil crisis. <sup>o</sup>
Basic Study of the Lima and Callao Mass Rapid Transport System <sup>o</sup>	M/P <sup>o</sup>	GOP <sup>o</sup> AATE <sup>o</sup>	n.d. <sup>o</sup>	Proposed 5-lines rail network evaluates demand, initial investment and operational costs for alternative alignments of North - South line. <sup>o</sup>	1986 <sup>o</sup>	Done <sup>o</sup>	Selects N - S line <sup>o</sup> (Approved by MO Presidency) <sup>o</sup>
Technical and Economical Study of the First Stage, AATE <sup>o</sup>	F/S <sup>o</sup>	GOP <sup>o</sup> AATE <sup>o</sup>	n.d. <sup>o</sup>	Selection of ting and examination of structural alternative of underground structure for North-south Line. <sup>o</sup>	1986 <sup>o</sup>	Done <sup>o</sup>	Defines viability of N - S line (Approved by MO Presidency) <sup>o</sup>
Preliminary design study for the Electric train for North-south Line <sup>o</sup>	P/D <sup>o</sup>	GO Italy AATE <sup>o</sup>	US\$ 1 million <sup>o</sup>	Basic design of railroad type transport system, estimation of cost, economic analysis and environment study. <sup>o</sup>	1987 <sup>o</sup>	Done <sup>o</sup>	Defines characteristics of N - S line <sup>o</sup>
Urban Rail Callao - Vitarte <sup>o</sup>	F/S <sup>o</sup>	GO Canada <sup>o</sup>	n.d. <sup>o</sup>	Proposes an East - West commuter service between Callao-Vitarte using the existing right of way of Central Railway, utilizing diesel car for urgent and electric car for future. <sup>o</sup>	1988 <sup>o</sup>	Done <sup>o</sup>	



Table 8.4-1 Existing Railways Projects – List of the Last 30 years

Project Name <sup>a</sup>	Project Type <sup>b</sup>	Budget Source <sup>c</sup>	Total Budget <sup>d</sup>	Outline of Project <sup>e</sup>	Implementation Period <sup>f</sup>	Project Progress <sup>ss</sup>	Problems or Issues <sup>g</sup>
Metropolitan Development Plan for Lima and Callao (1990 - 2010). Transportation Plan <sup>a</sup>	M/P <sup>a</sup>	WB Invermet <sup>c</sup>		Master plan for short, middle and long term public transport plan in Lima. Proposes 2 · line rail network <sup>e</sup>	1989 <sup>f</sup>	Done <sup>ss</sup>	(Approved by Municipality 1992) <sup>g</sup>
Working design of civil works and electromechanical equipment of line and depot <sup>a</sup>	D/D <sup>a</sup>	GO Italy AATE <sup>c</sup>	9 million <sup>d</sup>	W/D of civil works in line (US\$ 2.5 million) <sup>e</sup> W/D of electromechanical equipment of line (US\$ 4.5 million) <sup>e</sup> W/D of civil works of depot (US\$ 1.3 million) <sup>e</sup> W/D of electromechanical equipment of depot (US\$ 0.7 million) <sup>e</sup>	1990 · 1992 <sup>f</sup>	done <sup>ss</sup>	Donation <sup>g</sup>
Technical Assistance to AATE <sup>a</sup>	Supervision <sup>a</sup>	GO Italy AATE <sup>c</sup>	US\$ 53,000 <sup>d</sup>	Supervision of design, construction, mounting and commissioning <sup>e</sup>	1989 · 1995 <sup>f</sup>	done <sup>ss</sup>	Donation <sup>g</sup>
Supplies for urban train <sup>a</sup>	Equipment <sup>a</sup>	GO Italy AATE <sup>c</sup>	US\$ 10.5 million <sup>d</sup>	Part of the supplies for the electromechanical equipment of urban rail (telecommunication, parts and equipment of depot) <sup>e</sup>	1992 · 1995 <sup>f</sup>	done <sup>ss</sup>	Donation <sup>g</sup>
In-depth Evaluation of Alternative for the Second Section of the Electric Train Atocongo Bridge · Center of Lima. UNI <sup>a</sup>	F/S <sup>a</sup>	GOP AATE <sup>c</sup>	US\$ 61,000 <sup>d</sup>	Selection of adequate route by the analysis of economic viability for each alternative route for 2 sections <sup>e</sup>	1996 <sup>f</sup>	Done <sup>ss</sup>	Confirms alignment of N · S line by Aviación avenue. <sup>g</sup>

Table 8.4-1 Existing Railways Projects – List of the Last 30 years

Project Name <sup>o</sup>	Project Type <sup>o</sup>	Budget Source <sup>o</sup>	Total Budget <sup>o</sup>	Outline of Project <sup>o</sup>	Implementation Period <sup>o</sup>	Project Progress <sup>o</sup>	Problems or Issues <sup>o</sup>
Adjustment of Demand and Operation Plan of Train-Bus Service. Study in Depth of Demand, Center of Lima. UNI <sup>o</sup>	D/D <sup>o</sup>	GOP AATE <sup>o</sup>	US\$ 17 6,000 <sup>o</sup>	Based on demand forecasting, <sup>o</sup> 1) Creation of integrated transportation system of rail and bus, <sup>o</sup> 2) Development of feeder bus network <sup>o</sup>	1996 <sup>o</sup>	Done <sup>o</sup>	Integration of first stretch of urban rail with feeder buses <sup>o</sup>
Complementary Study of the Lima Metro Network <sup>o</sup>	F/S and P/D <sup>o</sup>	GOP <sup>o</sup>	US\$ 89 3,000 <sup>o</sup>	Selection of new alignment through Paseo de la República Expressway, and preliminary design. Demand forecasting for 2 line medium-term network and proposal of 5 line future network. <sup>o</sup>	1998 <sup>o</sup>	Done <sup>o</sup>	Analyses other alignment for N · S line <sup>o</sup>
Lima Metro Project Feasibility Study of the Extension of Line 1 between Puente Atocongo and Benavides Station. <sup>o</sup>	F/S <sup>o</sup>	GOP <sup>o</sup>	<sup>o</sup>	Derives from the Complementary Study of the Metro Network. Evaluates feasibility of a smaller project suitable for financing. <sup>o</sup>	1998 <sup>o</sup>	Done <sup>o</sup>	Presented to Japan Eximbank for financing of the second stretch of Line 1. <sup>o</sup>
Bus Corridor Aviación <sup>o</sup>	D/D <sup>o</sup>	AATE <sup>o</sup>	n.d. <sup>o</sup>	Rapid Bus segregated lane by the center of Aviación Ave. <sup>o</sup>	2000 <sup>o</sup>	Done <sup>o</sup>	<sup>o</sup>
Reorganization of the Urban Public Transportation. Showcase project: Túpac Amaru. <sup>o</sup>	F/S <sup>o</sup>	Rail Consult <sup>o</sup>	n.d. <sup>o</sup>	Light Rail Transit network for Lima and Callao. Showcase line North · Downtown by Túpac Amaru. <sup>o</sup>	2002 <sup>o</sup>	Done <sup>o</sup>	<sup>o</sup>
Metro · Bus System <sup>o</sup>	F/S <sup>o</sup>	AATE <sup>o</sup>	n.d. <sup>o</sup>	Integrated Bus · Rail Operation of the existing line with 9 feeder bus routes and 2 rapid bus transit lines. <sup>o</sup>	2002 <sup>o</sup>	Done <sup>o</sup>	<sup>o</sup>

Table 8.4-1 Existing Railways Projects – List of the Last 30 years

Project Name <sup>o</sup>	Project Type <sup>o</sup>	Budget Source <sup>o</sup>	Total Budget <sup>o</sup>	Outline of Project <sup>o</sup>	Implementation Period <sup>o</sup>	Project Progress <sup>o</sup>	Problems or Issues <sup>o</sup>
Master Plan for Public Transportation in Lima <sup>o</sup>	M/P <sup>o</sup>	Rail Consult <sup>o</sup>	n.d. <sup>o</sup>	Integrated multimodal system with Heavy rail (68 km), Light rail (172 km) and feeder bus routes. Priority line: Villa El Salvador · Downtown by Via de Evitamiento <sup>o</sup>	2003 <sup>o</sup>	Done <sup>o</sup>	
Alternatives of Urban Rail Transit for Lima · Peru <sup>o</sup>	F/S <sup>o</sup>	Lahmeyer International <sup>o</sup>	n.d. <sup>o</sup>	Extension of the Line 1 from Atocongo Bridge to Dos de Mayo Hospital by Aviación Ave. <sup>o</sup>	2003 <sup>o</sup>	Done <sup>o</sup>	
Study proposal <sup>o</sup> Reorganization of urban public transit system of Lima <sup>o</sup>	M/P <sup>o</sup>	MML <sup>o</sup>	US\$ 26 0,000 <sup>o</sup>	Study would design a network of mass transit routes comprising the main corridors in Lima. <sup>o</sup>	2003 <sup>o</sup>	Not initiated <sup>o</sup>	Scheme for mass transit network based on main corridors <sup>o</sup> (Approved by Municipality) <sup>o</sup>
Feasibility Study of the Extension of Line 1 between Puente Atocongo and Grau Avenue <sup>o</sup>	F/S <sup>o</sup>	AATE <sup>o</sup>	. <sup>o</sup>	Analyzes level of demand and financial conditions required for viability of concession. <sup>o</sup>	2004 <sup>o</sup>	Done <sup>o</sup>	
Feasibility Study on Urban Railway Project in Lima <sup>o</sup>	F/S <sup>o</sup>	USTDA <sup>o</sup>	US\$ 47 7,000 <sup>o</sup>	The study will cover followings <sup>o</sup> 1. Technical analysis of rehabilitation/service plan. <sup>o</sup> 2. Economic/market analysis <sup>o</sup> 3. Financial Analysis <sup>o</sup> 4. Environmental and habitational Studies <sup>o</sup> 5. Supporting Legal-regulatory analysis <sup>o</sup>	2004 <sup>o</sup>	Cont <sup>o</sup>	

## 8.4.2. PREVIOUS STUDIES ON RAILWAY TYPE DEVELOPMENT PROJECTS

### (1) Basic Study of the Lima and Callao Mass Rapid Transportation System (1986)

The present study was elaborated by AATE (Autonomous Authority of the Electric Train) under the jurisdiction of the Ministry of the Presidency (MOP) at the time. The Master Plan concerning railway type developments proposed 5 lines and, for the most urgent line interconnecting the city of Lima, investment costs and operative plan were evaluated. Said study was followed by the “Complementary Study of the Lima Metro”, of 1998.

### (2) Complementary Study of the Lima Metro Network (1998)

AATE was also responsible for the elaboration of the present study and evaluated the execution plan of the South-North line, selected as the most urgent, in detail. Figure 8.4-3 and Figure 8.4-4 shows the railway network for Metropolitan Lima. In the same period, IDB granted a loan to the Ministry of Transportation and Communications (MTC) and the Study on the “Urban Transport Program for Lima”, deciding to implement an exclusive bus corridor at Paseo de la Republica, the same section considered by the South-North line, so that the train route had to be reviewed from the Atocongo station.

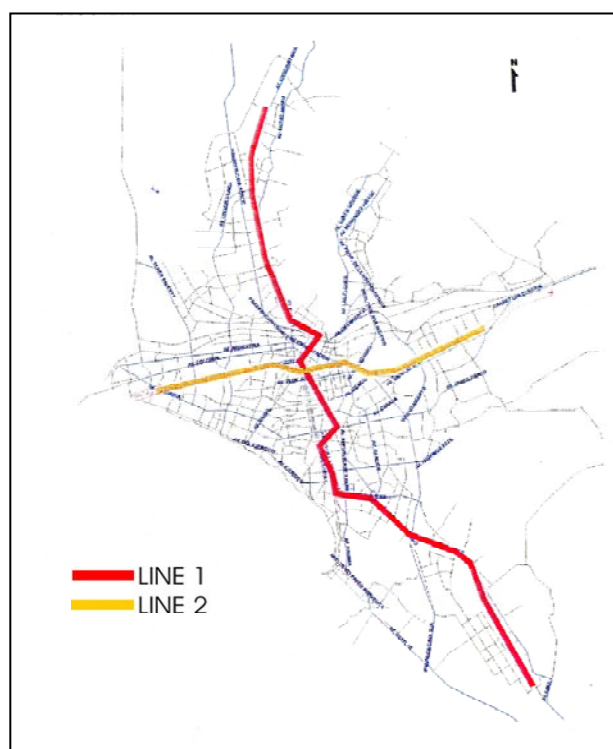


Figure 8.4-3 Railway Network Project (1998) Short Term Proposal

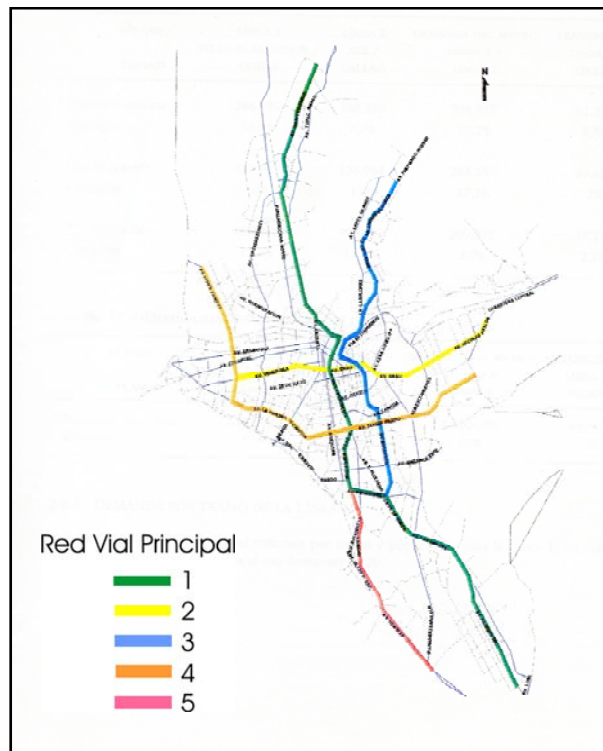


Figure 8.4-4 Railway Network Project (1998) Long Term Proposal

### 8.4.3. AATE' ACTIVITIES (RAILWAY PUBLIC CORPORATION)

The Metropolitan Area of Lima and Callao has a population of approximately 8 million habitants (2004 estimation), concentrating almost 30% of the total population in Peru. The railway system is not established and transportation relies totally on roadways. For this reason, vehicular congestion is constant not only at morning and evening peak hours but during business hours too. Also, constant traffic accidents and a high grade of air pollution, due to automobile exhaust, deteriorate the living conditions of the population.

AATE (Autonomous Authority of the Electric Train) was created under the jurisdiction of the Ministry of the Presidency in 1986 by establishing the start of the railroad system organization to solve traffic problems at the metropolitan area of Lima and Callao. Figure 8.4-5 shows the existing AATE organization

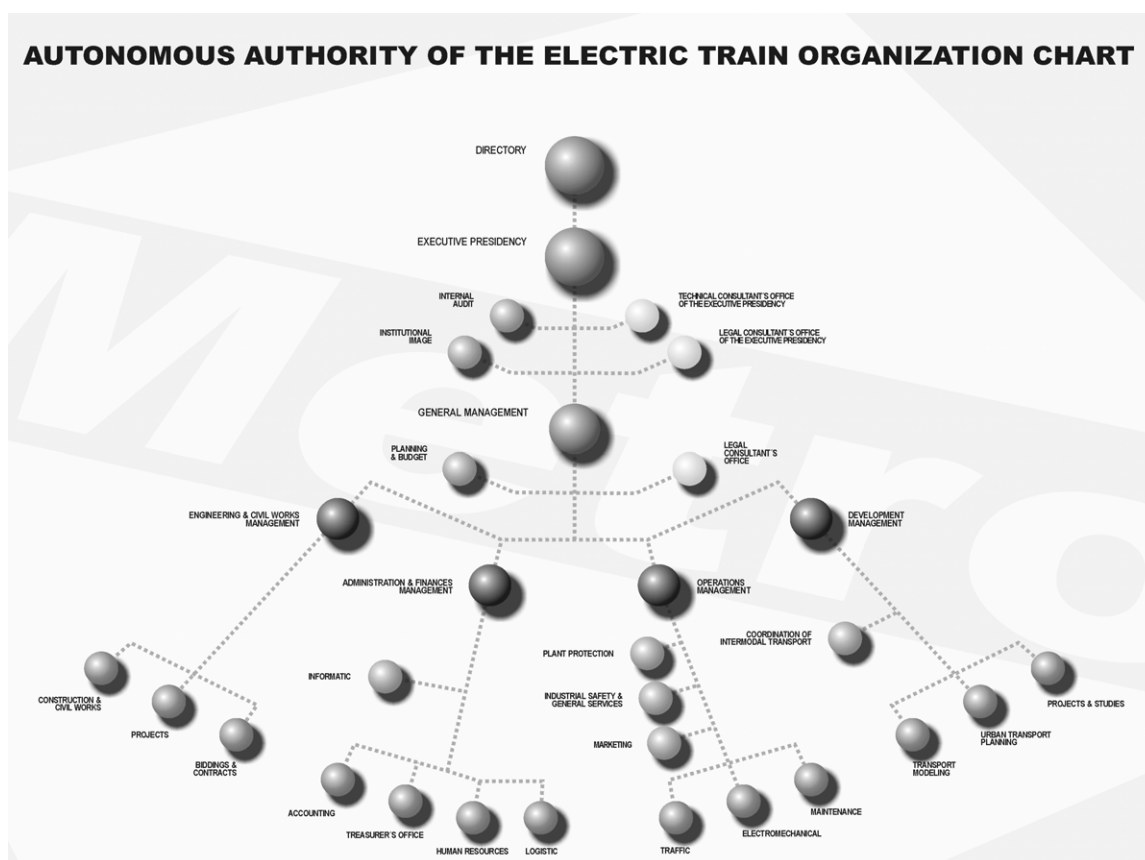


Figure 8.4-5 AATE Organization Chart

### 8.4.4. METROPOLITAN TRANSPORTATION COMMITTEE ( TRANSMET )

#### (1) TRANSMET Organization

The Municipality of Lima created an administrative and executive entity related to Transport on February 2003 (Municipal by-law No.092) to solve problems concerning urban transport in the metropolitan area. Said entity named the Metropolitan Lima Transportation Committee TRANSMET, integrates the policies concerned with transport that were carried out by several institutions of the Municipality. Figure 8.4-6 shows the structure of TRANSMET.

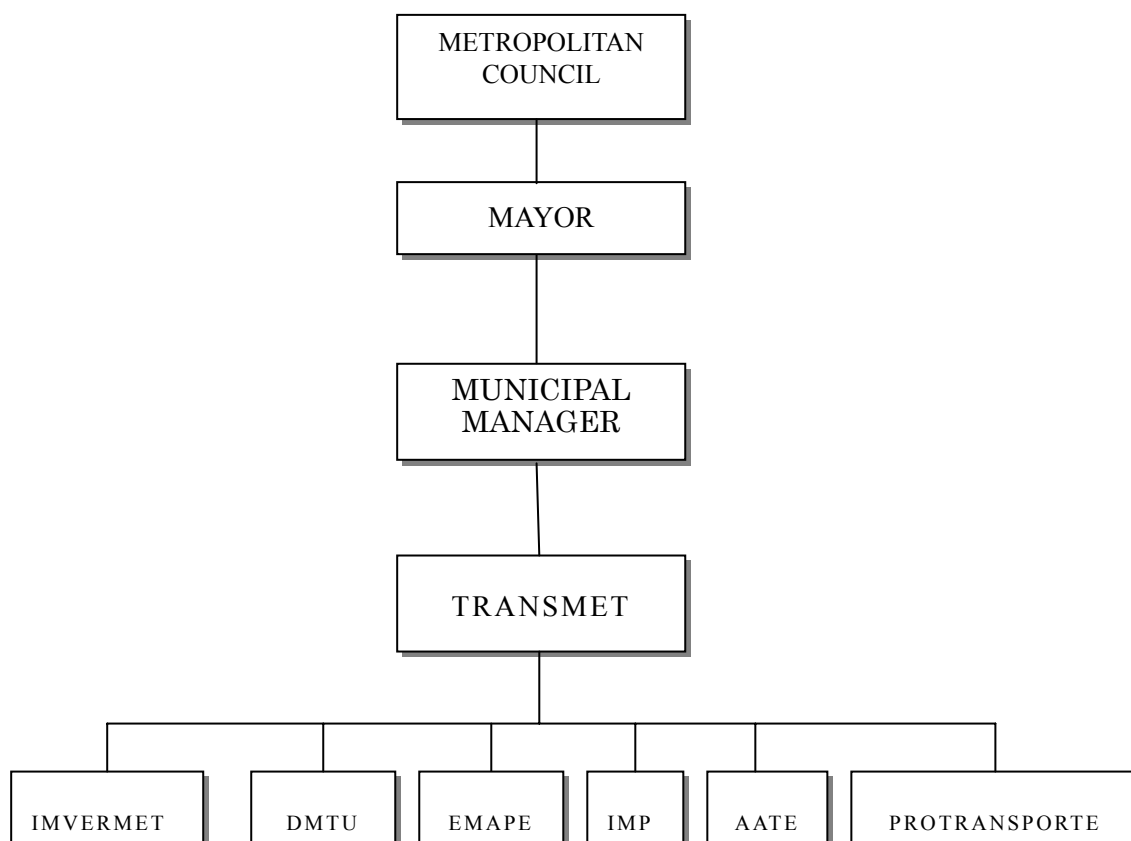


Figure 8.4-6 TRANSMET Organization Chart

## (2) Summary of Each Entity

- 1) Metropolitan Council: Conformed by 40 city members (elected by popular vote).
- 2) Mayor: Mayor of the city of Lima elected by popular vote. Present Mayor is Dr. Luis Castaneda Lossio.
- 3) Municipal Manager: Representative of the present organization nominated by the Municipal Council.
- 4) Lima's Metropolitan Transportation Committee – The Municipal Manager is the chairman of TRANSMET. Organizes transport regulations. Regulates the integration between the distinct transport projects.

## (3) Functioning of TRANSMET

The following institutions are the conforming members of TRANSMET.

- 1) INVERMET : Responsible for the financial administration in the execution of projects in the metropolitan area.
- 2) DMTU : Responsible for regulations, institutionalization and control of public transport in the metropolitan area (Buses).
- 3) EMAPE : Establishment and charge of toll fees.
- 4) IMP : Proposal and execution of projects in Metropolitan Lima
- 5) AATE : Projects, regulation, control and administration of Metropolitan Lima and Callao railway system.
- 6) PROTRANSPORTE : Planning and execution of trunk bus operation system(COSAC )

#### (4) TRANSMET Basic Guidelines

Basic guidelines to be executed by TRANSMET are described as follows.

- 1) Preparing, suggestions and approval of projects proposed to be financed concerning transport developments with the objective of improving urban development and living conditions of its population. To achieve such objectives, INVERMET proposes more effective and efficient solutions for the integrated public transport systems.
- 2) Definition of priorities for public transport projects putting into practical use the road network in Lima, regulating the integration and clarity of the mechanisms to elaborate investment projects.
- 3) Coordinates the execution of investments for transport projects in Metropolitan Lima.
- 4) Control and evaluation on the execution of investments for transport projects in Metropolitan Lima.
- 5) TRANSMET short time investment projects related to transport improvement have to be coordinated with other entities to be finally approved by the Metropolitan Council.

#### (5) Short Term Development Projects

TRANSMET has considered the following short-term development projects for the integrated transport system network in Lima as shown in Figure 8.4-7.

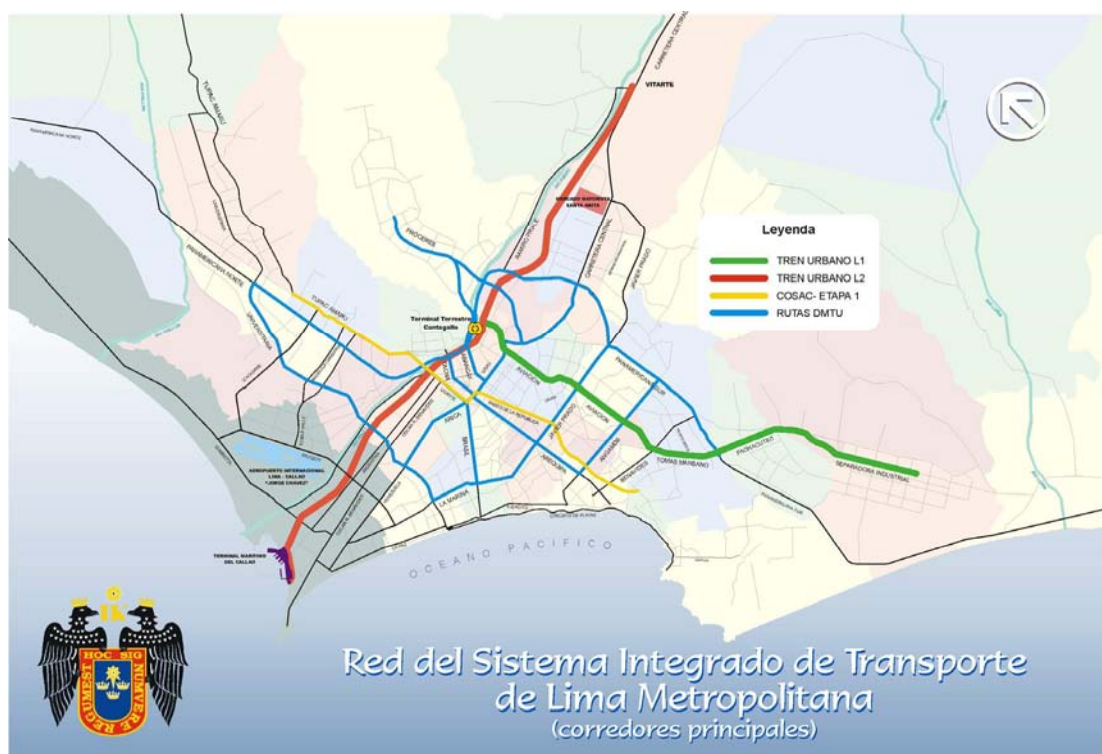


Figure 8.4-7 Metropolitan Lima Integrated Transport Network System

The short-term development projects are as follows.

- 1) For the urban train network, there are two lines, South-North line 1 under the responsibility of AATE (green) and line 2 (red). Presently line 1 is under bidding process for concession. A feasibility study, through a donation of USTDA, is under progress for line 2 and it is expected to be finished by October 2004. Line 2 would



- be given in concession also depending on the result of the study.
- 2) For the trunk bus system presently there is the COSAC 1 (yellow) executed by PROTRANSPORTE and financed by World Bank and IDB loans.
  - 3) For the arterial roads of the city (blue line), DMTU has planned to conduct the re-ordainment of routes in the short-term, allowing the introduction of mass public transport systems in the future.
  - 4) The target year for the implementation of the Metropolitan Lima Short Term Integrated Transport Network System is 2006.

#### **8.4.5. NORTH-SOUTH ELECTRIC TRAIN EXTENSION LINE PROJECT**

##### **(1) Objectives of the Construction**

The objectives of the project to solve the transport problems in the city are described as follows.

- 1) Improve the quality of transport services offered to the population of Metropolitan Lima.
- 2) Provide alternatives of solutions for traffic congestion problems in the city.
- 3) Introduction of new transport technologies to improve the existing system.
- 4) Provide rational routes and trip frequencies of public transport.
- 5) Reduce traffic accidents and environmental pollution.
- 6) Provide a high quality service to benefit the population of Lima.
- 7) Transform Lima into a more attractive city for foreign investment.

##### **(2) Actual Conditions for Project Execution Approvals**

The construction of the North-South Urban Train line was approved by Council Agreement (Acuerdo de Concejo) No. 212 (October 2003). On October 07, 2003 through Official Note (Oficio) No 279, the need to continue the construction and operation of the urban train line 1 Villa El Salvador- Av. Grau, through the Av Aviación axis, under the AATE administration, by the system of concession, is decided. The antecedents of this decision are as follows:

- 1) On September 21, 1998, the strategic objectives for the 1998-1999 period were approved through Municipal Decree (Decreto de Alcaldía) No.073 by the implementation of the Rapid Public Transportation System Project.
- 2) On January 19, 1999, through Council Agreement No. 005, the Metropolitan Municipality of Lima decides to implement a proper Metropolitan Urban Road Network.
- 3) On October 19, 2001, by Municipal Decree No. 121, the Institutional Objectives for the year 2002 were approved establishing Urban Transport as a First Priority of the Metropolitan Municipal Action.
- 4) On June 17, 2002, by Edict (Edicto) No.250, AATE is incorporated to the Organic Structure of the Municipality as a Decentralized Entity and in this context the Metropolitan Municipality of Lima considers the convenience to give in concession the construction and operation of the extension project.
- 5) On September 05, 2002, through Municipal Decree No. 110, Urban Public Transport System is declared in emergency.
- 6) On May 27, 2003, through Article 161, Clause 7.4 of the Municipal Organic Law No. 27972, it is established that the Municipal Authority is competent to grant operation concessions, authorizations and permits for the rendering of distinct types of passenger and cargo transport services.
- 7) Municipal Decree No.166 states that the Metropolitan Council of Lima is entitled to determine the public works to be executed as well as the public services to be rendered through concession.

- 8) In Article 13 of the same decree the “Special Committee of Private Investment Promotion (CEPRI)”, who conducts concession processes, is constituted.
- 9) In September 18, 2003 the Council Agreement (Acuerdo de Consejo) No.181, authorizes the execution and concession of the “Project for the Extension of the Lima Urban Train Network”.
- 10) In order to fulfill the requirements of the above-mentioned agreement, by Official Note No279-2003-AAE/PE, AATE submits technical and legal information to demonstrate that the Metropolitan Municipality of Lima is entitled to administer its assets. Also, it declares that the AATE project will not compete with the COSAC project of Protransporte. AATE submits the study “Function and Operation of Feeder Routes Integrated to the Urban Train” containing the design, demand projection of bus routes integrated to the train, tariff system both in structure and in operative aspects.

Also, the above-mentioned Council Agreement says that:

- 1) Line 1 Villa El Salvador – Av. Grau extension should be executed through private investment promotion.
- 2) As a condition for the international bidding, existing installations and wagons will be transferred to the extension section.
- 3) AATE is the executing entity.

CEPRI-LIMA board of directors conducts the bidding process.

### (3) Summary of the Project

The summary of the project is presented as follows.

#### 1) Installations

The summary of installations is shown in Table 8.4-2 and Figure 8.4-8.

Table 8.4-2 Summary of the Project Installations

Station name	Extension (Km)	Structure
1. Jorge Chavez	10.551 (Workshop yard)	Elevated station
2. Ayacucho	11.642	Elevated station
3. Los Cabitos	12.587	Elevated station
4. Angamos	14.608	Elevated station
5. San Borja	15.603	Elevated station
6. Javier Prado	17.228	Elevated station
7. Arriola	18.888	Elevated station
8. Mercado Mayorista	19.850	Elevated station
9. Hospital 2 dos de Mayo	20.654	Elevated station

#### 2) Construction Period and Project Life

Construction Period: 3 years

Project Life: 30 years

AATE estimates that construction costs are in the order of US\$182.4 million with taxes and US\$ 142.9 million without taxes, including additional investment on wagons (40 used wagons) and yards.

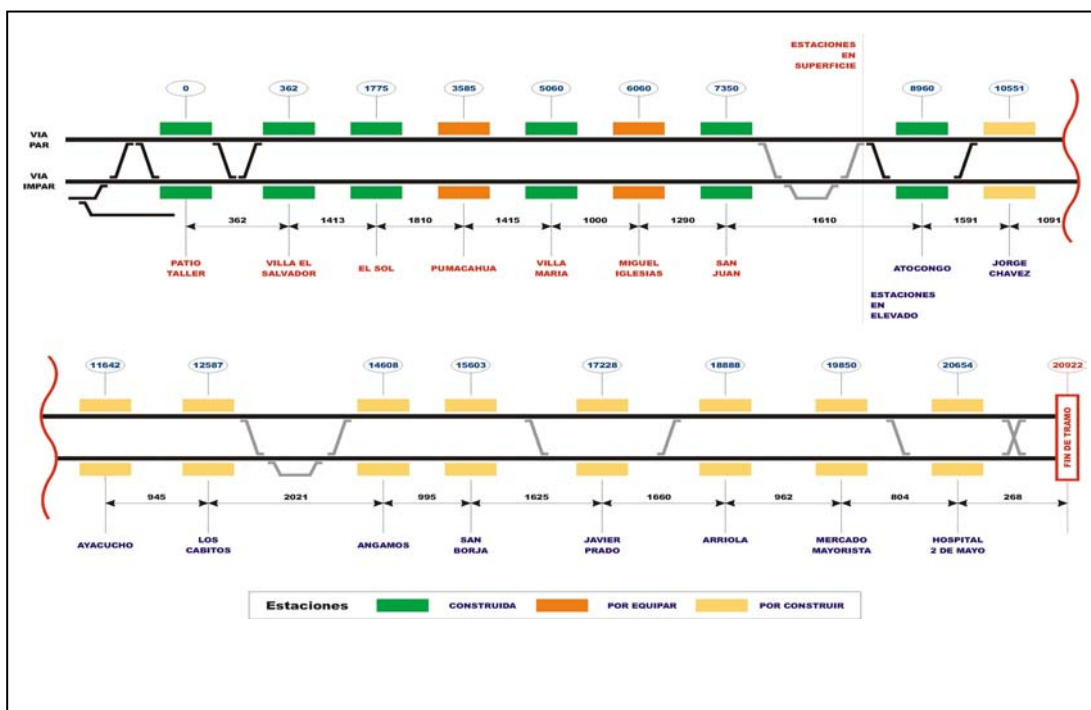


Figure 8.4-8 Summary of the Extension Project Installations

### 3) Contribution of the Municipality of Lima to the Project

Existing stations (about 10Km), wagons (32 units), security facilities, wagon yard were installed. According to the evaluation of installations carried out by AATE, total assets are valued in US\$ 250 million. Also, sites for the construction of railway routes approved in April, 1987 are to be provided without compensations according to Law No.24565 of October 30, 1986.

### 4) Basic Conditions for Operation

- 1) Tariff definition  
Presently, single fee costs 50 Céntimos, but for the whole route, including the existing section (about 20Km), fee costs 1.1 Soles for adults and 50 Céntimos for students and children.
- 2) Feeder buses  
Considering that the actual section would be finished, AATE has evaluated operation routes of feeder minibuses to the main stations, with a 50 Centimos fee. The actual feeder bus project has been submitted to TRANSMET and the DMTU.

### (4) Schedule of the Bidding Process

The schedule of the bidding process is shown in the following Table 8.4-3.

Table 8.4-3 Bidding Process Schedule

Nº	Date	Item
1	2003. 12. 11	Call for bidding
2	2003.12.15. ~ 2004. 05. 05	Seale of bidding conditions
3	2004. 01. 05 ~ 2004. 05. 10	Reception of questions
4	2004. 01.19 ~ 05.14	Answers
5	2004. 02. 02 ~ 2004.05.07	Submittal of proposals
6	2004. 05. 25	1. Opening of envelops 3. Definition of the awarded consortium
7	2004. 05. 28	Contract negotiation
8	2004. 05. 31	Signing of contract

## (5) Bidding Conditions

### 1) PFI Model

The present bidding method is to give public installations in concession, similar to the MRT3 Line in Manila (Philippines). In the case of the elevated train of Bangkok there is no shadow tool (definition of fee) so risks are greater than this case.

### 2) Items to be Provided by the Municipality of Lima

- 1) Based on the projection of potential railway users, the Municipality will cover the amount of the difference if the number of passengers is less than the projected, according to the shadow tool (shadow fee definition).
- 2) Existing installations of the North-South line (wagons, yard, station facilities, security facilities, among others)
- 3) The site for the railway route has been secured already, so it will be given without compensations.
- 4) Management plan is included in the contract, thus no maintenance and operation costs would arise.

The scopes of civil works are shown in the following Table 8.4-4.

Table 8.4-4 Scope of civil works

Existing installations	Extension
9.8 Km finished	11.0 Km to be constructed
3.0 Km elevated viaducts	Additional elevated viaducts 9.0 km
2.0 Km ground section	Additional ground section 7.0 Km

### 3) Responsibilities of the Concessionaire

The concessionaire is responsible for financing (investment and bank loan), and construction management.

- 1) Fee collection through shadow tools.
- 2) Considering a timely construction and efficient maintenance, operation and maintenance expenses would be saved in order to increase profit.
- 3) The obtaining of revenue from other related activities besides operation needs authorization from the Municipality of Lima, however its execution is possible.
- 4) The Municipality of Lima pays a fixed amount so that the recovery of capital is assured.

## 8.4.6. CONSTRUCTION PROJECT OF THE EAST - WEST URBAN TRAIN LINE

The existing Urban Train projects for Lima are described as follows.

**(1) Feasibility Study on Callao-Vitarte for Urban Railway (Canada Commercial Cooperation 1988)**

In 1988, by request of the Municipality of Lima, the government of Canada provided a non-refundable grant for the execution of the present feasibility study to utilize the existing railway line between Callao and Vitarte (30Km) as an urban transport system.

The proposed operation period would be as shown below and intervals would be 15 ~ 20 min.

Weekdays	05:00 - 23:00
Saturdays	06:00 - 22:00
Sundays	08:00 - 22:00

Based on the results of the study, the government of Canada would provide D.C, however, the Peruvian government was not able to finance their share, such as rails, security facilities, and construction facilities, henceforth the Project was not carried out.

**(2) Feasibility Study on Urban Railway Project in Lima (USTDA 2004)**

On February 2004 a contract for the execution of a study to investigate the possibilities to use the existing railway line from Callao station to Vitarte station, passing through Desamparados (30 Km), including the connection to the last station of the North South extension line, Hospital 2 de Mayo (1.8Km), as a commuting line, was made. Later, the service would be extended to Chosica station (54Km). This is considered a Priority Execution Project and it is expected to be executed from March to October of the present year.

Table 8.4-5 East - West-East Line

Stage	Station	Distance
Phase 1	Callao	0 Km
	Desamparados	13.50 Km
	Vitarte	30.00 Km
Phase 2	Chosica	54.00 Km

Depending on the result of the study AATE's policy is to give this commuting transport section in concession as well.

The scope of the present Feasibility Study is described as follows.

- 1) Rehabilitation of the existing railway site into installations for the urban train.
  - a) Diversification of lines to make good use of the existing line, protection fences, elimination of the existing railway crossings and other items to consolidate the line as described below.
  - b) Investment plan to assure a safe transport
  - c) Disbursement of the necessary expenses to rehabilitate railway installations
  - d) Evaluation of transportation alternatives accordingly to the demand
  - e) Construction of railway station facilities and implementation of security facilities.
- 2) Economic evaluation
- 3) Financial evaluation
- 4) Studies on environment and housing reallocation
- 5) Legal evaluation on concerned issues

## 8.4.7. FUTURE PROJECTS

### (1) Short Term Projects

It is necessary to take concrete actions aiming to execute the TRANSMET plan (Integrated Transportation Network System) implemented by the Municipality of Lima in 2003 with target year of 2006.

#### 1) *Extension of the North –South Line (2)*

In the AATE project the extension up to San Juan de Lurigancho is included. Said zone, with a population of 750,000 persons in 2002, is considered one of the most populated zones inside the Metropolitan area. Although the actual plan should consider the results of the South-North line 1 concession (Jorge Chavez – Hospital 2 de Mayo) and the intersection with the West-East line under study by the USTDA, it would constitute the network to connect Lima from South to North once finished. Figure 8.4-9 shows the projected network.

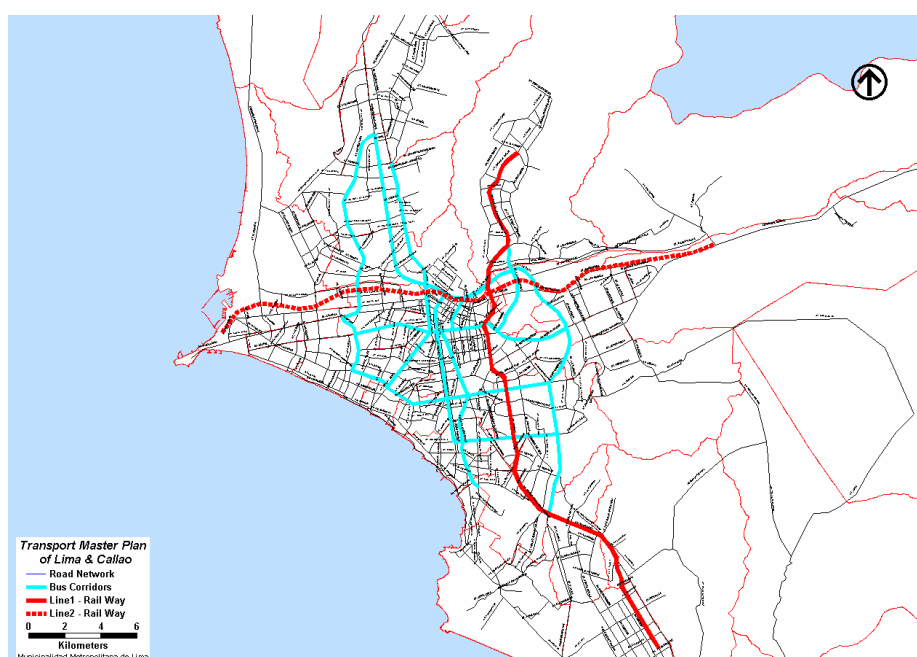


Figure 8.4-9 Short-Term Project

#### 2) *East – West Railway Line Project*

It is necessary to wait for the results of the USTDA study; however a commuting transportation system using the existing railway site in an early stage would be desirable.

### (2) Medium Term Plan

It will be necessary to wait for the distribution of lines in accordance to the future demand projection; however it is necessary to carry out a concrete analysis of line 3. Figure 8.4-10 shows AATE's medium-term plan.

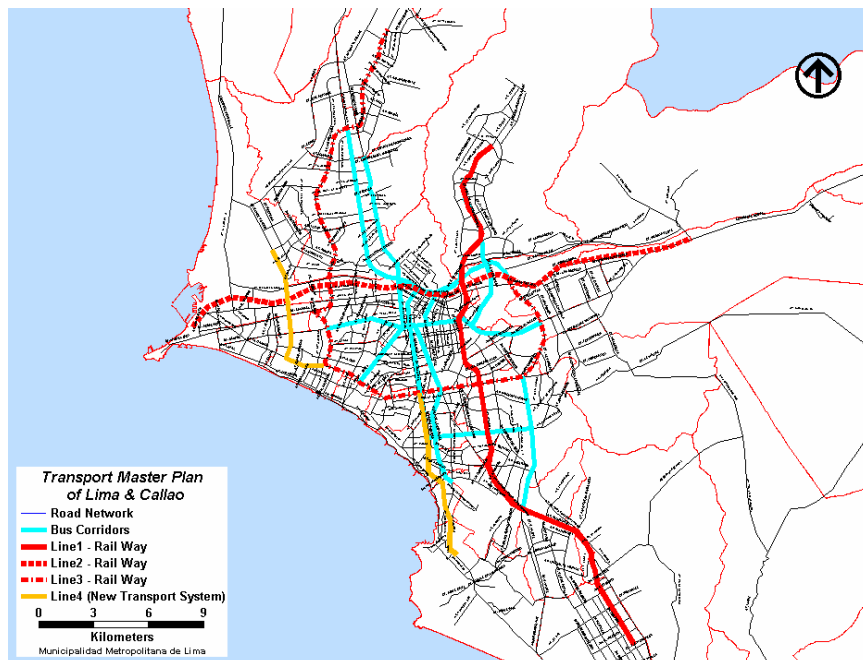


Figure 8.4-10 North –South Line Extension Plan

### (3) Long Term Plan

It will be necessary to wait for the distribution of lines in accordance to the future demand projection; however it would be desirable if AATE considered a more detailed plan referred to the railway network. Figure 8.4-11 shows AATE’s railway network plan.

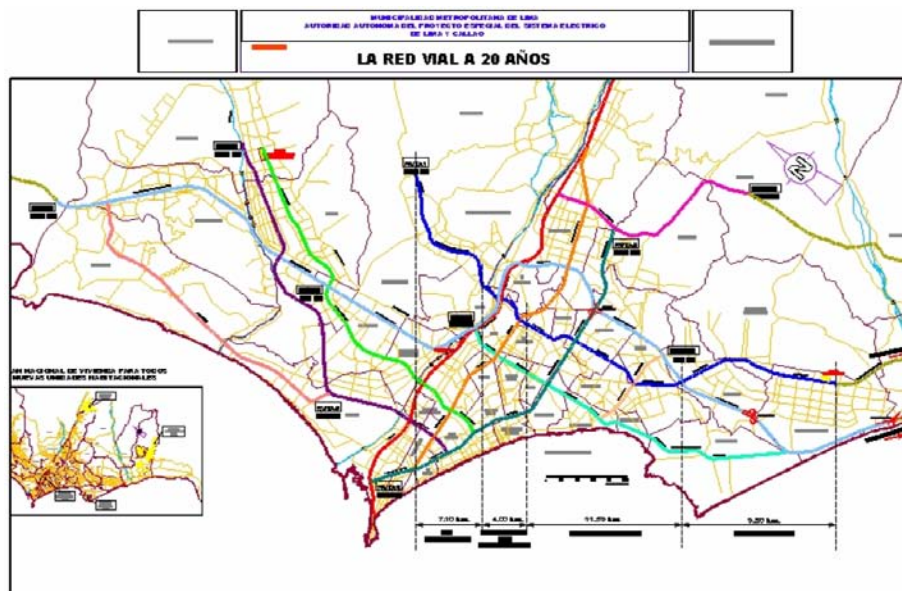


Figure 8.4-11 AATE Long Term Plan

CHAPTER 9  
Current Urban Transport Problems  
and Issues



## 9. CURRENT URBAN TRANSPORT PROBLEMS AND ISSUES

### 9.1 SUMMARY OF EXISTING TRANSPORT AND TRAFFIC STATISTICAL DATA

In the Master Plan, many transport and traffic surveys such as PT survey, traffic counting survey, public transport survey, were conducted. In addition, many information and related data were also collected. Based on the results of these surveys and data collected, the Master Plan was formulated. The results of each survey was resented by the each related study, however, in this section, the major results of existing transport and traffic surveys and data collected are summarized in Table 9.1-1 to Table 9.1-2 as the existing transport and traffic statistical data.

Table 9.1-1 Socioeconomic and Trip Characteristic Indices

Items	Sub Items	Sub-sub items	unit	Volume	source
Socio-Economic Index	Study Area		ha	279,402	INEI
	Population		person	8,043,256	INEI
		(Lima Municipality)	person	7,231,646	INEI
		(Callao Municipality)	person	811,610	INEI
		Share of National Population	%	29.2	INEI
		growth rate (1993-2004)	%	2.05	INEI
		density	person/ha	28.8	INEI
	GRDP		Billion Soles	60.83	Jica study team
		(Primary Sector)	%	4.4	Jica study team
		(Secondary Sector)	%	38	Jica study team
		(Tertiary Sector)	%	57.6	Jica study team
		Share of National GDP	%	42	INEI
		Growth rate of GRDP (2003-2004)	%	3.2	the Ministry of Economy and Finance *1
		Person Trip Index	Household	No of Household	1000H/H
(Lima Municipality)	1000H/H			1,608	Jica study team
(Callao Municipality)	1000H/H			186	Jica study team
Average Household Member	person/HH			4.5	Jica study team
Trips	Number of trips			1000 trips	16,538
	(Excl. Walk Trips)		1000 trips	12,246	Jica study team
	Trip rate		times	2.1	Jica study team
	(Excl. Walk Trips)		times	1.5	Jica study team
	Ratio of "to work" trip		%	30.5	Jica study team
	"to home" trip		%	26.2	Jica study team
	"business" trip		%	5.8	Jica study team
	"private" trip		%	37.5	Jica study team
	Ratio of trip by "walk"		%	25.4	Jica study team
	by "private mode"		%	12.8	Jica study team
	by "para transit"		%	10.2	Jica study team
	by "public transport"		%	51.5	Jica study team
	average travel time		minute	31.4	Jica study team
Car ownership	No owning		%	81.4	Jica study team
	1 car owning		%	15	Jica study team
	2 cars or more		%	3.6	Jica study team
traffic of Estrato E	Population		1000 pers/day	1,229	Jica study team
	Population who did 1 trip or more		1000 pers/day	860	Jica study team
	no of trips		1000 trips/day	2,227	Jica study team
	trip rate	times/day	1.8	Jica study team	
Cordonline		total travel volume	vehciels/day	16,224	Jica study team
Screenline Index	Traffic Crossed on Rimac river	N-S	1000Vehs/day	320	Jica study team
		S-N	1000Vehs/day	312	Jica study team
		N-S	1000Psgs/day	1,737	Jica study team
		S-N	1000Psgs/day	1,777	Jica study team
Road/Traffic	Road Length(present)	express	km	71.5	Diagnostic of the Metropolitan Urban Transport, July 1988
		arterial	km	327.3	Diagnostic of the Metropolitan Urban Transport, July 1988
		colector	km	397.2	Diagnostic of the Metropolitan Urban Transport, July 1988

Table 9.1-2 Public Transport and Traffic Management Conditions

Items	Sub Items	Sub-sub items	unit	Volume	source
Public Transport Travel Characteristics	Bus	1) Total No. of Bus Fleets in Study Area	Vehs	31,594	JICA Study Team
		Total No. of Bus Fleets in Lima	Vehs	24,500	DMTU, 2003
		Omnibus	Vehs	4,500	DMTU, 2003
		Microbus	Vehs	11,000	DMTU, 2003
		Camioneta	Vehs	9,000	DMTU, 2003
		Total No. of Bus Fleets in Callao	Vehs	7,094	DGTU, 2004
		Microbus	Vehs	2,026	DGTU, 2004
		Camioneta	Vehs	5,068	DGTU, 2004
		2) No. of Bus Companies	company	1337	
		In Lima	company	1196	DMTU, 2003
		In Callao	company	141	DGTU
		3) No. of Bus Routes	No.	694	
		In Lima	No.	431	DMTU, 2004
		In Callao	No.	263	DGTU, 2004
		4) Average Route Distance/round route	km	64.3	JICA Study Team
		5) Maximum Route Distance/round route	km	163	JICA Study Team
		6) Average Travel Time in Peak Hour (House to Destination)	min.	60	JICA Study Team
		7) Average Waiting Time at Bus Stop	min.	10	JICA Study Team
		8) Transfer Times			
	Without Transfer/Total	%	54	JICA Study Team	
	9) Fare Rate				
	70% of Total Passengers	S./	2	JICA Study Team	
	Taxi	No. of Authorized Taxies in Study Area	Vehs	30,258	DMTU, DGTU, 2004
		No. of Unauthorized Taxies in Study Area	Vehs	27,000	JICA Study Team
		Average No. of Trips (Authorized Taxi)	trips	20	JICA Study Team
		Average Taxi Fare (Authorized Taxi)	S./	6.1	JICA Study Team
		Average Travel Time	min.	17	JICA Study Team
Average Passengers/trip		person	2	JICA Study Team	
Empty Taxi Ratio (without passenger) on Screen Line at Peak Hour		empty/all taxi	0.26	JICA Study Team	
Moto-taxi		Average No. of Trips (Moto-Taxi)	trips	37	JICA Study Team
		Average Moto-taxi Fare (Moto-taxi)	S./	0.7	JICA Study Team
	Average Travel Time (Moto-taxi)	min.	7	JICA Study Team	
Traffic management	Signalized intersections	No of signalized intersection in all transport	—	710	DMTU
		No of signalized intersection in Lima	—	621	DMTU
		No of signalized intersection in Callao	—	89	GGTU
	Traffic safety	number of traffic accidents in the Study AREA	—	71335	Ministerio de Interior- PNP, dvpiat-pnp Statistics Section
		number of fatalities	person	671	Ministerio de Interior- PNP, dvpiat-pnp Statistics Section
		number of fatalities per 1000 registered vehicles	person	0.8	Ministerio de Interior- PNP, dvpiat-pnp Statistics Section

## **9.2 TRANSPORT PROBLEMS AND ISSUES**

The current social and socioeconomic conditions, transport and traffic characteristics, public transport characteristics, and other characteristics or conditions based on the results of transport surveys and their analysis conducted by the JICA Study Team are described in the previous Sections. In this Section, the urban transport problems and issues to be solved are examined based on the above mentioned current transport conditions and characteristics and also on the results of the reconnaissance survey and its analysis conducted by the JICA Study Team.

### **(1) Problems and Issues from the Point of View of Transport and Traffic Facilities**

#### **1) Current Problems**

The problems of current transport and traffic facilities are pointed out as follows:

- a) Road facilities such as right of way width, carriageway width, central reservation width, pedestrian width and number of lanes on the trunk and arterial roads are maintained as comparatively good capacity and conditions. However, in some road segments the road network has not been connected (un-linked road networks exist), and a shortage in the number of lanes on the trunk and arterial roads is observed. These problems seem to be one of the causes of traffic congestion.
- b) The grade-separated intersections are developing at the major intersections on the trunk roads; however, many intersections on the arterial roads are developed as at-grade intersections. The heavy traffic congestions occur on the at-grade intersections on the arterial roads.
- c) Many at-grade intersections, including rotary type intersections without traffic signals and without turn-left lanes on the arterial roads, are maintained. Heavy traffic congestion and traffic accidents occur on these intersections.
- d) The maintenance conditions of road lane-marks, traffic information boards, and traffic control and regulation boards are poor. These problems seem to be one of the causes of traffic congestion and traffic accidents.

#### **2) Issues to be Solved**

The issues to be solved for current problems are pointed out as follows:

- a) To develop and to maintain the functional road network, and to connect the un-linked road network to mitigate the traffic congestion and to maintain a smooth traffic flow.
- b) To develop the grade-separated intersection at the major intersections on the trunk and arterial roads for mitigation of traffic congestion and to decrease traffic accidents.
- c) To reinforce traffic information and guide board systems to control the smooth traffic flows and decrease the traffic accidents.

### **(2) From the Point of View of the Public Transport System**

#### **1) Current Problems**

The current public transport system problems are pointed out as follows:

- a) In spite of about 8 million inhabitants in the metropolitan area of Lima and Callao, the only bus transport system is operating as a representative public transport.
- b) Railway infrastructures, with about 10.2 km of length, and stations and control centers have already been constructed. However, full operation has not been implemented yet.
- c) The bus operation routes are concentrated on the trunk roads. This is one of the reasons for traffic congestion.

- d) Almost all of the operating bus fleets are very old (more than 15 years old), and the exhaust of these buses is one of the main factors that increase air pollution.
- e) Since the year 1980, many public transport improvement plans and railway introduced plans have been prepared by the Municipalities of Lima and Callao; however, the realization of these plans or projects has been delayed.

## **2) Issues to be solved**

The issues to be solved regarding the current problems are pointed out as follows:

- a) Mass transit systems should be introduced to mitigate traffic congestion and to contribute to the activation of socio-economic activities.
- b) Existing bus systems should be improved to mitigate traffic congestion and to maintain traffic safety.
- c) The existing railway facilities should be utilized for the reinforcement of the mass public transport system.

## **(3) From the Point of View of Environmental Aspects**

### **1) Current Problems**

The current problems regarding environmental aspects are pointed out as follows:

- a) As a result of an increasing traffic volume, the air pollution of the metropolitan area of Lima and Callao has been intensified.
- b) The current values of air pollution observed in the central area of Lima, in particular dust, are over the environmental standards of the Municipality of Lima.
- c) Many old buses are operating. They tend to increase the air pollution in the metropolitan areas of Lima and Callao.

### **2) Issues to be solved**

The issues to be solved regarding the current problems are pointed out as follows:

- a) A mass transit system should be introduced due to decrease the effects of air pollution and to maintain the good socio-economic environmental aspects in the cities.
- b) A functional public transport system should be introduced as soon as possible.
- c) Improvement of the bus fleets to introduce CNG for bus fuel to mitigate the air pollution of the metropolitan area.
- d) Introduction of the TDM system to decrease the traffic demand and the effects of air pollution.

## **(4) From the Point of View of Poverty (Low income population)**

### **1) Current Problems**

The current problems regarding poverty aspects are pointed out as follows:

- a) The majority of the low-income population does not have the sufficient income to use public transport; therefore, they must often walk to work.
- b) In some low-income areas there is a shortage of bus operation routes, therefore, the habitants often walk long distances from their houses to the bus stops.

### **2) Issues to be solved**

The issues to be solved regarding current problems are pointed out as follows:

- a) The introduction of a free charge on boarding passes for public transport should be examined based on the laws and regulations.
- b) Bus re-routing should be examined to improve the public transport services for the lower-income population.

- c) A non-motorized transport system should be reinforced.

## **(5) From the Point of View of Traffic Characteristics**

### **1) Current Problems**

The current problems from the point of view of traffic characteristics are pointed out as follows:

- a) In general, the vehicle composition ratio amongst cars, buses, taxis (registered and non-registered), and other vehicles on the major trunk roads are observed as approximately 30%, 30%, 30%, and 10% respectively. From these figures, it can be observed that the bus traffic volumes have a very high percentage (30%) with regards to the total traffic volume, and the heavy traffic congestion occurs at the locations of the bus stops.
- b) The traffic congestion occurs on the trunk radial roads due to the large bus traffic volume concentrated on these roads.
- c) The traffic congestion and traffic accidents occur on major non-signalized intersections without left-turn lanes.
- d) Cargo traffic (heavy trailer traffic) flows from the Port of Callao to other cities passing through the center of the urban area of the metropolitan area of Lima and Callao since there is no diversion route or cargo traffic.
- e) Traffic flows of inter urban buses from Lima to other cities pass through the center of the urban area of the metropolitan area of Lima and Callao since the inter urban bus terminals are located in the urban area.
- f) The heavy traffic congestion on major roads occurs during peak hours.

### **2) Issues to be Solved**

The issues to be solved regarding current problems are pointed out as follows:

- a) An effective public transport network, including the mass transit system, should be introduced.
- b) Some city functions and activities should be decentralized.
- c) A priority public transport policy should be introduced.
- d) A Traffic Demand Management (TDM) system should be introduced.