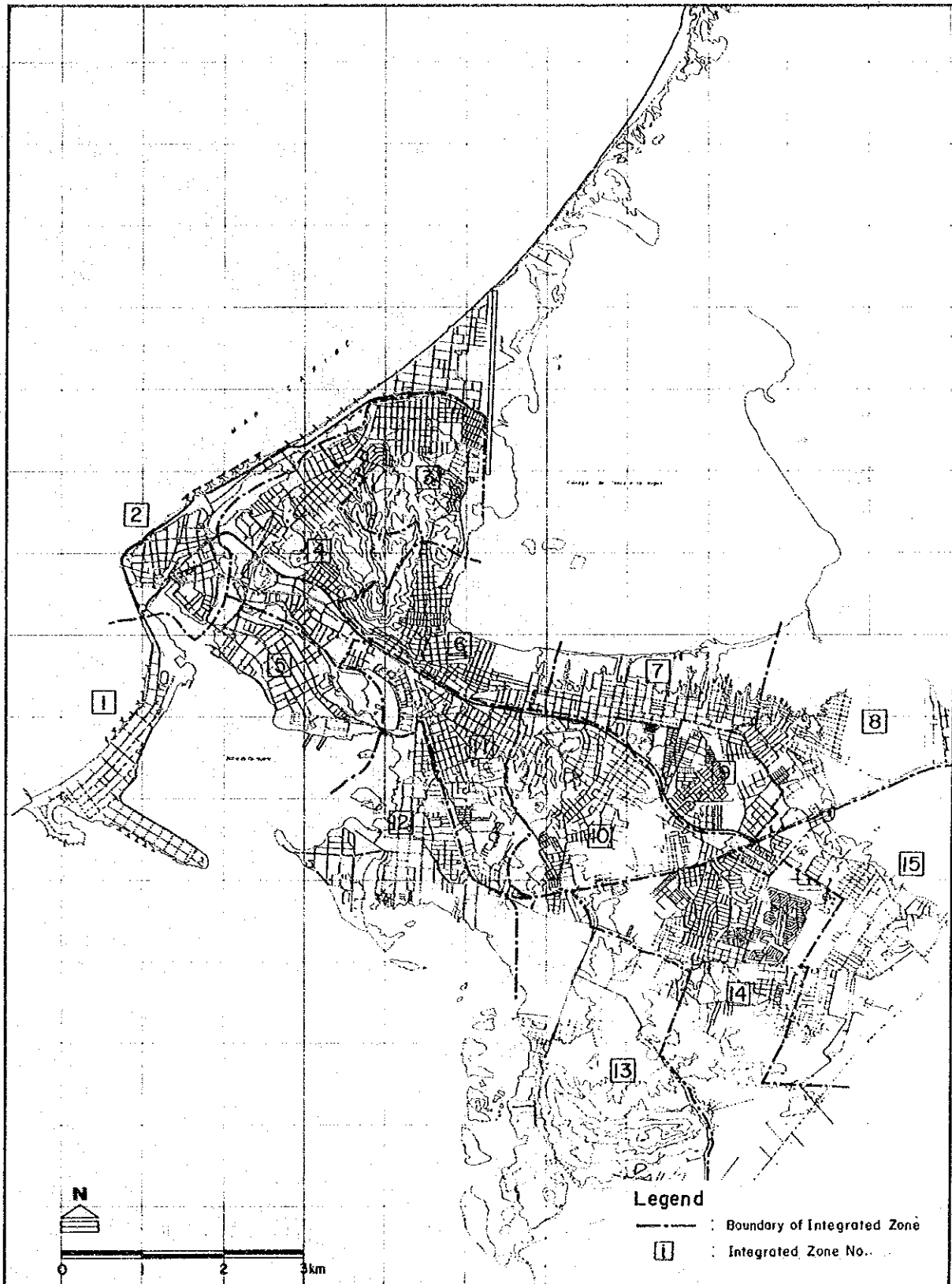


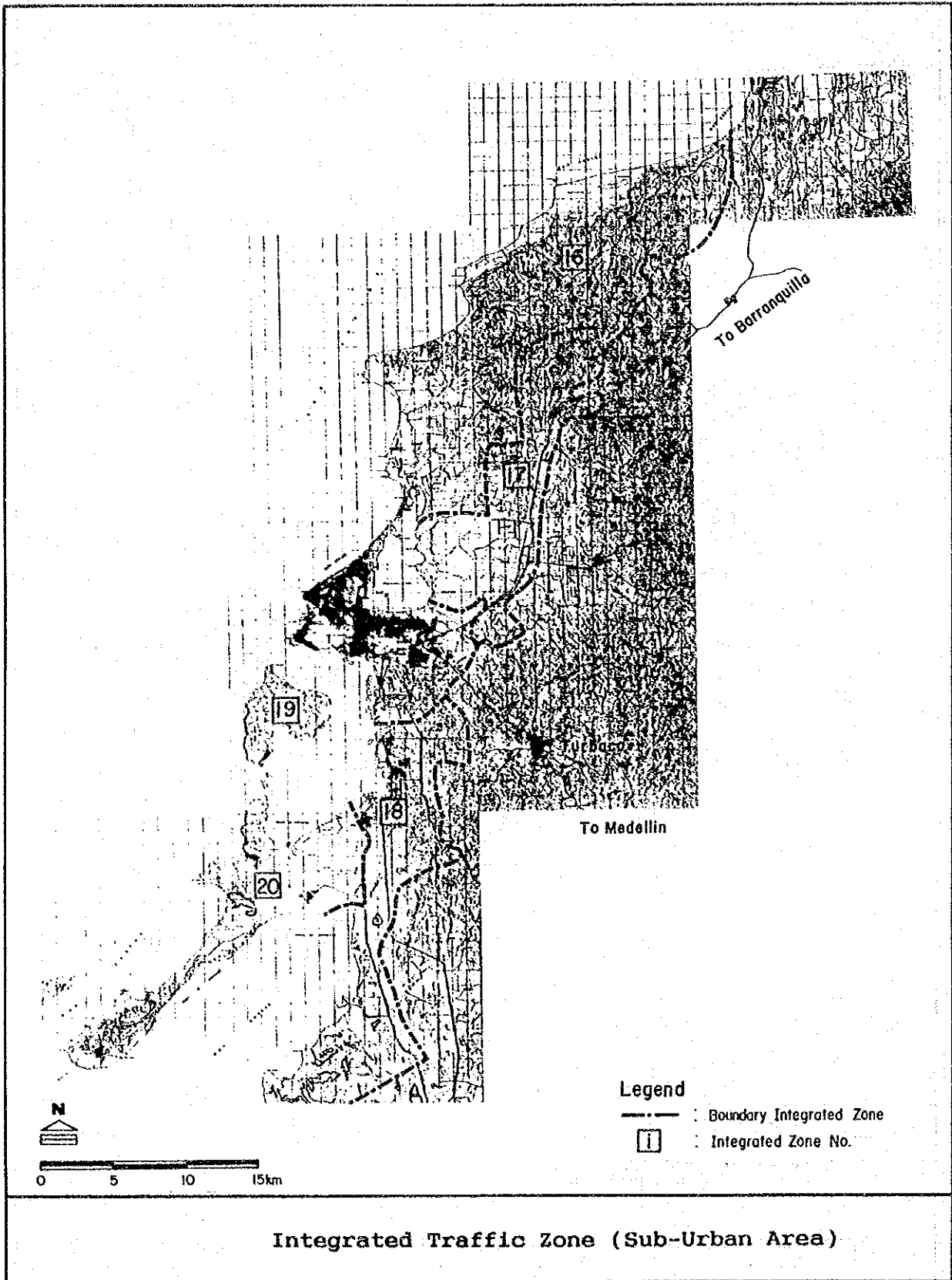
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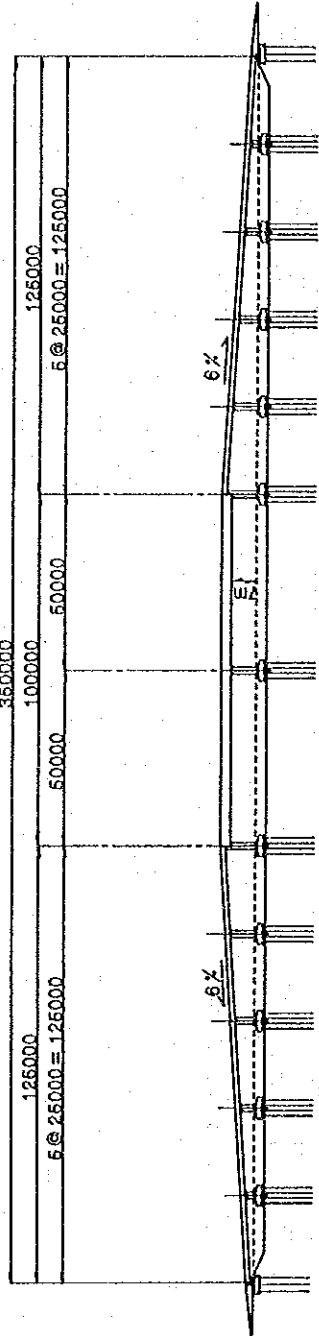
Appendix Figure 3-1 Integrated Traffic Zone (Urban Zone)



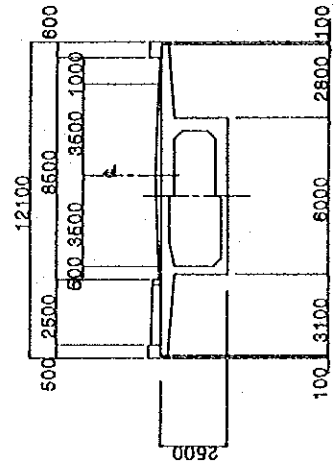
Integrated Traffic Zone (Sub-Urban Area)

Br-1: San Lorezo Bridge

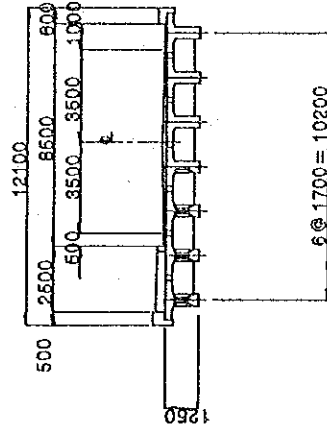
General View



Cross Section Of Main Girder

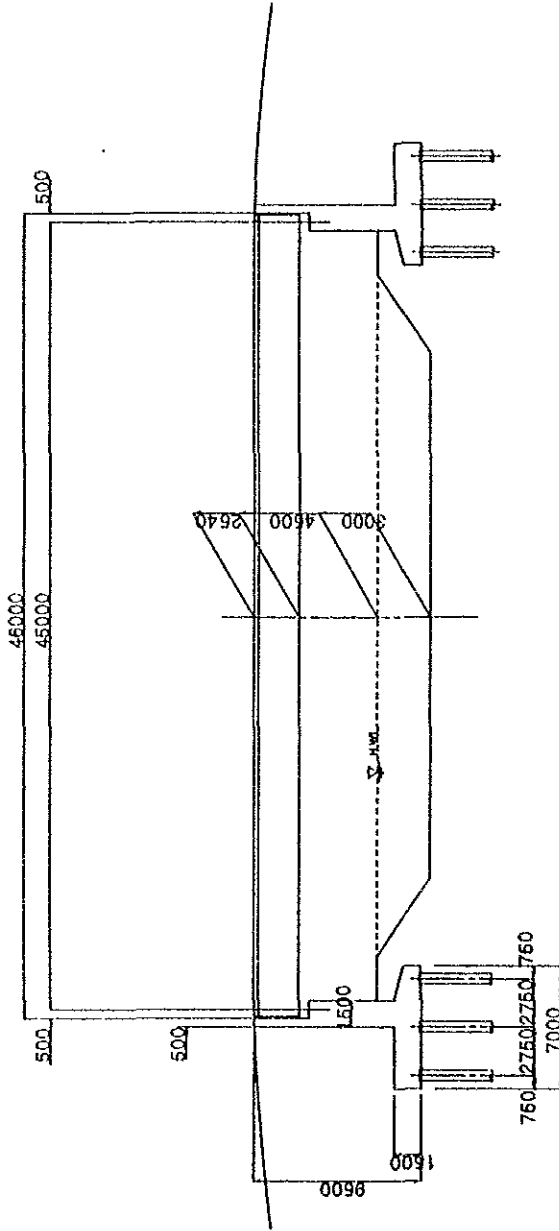


Cross Section Of Side Girder

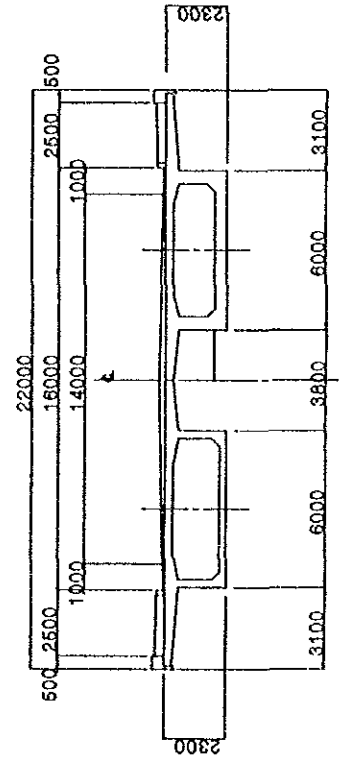


Br-2: Bazurto 2 Bridge

General View

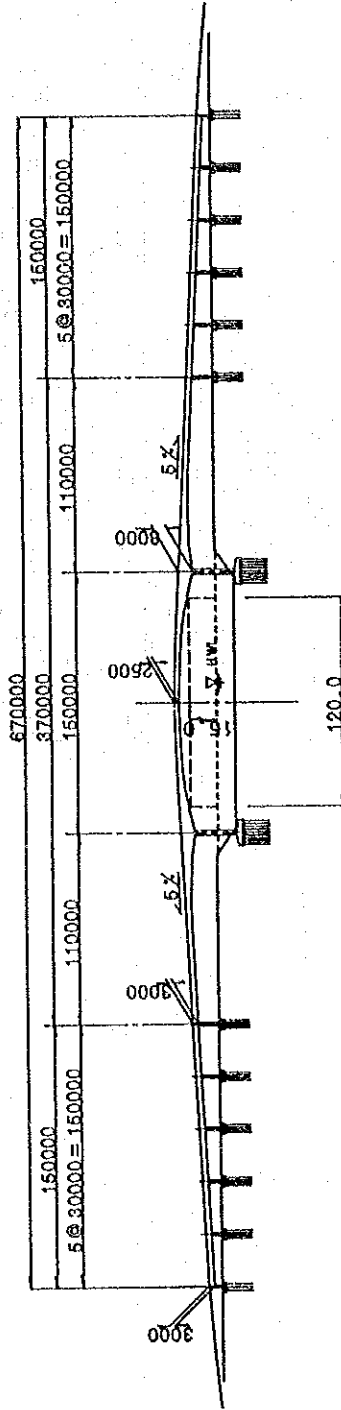


Cross Section

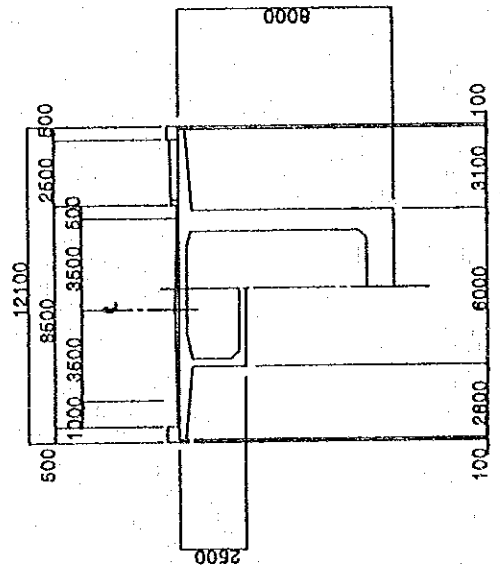


Br-4: Pasacaballo Bridge

General View

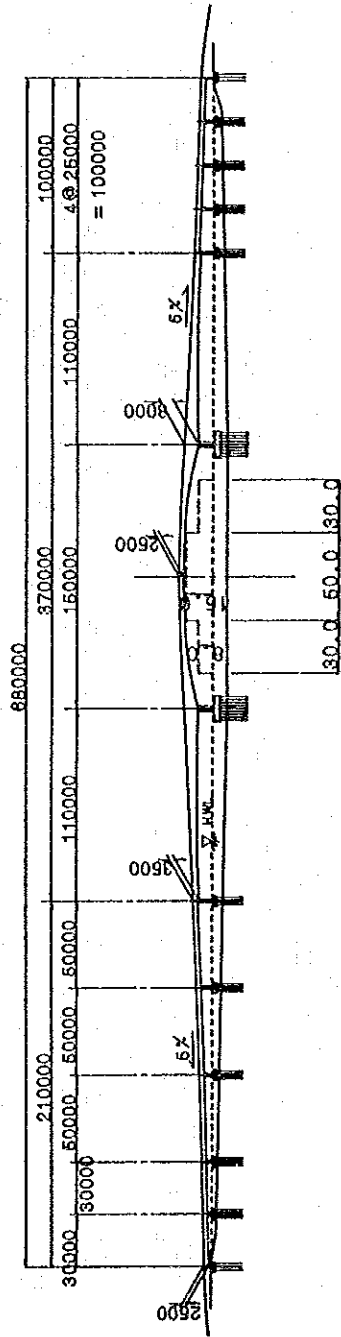


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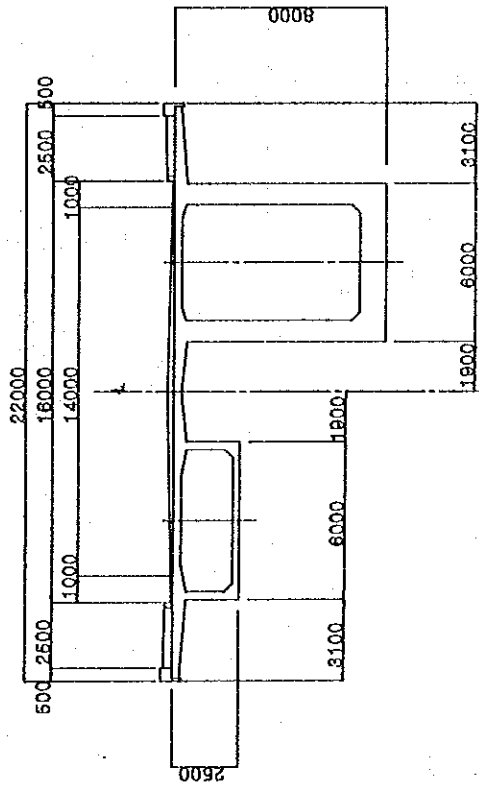


Br-8: Las Animas Bridge

General View

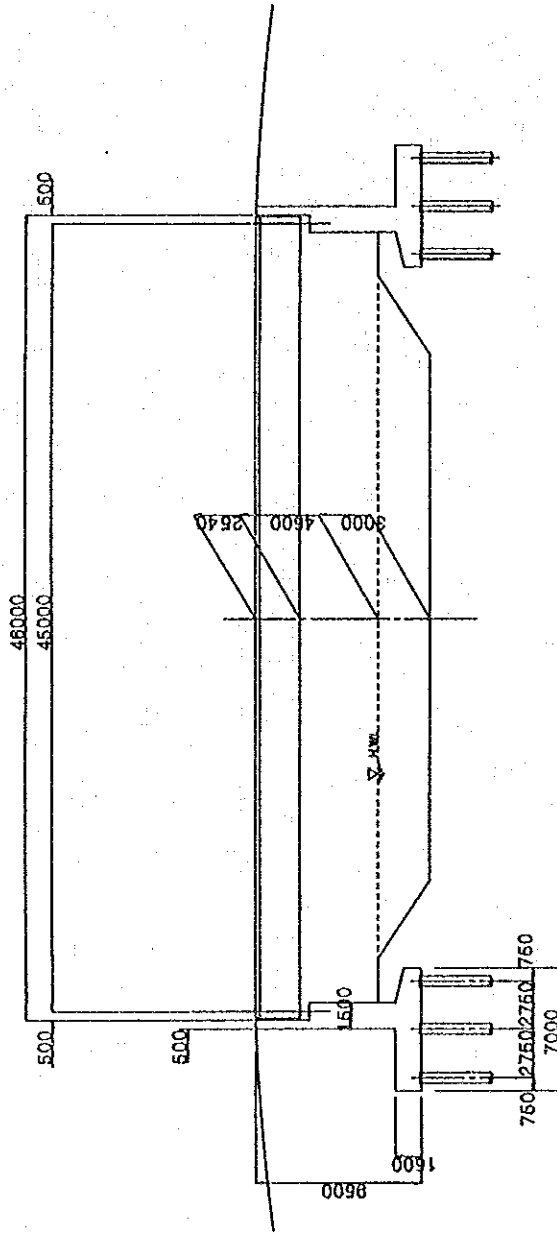


Cross Section

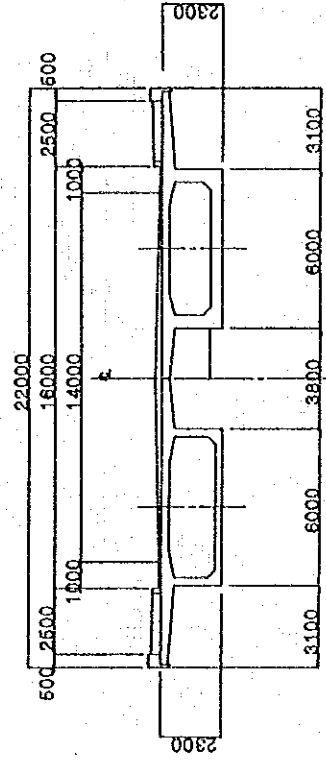


Br-9: Las Palmas Bridge

General View

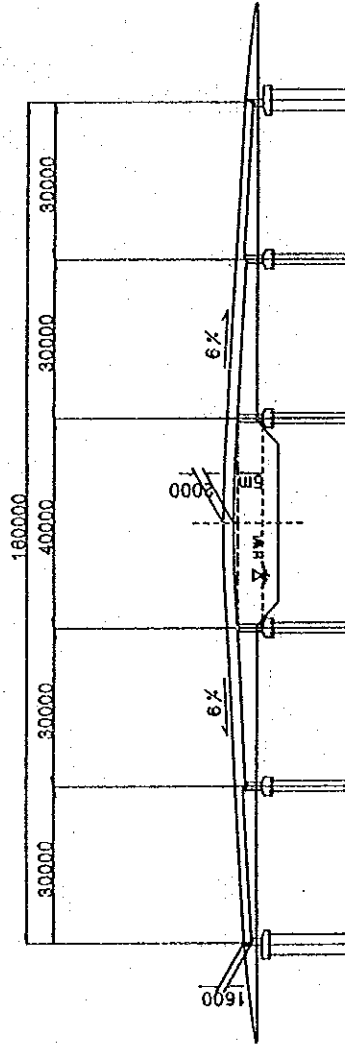


Cross Section

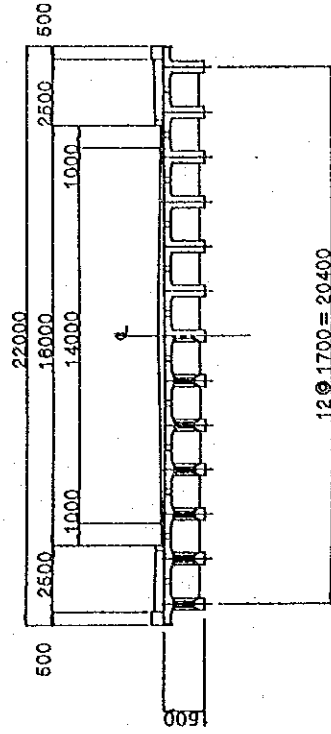


Br-10: Marbella Bridge

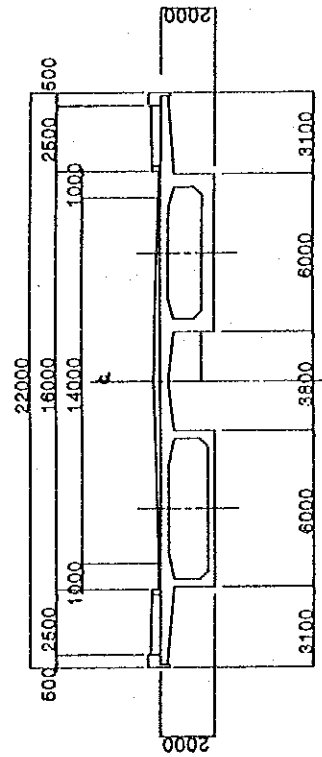
General View



Cross Section Of Side Girder

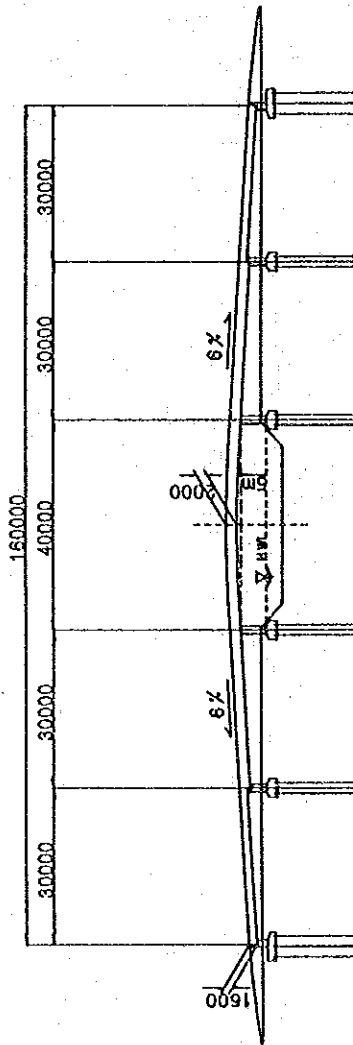


Cross Section Of Main Girder

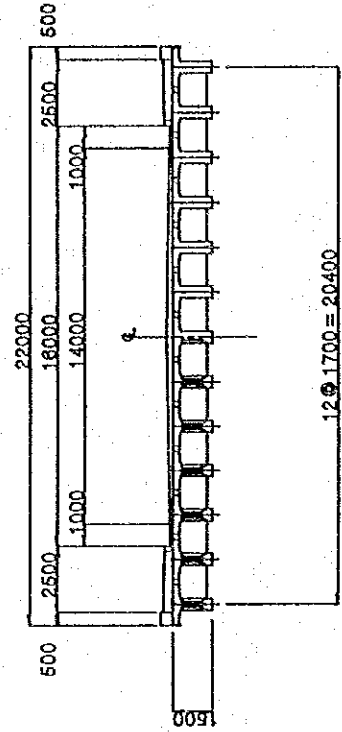


Br-11: Canapote Bridge

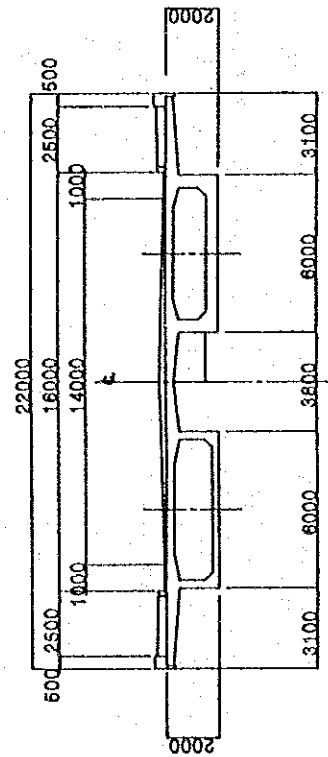
General View



Cross Section Of Side Girder

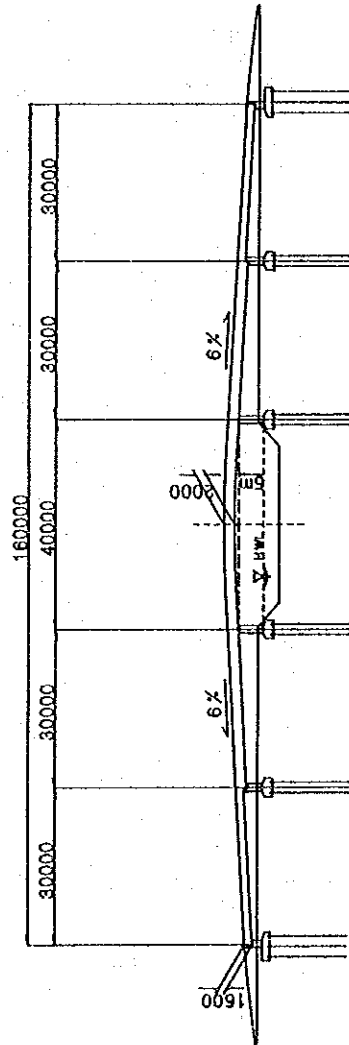


Cross Section Of Main Girder

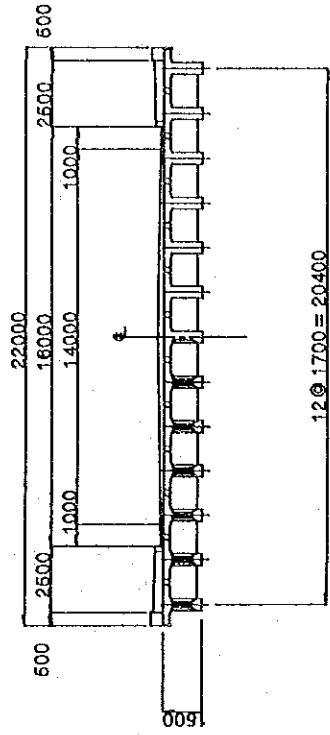


Br-12: Crespo Bridge

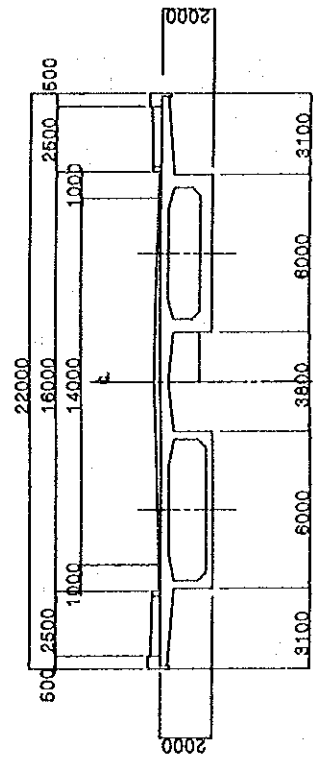
General View



Cross Section Of Side Girder

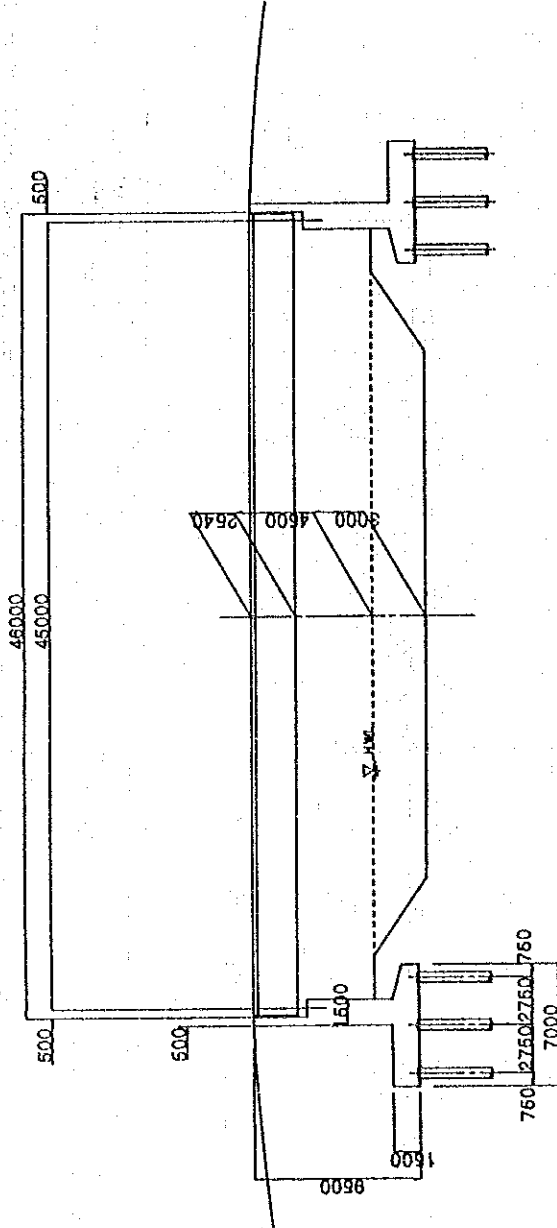


Cross Section Of Main Girder

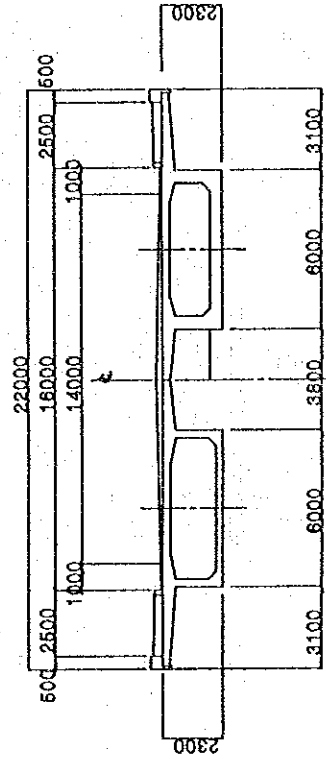


Br-13: Heredia Bridge

General View



Cross Section



Appendix 10.1-1 Existing Issues on Public Transport

PROBLEMAS EN EL PRESENTE	CAUSA	PUNTOS DE VISTA PARA LA PLANEACION
<p>1. Concentración en el centro y en el mercado de bazurto.</p>	<p>1.1. Alta tendencia de la gente en el hábito de ir al centro. 1.2. Las compañías y los dueños de buses quieren formar las rutas que lleguen al centro para conseguir más ingreso. 1.3. Mucha capacidad de servicio concentrado en el área del centro.</p>	<p>1. Sistema de la red de buses. -> Dividir las características de las rutas. * Mejorar los patrones de rutas. * Reestructurar las rutas de buses</p>
<p>2. Las rutas de buses se concentran específicamente en las principales vías.</p>	<p>2.1. No hay progreso en mejoras de vías. Especialmente en las vías secundarias. 2.2. Todas las rutas tienen la característica de tipo ruta tronco que tiene una gran longitud. 2.3. El suministro de la demanda depende de la competencia individual de buses y no de las empresas.</p>	<p>2. Sistema de la red de vías. -> Mejorar la capacidad de las vías * Introducir las vías específicamente para los buses * Hacer más sistemática la coordinación con el planeamiento.</p>
<p>3. Congestión de busetas en horas pico en el centro.</p>	<p>3.1. La capacidad de las busetas es poca. 3.2. La función es la misma que la de los buses de la ruta tronco. 3.3. Concentración de demanda en rutas específicas.</p>	<p>3. Capacidad de las flotas de buses. -> Agrandar la ruta tronco de las flotas de buses. * Incrementar el servicio de las rutas ramales de buses. * Incrementar la capacidad de los buses y busetas para equilibrar la demanda.</p>
<p>4. Carencia de terminales integrales de buses.</p>	<p>4.1. Las rutas de buses tienen terminales al final de estas, independiente e individualmente. 4.2. Alta prioridad en conseguir utilidades evita invertir en las instalaciones del servicio público de bus. 4.3. No hay inversiones para las instalaciones del servicio público de bus.</p>	<p>4. Mejoramiento del sistema de buses urbano. -> Cambiar de terminal individual/independiente a terminal integral de buses.</p>
<p>5. No hay mejoramiento de instalaciones de buses.</p>	<p>5.1. Carencia del concepto de parada de bus. 5.2. Evasión de inversión para las instalaciones de los buses por parte de las compañías. 5.3. Poco sentido para el</p>	<p>5. Especificar y mejorar las paradas de bus. -> Señalar las paradas de bus * Enumerar las rutas. * Equipar cada parada de bus con tabla de tiempo. * Proporcionar amparo contra la lluvia y el sol.</p>

Appendix 10.1-1 Existing Issues on Public Transport (continued)

6. Insuficiente cobertura de servicio de bus en areas suburbanas.
- 6.1. No hay planeamiento para urbanizacion progresiva.
- 6.2. Poco interes de las empresas en prestar el servicio en las rutas ramales.
- 6.3. Mala condicion de vias secundarias induce a concentracion en la ruta tronco.
6. Nivel de servicio de linea -> Como ajustar el progreso de urbanizacion y nuevo plan de rutas de buses.
 * Que nivel de frecuencia.
 * Necesidad de mejoramiento de vias secundarias.
7. Carencia de servicio radial de bus.
- 7.1. Progreso de mejoras en vias radiales.
- 7.2. No hay balance entre urbanizacion y mejoramiento de vias.
- 7.3. Necesidad de una red de buses que corresponda con la estructura de la ciudad en el futuro.
7. Necesidad de anillos viales.
 -> Caracteristicas de urbanizacion y distribucion de sitios de trabajo.
 * Mejoras para funcionamiento de centros sectoriales.
 * Cambios de patrones de movimiento en el futuro.
8. Dificultad de controles de buses en el area del centro.
- 8.1. Todos son tipo concentracion en el centro, muy pocos tipo circulacion o pasada por el centro.
- 8.2. Aumenta la funcion de transferencia de ruta de bus.
8. Papel del laguito y bocagrande.
 -> Concentracion de funcion de negocios y la estructura de sitios de trabajo.
 * Control de trafico en el area del centro.
 * Hacer una nueva terminal cerca del centro.
9. Paradas de bus no especificadas y obstruccion del flujo del trafico.
- 9.1. Costumbres de los pasajeros de caminar cortas distancias.
- 9.2. No hay esfuerzos para mejorar las instalaciones de paradas de bus.
- 9.3. Alta prioridad por parte de los dueños de los buses, las empresas y los conductores en recoger pasajeros en movimiento.
9. Utilizacion positiva de parada de bus.
 -> Prohibicion de tomar el auto bus en cualquier sitio que no sea parada de bus.
 * Mas instalaciones de paradas de bus.
 * Popularizar mas la educacion de trafico.
10. No hay consideraciones de conexcion entre el bus urbano y el intermunicipal.
- 10.1. La terminal de buses intermunicipales esta localizada lejos del centro y de otros lugares importantes.
- 10.2. La terminal de bus intermunicipal deberia tener tambien funciones de terminal de bus urbano.
10. Conexcion de funciones entre bus urbano e intermunicipal en la terminal.
 -> Mejorar el nivel de comodidad para el usuario.
 * Sistematizar la conexcion con bus urbano.
11. Malas condiciones del mantenimiento de las flotas de buses.
- 11.1. Las flotas de buses son muy viejas.
- 11.2. No son comodas, son oscuros de noche.
- 11.3. Las flotas viejas necesitan mantenimiento frecuentemente.
- 11.4. Alto costo de las partes.
11. Vieja condicion de la flota de buses.
 -> Aumentar capacidad de buses.
 * Mejorar las condiciones de mantenimiento.
 * Crear el centro de fabricas de mantenimiento con cooperacion de todas las empresas de bus.

Appendix 10.3-1 Facility Plan

Table 1 Bus Service Frequency at Peak Hour

Plan of Bus Terminal	Trunk Bus	Feeder Bus	Frequency		Frequency
	Route	Route	Trunk Peak	Feeder Peak	Peak Total
a Indina Catalina	3	4	542	447	989
b Mercado Bazurto	4	4	549	343	892
c Inter-Depart. Terminal	3	-	585	-	585
d Nacional Indust. -Area	2	-	333	-	333
e Parque Centenario	2	1	161	39	200
f Nueva Bosque	4	2	572	499	1071
g Bomba del Amparo	3	6	585	816	1401
h Bocagrande	4	-	205	-	205
i Air Port	1	-	100	-	100
j Daniel Lemaitre	-	3	-	200	200
k Manga	1	2	53	83	136
TOTAL	27	22	3,685	2,427	6112
(Unit)	Route	Route	Bus Trip	Bus Trip	Bus Trip

Remark: Estimation by Study Team

Table 2 Area of Bus Terminal

Plan of Bus Terminal	Total Area	Construction Area	Total Floor Area	No. of Berth to get on	No. of Berth to get off	Capacity of on Berths	Capacity of off Berths	Capacity of Total Berth
a Indina Catalina	9,660	8,700	27,280	12	14	62	72	134
b Mercado Bazurto	21,230	19,110	49,440	11	8	61	60	121
c Inter-Depart. Terminal	4,200	4,650	7,310	3	3	12	9	21
d Nacional Indust. -Area	14,000	12,600	4,500	4	4	32	16	48
e Parque Centenario	2,000	1,800	25	3	3	15	12	27
f Nueva Bosque	19,190	17,300	22,300	11	11	64	64	128
g Bomba del Amparo	32,530	29,280	25,110	6	6	90	42	132
h Bocagrande	1,460	1,460	50	2	2	7	8	15
i Air Port	500	490	-	1	1	3	3	6
j Daniel Lemaitre	2,470	2,200	100	3	3	12	9	21
k Manga	2,500	2,250	40	2	2	8	8	16
TOTAL	109,740	99,840	136,155	58	57	366	303	669
(Unit)	m ²	m ²	m ²	Berth	Berth	Buses	Buses	Buses

Remark: Estimation by Study Team

No. of Berth: When a berth(platform) has both place to get on & off a bus, it is counted both.

Appendix 10.4 Construction Cost

Table 1 Composition of Construction Cost

(Unit: %, Peso/m²)

Item	%	UNIT COST
1 Transportation of Mud	2.6	3.302
2 Structure	31.1	39.537
3 Waterworks & Sanitary	8.7	11.063
4 Brick-works & finishing	26.6	33.735
5 Furniture	0.7	894
6 Metallic & Wood Carpentry	12.7	16.111
7 Roofing Asbestos-Cement	9.3	11.816
8 Installation of Electricity, Telephone & Sound	6.1	7.754
9 Wiring to get the electric current	0.8	1.046
10 Board	0.9	1.123
11 Telephone System	0.3	374
12 Sound System	0.1	175
Total Direct Construction Cost	100.0	126.930
13 Indirect Cost : Overhead	15%	
14 : Contingency	10%	
15 : Engineering	12%	

Source: %: Terminal de transporte de Barranquilla S. A.
 Unit Cost: Adjustment to 1992 price by Study Team

APPENDIX TRAFFIC AND TRANSPORT IMPROVEMENT PLAN IN CENTRO

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Appendix Traffic and Transport Improvement Plan in Centro

Chapter 1 Road Network Improvement

1.1 Road Improvement Alternatives

1. The five (5) alternatives of the road improvement plan were prepared based on the combination of the following projects.

- 1) Br-3: Manzanillo Bridge
- 2) Br-8: Las Animas Bridge
- 3) I-9 and 10: Calle 30 (widening 2 to 4 lanes)

2. These projects influence traffic movement on the heaviest traffic corridor in east/west direction. According to the traffic assignment on the base case masterplan, traffic movement to Centro will divert from Pedro de Heredia to Manga or Boca-grande by using both bridges. Therefore, it is indicated that traffic load on Pedro de Heredia is dependent on whether both bridge projects are executed, or not.

3. The five (5) alternatives are shown in Table 1.1-1.

Table 1.1-1 Alternative plans in the Masterplan

Case	Br-3	Br-8	I-9,10
1	O	O	O
2	O	O	X
3	O	X	X
4	O	X	O
5	X	O	O

Note: O : With Project

X : Without Project, in case of I-9,10 indicates the present condition

4. The efficiency for the projects of Calle 30: I-9 and 10, which widen the number of lanes from 2 lanes to 4 lanes was analyzed in the alternative case-2. Case-3 and Case-5 were prepared for analyzing the efficiency of whether Manzanillo bridge project: Br-3 which links between Manzanillo and Castillogrande is constructed or not. As for Case-4, the efficiency of the Las Animas Bridge project was also evaluated.

5. Figure 1.1-1 shows the schematic traffic movements indicating different traffic volume from the masterplan case. In case that only the Manzanillo Bridge project (Br-3) is executed, the major traffic movement changes. Approximately 30,000

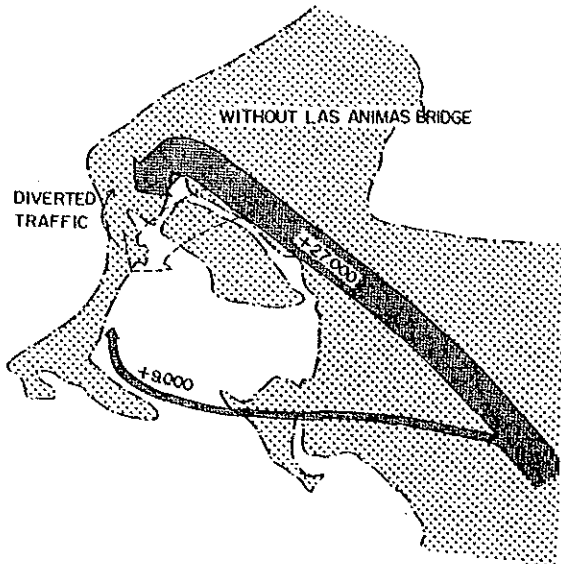
pcu/day are diverted from the corridor in continental area into the bridge. When the Las Animas Bridge is not implemented during the construction of the Manzanillo Bridge, approximately 27,000 pcu/day are also diverted and about 9,000 pcu/day are added on the Manzanillo Bridge. As for the widening on Calle 30 (I-9 and 10), traffic volume on the corridor falls to only 4,000 pcu/day and the diverted traffic into the bridge is very small.

6. The Manzanillo Bridge project will make a great impact on traffic movement against the heavy traffic corridor. The Las Animas Bridge also alleviates the traffic load on the corridor. Table 1.1-2 shows the volume capacity ratio on the three sections: Bocagrande, Laguna de Chambacu-San Lazaro, and Manga-La Quinta. As seen, in case of without the Manzanillo Bridge project, the volume capacity ratio on the sections of the Bocagrande and the Manga exceed 1.0. When the Las Animas Bridge is not constructed, the figure on bocagrande section is over 1.0 and on Laguna is close to 1.0. Anyhow, those bridge projects are needed to alleviate the traffic congestion in future on the corridor.

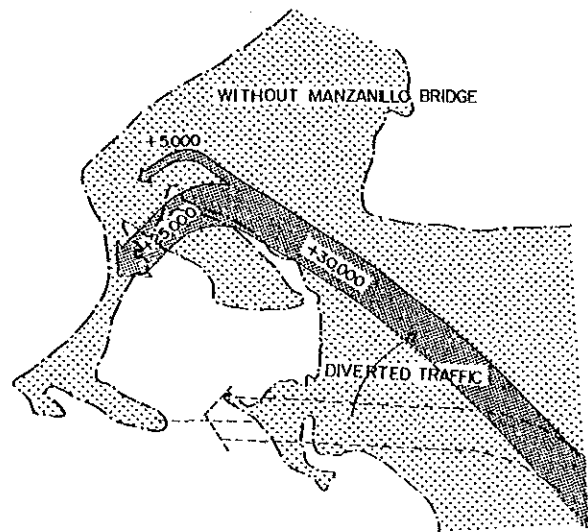
Table 1.1-2 The Volume Capacity Ratio by Sections

Case No.	Bocagrande Section-2	Laguna -3(1)	Manga -3(2)	Without Projects
Case-1	0.81	0.79	0.82	
Case-2	0.81	0.77	0.81	I-9,10
Case-3	1.23	0.90	0.82	Br-8, I-9,10
Case-4	1.23	0.91	0.82	Br-8
Case-5	1.07	0.90	1.01	Br-3

Without Las Animas Bridge Project



Without Manzanillo Bridge Project



Without Improvement of Calle 30

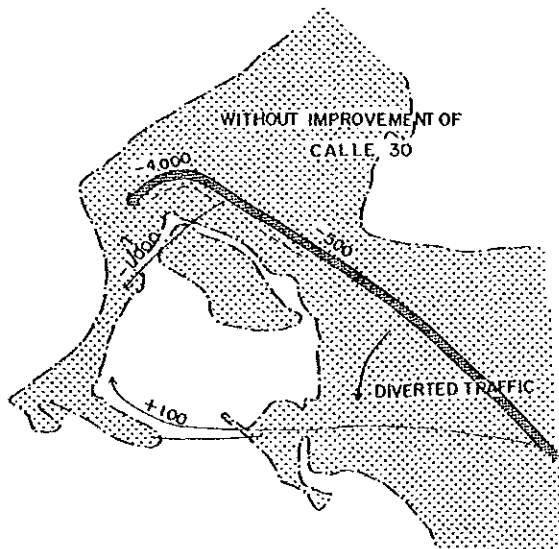


Figure 1.1-1 Schematic Traffic Movements
(Difference of Traffic Volume from Masterplan)

Chapter 2 Public Bus Transport Improvement

2.1 Public Bus Operation

(1) Trunk-Feeder Bus Operation System

7. The trunk route should be operated by a large capacity bus, such as about 80 passengers or more. This capacity will be introduced by standing passenger type bus or the articulated bus. These large type buses will serve at high frequency on this trunk bus routes.

8. Trunk bus routes are formed by connecting the major bus terminals. The operational variation will be necessary. That is, one is express type directly connecting between the terminals, and another one is local type stopping at each bus stop on trunk route.

9. Feeder bus is to collect the passengers in the residential area and transfer those passengers to trunk routes at the major terminals. Thus feeder bus is operated by smaller buses such as BUSETA in its short bus route. Due to this short length of feeder bus route, the frequency can be kept high and bus vehicle*km does not increase appreciably.

(2) Bus Stop

10. The bus operation in future should fundamentally be based on the bus stop system. At present, passengers can ride on/off the bus anywhere along the road. This seems to be a convenient system for passengers, but it gives reverse effect for the smooth traffic flow and traffic safety. Therefore, from an overall point of view, passengers do not receive much benefit from this free ride system.

11. The orderly and systematic operation would be kept by stopping at the fixed bus stop. In future, much more buses shall be operated. If a bus will stop at any place along the road section, the major road will not function anymore. Especially, a bus tends to stop at the corner of crossing, then this will cut the traffic flow and induce a traffic congestion.

(3) Bus Priority Lane and Bus Exclusive Lane

12. Bus exclusive lane is so much effective for the bus operation with high frequency. It can be introduced in case the road has enough capacity for the traffic volume. From view point of the trunk bus route operation, it is better to have a bus exclusive lane system. This possibility depends upon the improve-

ment of arterial road network in future. The proposed road sections of the bus exclusive lane are as follows;

- a. Av. Pedro Heredia; India Catalina- Bomba del Amparo
- b. Via de la Cordialidad Transversal 54; Bomba del Amparo -
Inter departmental bus terminal
- c. New road along the Caño de Bazaruto; Pie del Cerro -
Pie de la Popa - Mercado Bazaruto

13. Bus priority lane is more desirable to be introduced for the other sections of trunk bus routes in the major roads.

2.2 Public Bus Facilities

(1) Major Bus Terminal

1) The Major Terminals

14. The major terminals of the trunk bus routes are planned at the end of the routes. These are as follows;

- a. India Catalina in Centro area
- b. Mercado Bazaruto
- c. Inter-Departmental Bus Terminal
- d. Mamonal area

i) India Catalina

15. India Catalina in Centro area is the most important bus terminal. The main pattern of bus passengers up to the year 2010 is still the movement toward the Centro area. Thus it will be involved in a large number of bus trips and their passengers. However, Centro area does not have any more space for operation of such number of buses on the road, because Centro area is the historical/touristic zone and also preserved area. Therefore, up to the year 2010, this Centro area should be relieved from vehicle traffic as much as possible. From this point of view, if the major bus terminal would be at India Catalina, buses can terminate their operation there and there would be no need to pass through inside Centro area.

16. At India Catalina, there is no space on the road to operate a larger number of buses than at present (989 buses in a peak hour in 2010). It is necessary to improve the present condition for the major bus terminal.

ii) Mercado Bazurto

17. As for the road traffic at Mercado Bazurto, the road section is fully occupied by buses and also the roadside by passengers at the peak hour. Here is so called "gran parada". It is very difficult to manage larger number of buses/passengers than at present on the same space of present road section and road side (892 buses in a peak hour in 2010).

2) The Major Local Terminal

18. The scale of major local bus terminal is not as big as the major bus terminal. However the function is important for the trunk /feeder bus system. These are connecting points of trunk bus routes or main feeder bus route. These bus terminals support the function of the trunk /feeder bus system. These major local bus terminals are proposed as shown below;

- a. Parque Centenario in Centro area
- b. Nueva Bosque
- c. Bomba del Amparo (at Santa Lucia)
- d. Bocagrande
- e. Air Port
- f. Daniel Lemaitre
- g. Manga (at Terminal Maritimo)

19. Parque Centenario is the bus terminal for the routes of Bocagrande and Manga. In order not to pass through the Centro, the bus terminal facility should be located in the place opposite of India Catalina. The passengers who want to use the bus service at India Catarina are requested to walk to there for transfer. This terminal does not need a big facility because of small number of the bus routes it serves (200 buses in a peak hour in 2010).

Chapter 3 Water Transport Introduction

3.1 Network and Service Area

20. Based on the previous study results, three routes of Bay Area route, Centro-Mamonal route and Canal route are proposed. Considering the accessibility to public bus route and commercial/residential/industrial/tourist zones, several boat terminal points are selected.

21. However, from 1991 public bus passenger OD table, it can be found that the demand for Centro-Mamonal Route is very small at present and the operation of Mamonal route should be postponed until the development of south Mamonal area.

22. On the other hand, as the demand between Centro and Mercado Bazarro is quite large, the operation on this route is also examined. Figure 3.1-1 shows the operation routes for water transport investigated in preliminary stage from 1995 for example.

23. As for the Bay Area Route, round trip type operation around Bocagrande-Castillogrande-Bosque-Mercado Bazarro-Manga was envisioned at first. However, considering the canal improvement completion within several years, when water transport will be open for public, piston type operation between India Catalina-Bocagrande-Castillogrande-Bosque-Mercado Bazarro is investigated.

Table 3.1-1 Routes and Terminals

No.	Route			
	Bay Area Route	Centro Route	Canal Route	Mamonal Route
1	<u>India Catalina</u>	<u>Los Pegasos</u>	Olaya Herrera	Los Pegasos
2	<u>Bocagrande</u>	<u>El Bosque</u>	Boston	Albornoz
3	<u>C/grande</u>	<u>Mercado Bazarro</u>	La Maria	Pta di Soda
4	<u>El Bosque</u>		Santa Maria	Pasacaballo
5	<u>Mercado Bazarro</u>		<u>San Pedro</u>	
6			<u>Marbella</u>	
7			<u>India Catalina</u>	
8			<u>Barrio Chino</u>	
9			<u>Mercado Bazarro</u>	

note: Underlined ones are terminals in preliminary stage.

1) Route No.101, Bay Area Route

24. This is the local type route dropping in the spots of tourism, business, commercial and administrative centers of Cartagena. Starting from India Catalina, it goes by Bocagrande, Castillogrande and El Bosque, and terminates at Mercado Bazarro.

It returns on the same route.

2) Route No.102, Centro Route

25. This is the express type route of only one stop at El Bosque starting from Centro (Los Pegasos) until Mercado Bazaruto. It aims to gather the passengers between Centro and Mercado Bazaruto including transfer from public bus services by less travel time.

3) Route No.103, Canal Route

26. This is the local type route serving for the residents living along the canal and Cienaga de La Virgen, which links the Centro and Cienaga de La Virgen. It starts from Olaya Herrera, east end of Cienaga de La Virgen, stops at seven terminals on the way and arrives at Mercado Bazaruto. It returns on the same route. In preliminary stage, the operation is scheduled between Mercado Bazaruto and Santa Maria.

27. Figure 3.1-2 shows the service network at 2010, which includes the introduction of Mamonal route and the extension of Canal route from San Pedro to Olaya Herrera into the preliminary network of water transport.

3.2 Demand Forecast

(1) Service Network without Bus Service Improvement

28. Tables 3.2-1 and 3.2-2 show the result of computer simulation for the water transport traffic demand in 1991 and 2010. Public bus network in 2010 is assumed as those by current operation system with additional introduction of several new routes on the roads implemented and the operation of Mamonal route and Canal route extension is assumed.

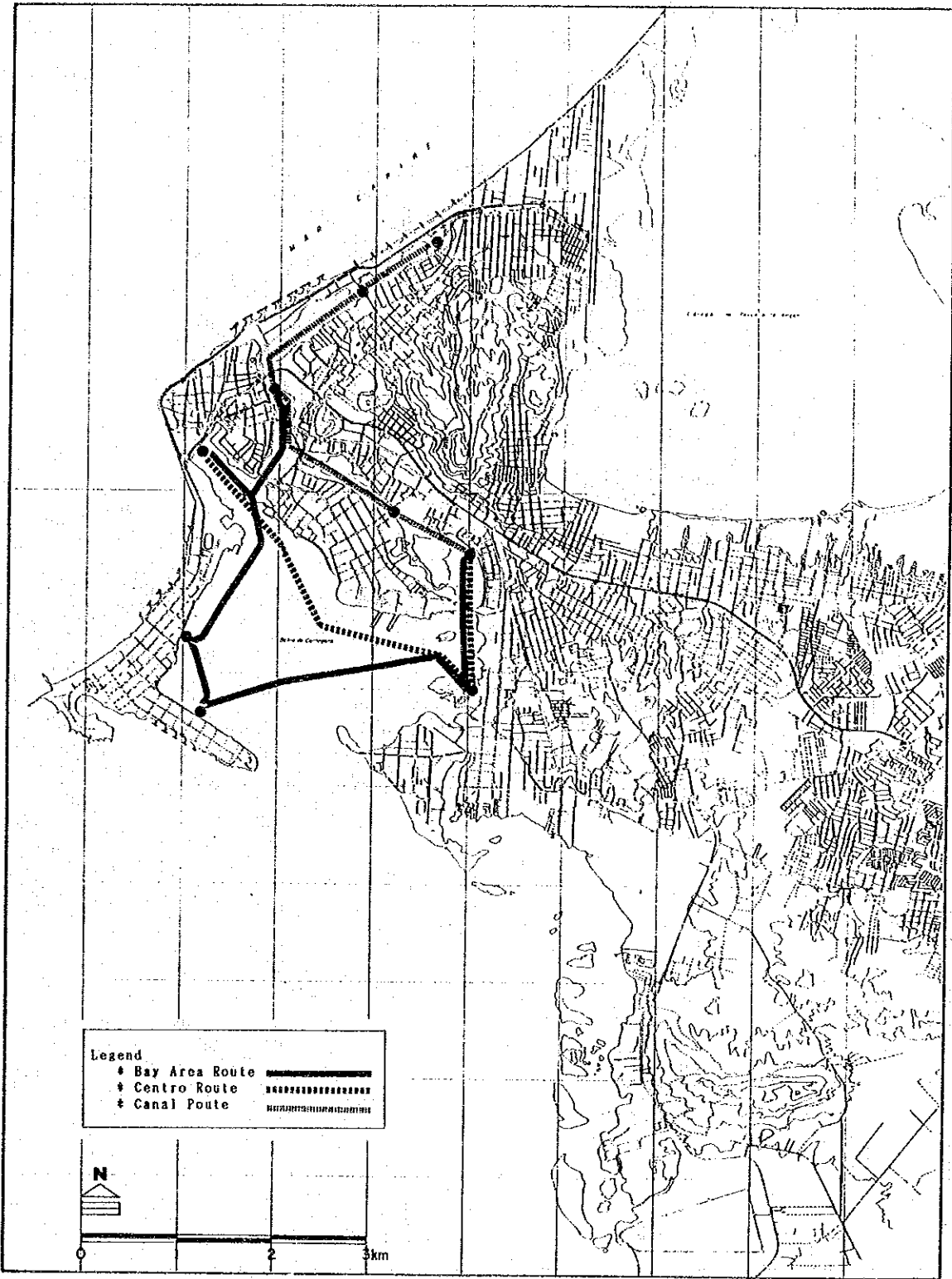


Figure 3.1-1 Route Network of Water Transport (Preliminary Stage)

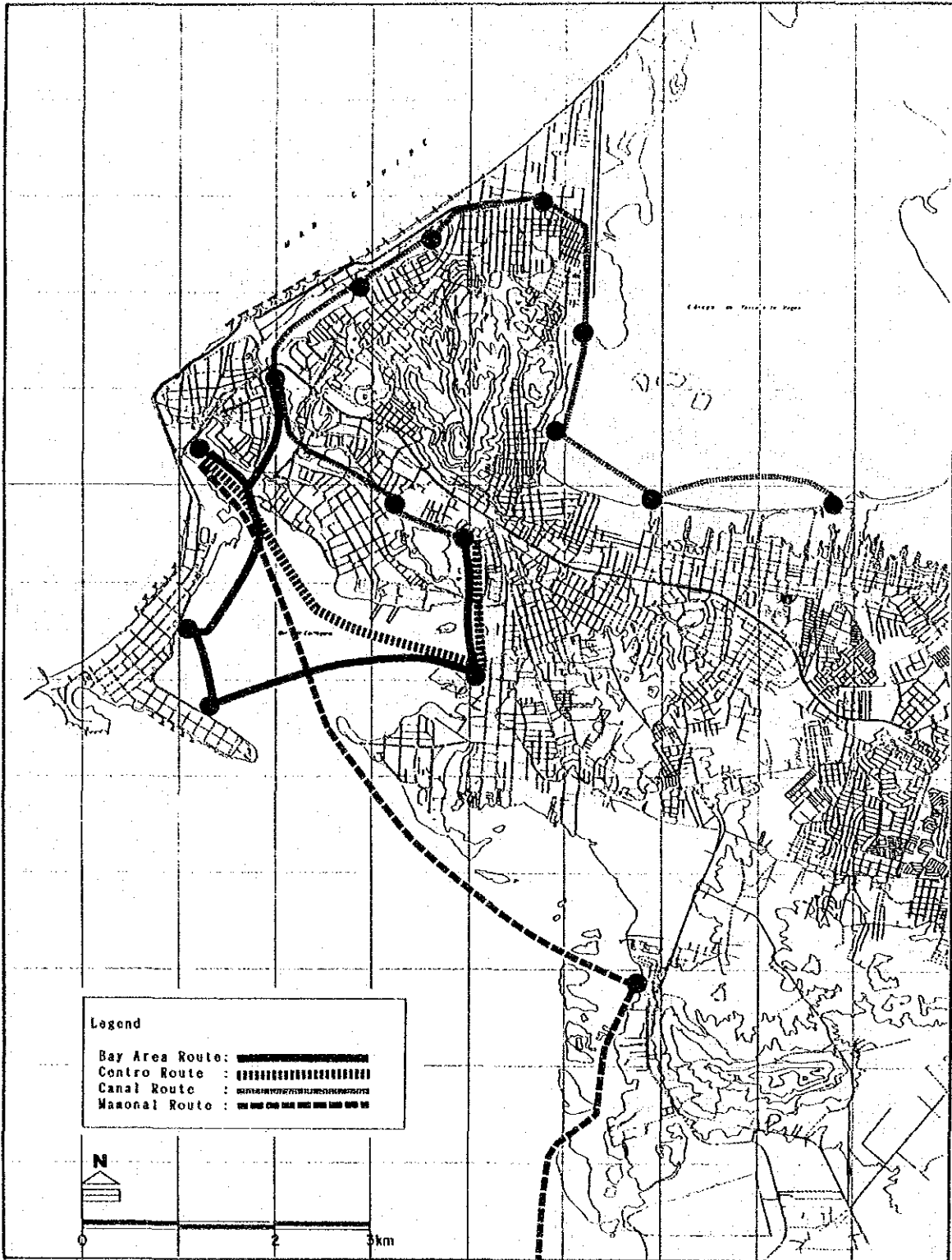


Figure 3.1-2 Route Network of Water Transport in 2010

Table 3.2-1 Water Transport Traffic Demand

	1991	2010	2010/1991
Potential Demand			
Boat only	28,499	124,637	4.37
Boat + Bus	14,313	47,237	3.30
Total	42,812	171,874	4.01
Demand diverted to Boat			
Boat only	15,815	58,132	3.68
Boat + Bus	4,822	19,239	3.99
Total	20,637	77,371	3.75

Table 3.2-2 Route Assignment of Passenger

Route No.	Total Pns No.		Peak Section Pns No.	
	1991	2010	1991	2010
101	9,319	40,856	3,580	17,199
102	5,517	6,651	2,478	3,343
103	8,939	47,950	4,185	23,047
104	-	21,365	-	10,988
Total	23,775	116,822	-	-

note: Peak passenger number for one direction

(2) Service Network with Bus Operation System Improvement

29. Using the 1991 and 2010 public passenger ODs and water transport network with Mamonal route and Canal route extension in 2010, water transport demand was analyzed. In this case, public bus network in 2010 was supposed as those of trunk-feeder system. The result is shown in Tables 3.2-3 and 3.2-4.

Table 3.2-3 Water Transport Traffic Demand

	1991	2010	2010/1991
Potential Demand			
Boat only	28,499	83,618	2.93
Boat + Bus	14,313	1,684	0.11
Total	42,812	85,302	1.95
Demand diverted to Boat			
Boat only	15,815	38,419	2.43
Boat + Bus	4,822	688	0.14
Total	20,637	39,107	1.87

Table 3.2-4 Route Assignment of Passenger

Route No.	Total Pns 1991	No. 2010	Peak Section 1991	Pns No. 2010
101	9,319	26,813	3,580	11,814
102	5,517	3,086	2,478	1,598
103	8,939	18,892	4,185	5,736
104	-	5,284	-	3,951
Total	23,775	54,075	-	-

note: Peak passenger number for one direction

3.3 Facility Plan

30. For the water transport operation, many sorts of facilities shall be invested on land as well as in the bay/canal. In the bay and canal, the beacon shall be introduced for night time navigation (about 11 locations).

31. On land, the following facilities are required;

- a. boat terminal,
- b. pontoon or wharf,
- c. fuel supply and storage, and
- d. maintenance yard.

(1) Boat Terminal

32. In order to determine the terminal size, it is necessary to plan its capacity for long term period. For this reason, passenger number passing through the terminal in 2010 is estimated. Table 3.3-1 shows the passenger number for each terminal.

Table 3.3-1 Passenger Number of the Terminal in 2010

Terminal No.	Name	No. of Passenger
1	Castillogrande	2,100
2	Bocagrande	5,100
3	Centro	14,300
4	India Catalina	8,400
5	Marbella	2,900
6	San Pedro	2,400
7	Barrio Chino	2,800
8	Mercado Bazurto	6,900
9	El Bosque	1,500
10	Santa Maria	4,200
11	Boston	500
12	Olaya Herrera	1,000

source: Study Team

(2) Wharf

33. Two types of wharf are considered depending on location. Table 3.3-2 shows the type and its size.

Table 3.3-2 Wharf Type and Its Size

Terminal	Wharf Type	Wharf Size
Castillogrande	Pontoon	30 x 7 x 0.8 m
Bocagrande	Pontoon	30 x 7 x 0.8 m
Centro	Pontoon	30 x 7 x 0.8 m
India Catalina	Pontoon	30 x 7 x 0.8 m
	Pontoon	20 x 6 x 0.8 m
Marbella	Pier	
San Pedro	Pier	
Barrio Chino	Pier	
Mercado Bazurto	Pontoon	30 x 7 x 0.8 m
	Pontoon	20 x 6 x 0.8 m
El Bosque	Pontoon	30 x 7 x 0.8 m
Santa Maria	Pier	
La Maria	Pontoon	20 x 6 x 0.8 m
Boston	Pontoon	20 x 6 x 0.8 m
Olaya Herrera	Pontoon	20 x 6 x 0.8 m

note: size; represents length, width and depth

Chapter 4 Traffic Management Improvement

4.1 Curb Parking Restriction

34. Road side parking is restricted on major roads and narrow streets in Central Area as well as in the whole urban area. The selection of such major roads and streets seems reasonable. Curb parking restriction shall be enforced on the arterial and collector roads in urban area at least (refer to Figure 4.1-1).

35. DATT has its own police organization of some seventy (70) persons. It can easily be understood that with this number of traffic policemen parking control is very difficult to enforce for all the urban area of Cartagena at any time. However, during the conference of UNCTAD (United Nations Conference on Trade and Development) on February 1992, several streets around the convention center which are the important traffic links between Manga island and the Centro were free from curb parking.

36. From this example, it can be said that for some road sections it is possible to control curb parking by the limited number of traffic policemen of DATT. How to select the target streets or how much to fine for illegal curb parking is a matter for investigation, however, strict enforcement of curb parking restriction at random selection of target road sections and large amount of fines are very useful tools to eliminate the illegal curb parking.

37. At the same time, curb parking spaces should be assigned near the restricted roads and streets at selected local roads of less traffic flow.

4.2 Parking Plan in Central Area

38. There is an idea to restrict all the vehicles from entering into the Central area from view point of the conservation of historical and cultural monuments of the Area. The complete and immediate implementation of this idea is impossible due to the concentration of urban functions in the Area and socioeconomic losses caused within this Masterplan period.

39. However, it is necessary to restrict the increase of vehicle entering into the Area by diversification of urban functions of the Area, road network improvement and parking restriction for preserving the precious monuments for the future of Cartagena.

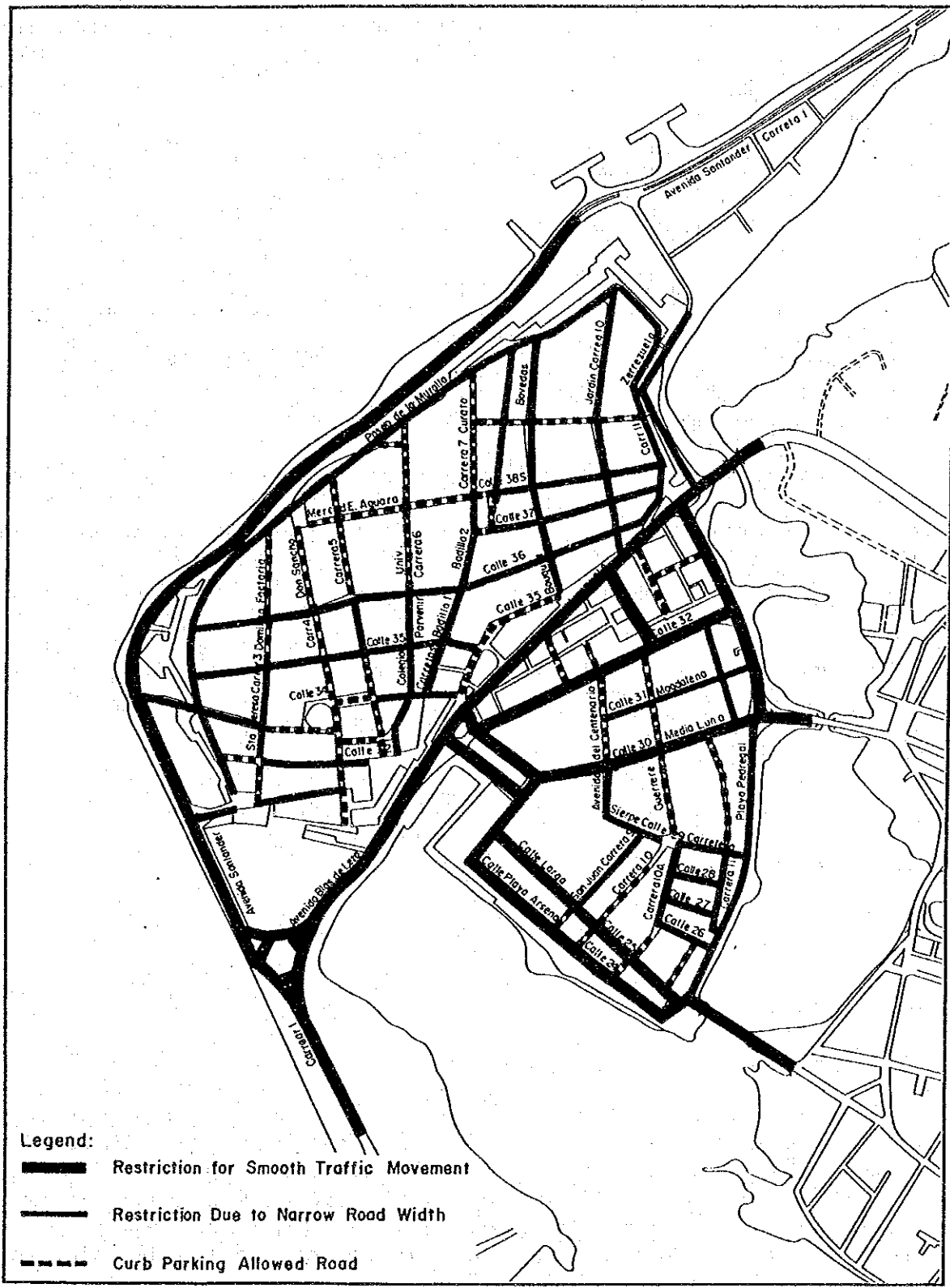


Figure 4.1-1 Curb Parking Restriction Plan (Central Area)

40. From the imbalance in the parking demand and capacity in Central Area described below, discussions shall be started in near future on measures for restriction of vehicles entering into Central Area.

41. The current curb parking capacity in the Central Area is about 9,300 vehicles per day. It balances now with curb parking demand. About 90 per cent of this peak demand is by car and the balance is by other vehicles such as taxi and trucks. Parking demand by taxi is very small, less than 5 percent.

42. Table 4.2-1 shows the number of vehicles attracted into Central Area by vehicle types of car and taxi in the years of 1991 and 2010. Taxi will be attracted about three (3) times as much as at present, however, its curb parking demand is considered not to be large and to be about one thousand per day.

43. In case of cars, the total parking demand will become more than 33 thousand based on the figures indicated in the Table. If the parking capacity of existing private parking lots and public parking facilities remains the same as present level, an imbalance between demand and capacity of curb parking will become 13 thousand per day in 2010.

Total Parking Demand: 33,000/day
Capacity of Private Lots/Public Parking Facilities: 12,000/day
Curb Parking Capacity for Car: 8,000/day
Demand/Capacity Imbalance: 13,000/day

Table 4.2-1 Vehicle Number Attracted into Central Area

Vehicle Type	1991	2010	Increase Ratio
Passenger Car	20,389	33,148	1.626
Taxi	8,974	27,484	3.063
Total	29,363	60,632	2.065

Source: Study Team

44. Taking into consideration current control on building construction in the Central Area surrounded by stone walls, the large amount of parking capacity increase by new private parking lots and public parking facility constructions is very difficult to expect. However, to accept the employment increase in future, several new business buildings will be built equipped with parking lots. Current public use parking facilities are expected to continue their services because of the profitable business under the large parking demand.

45. Assuming the capacity increase of private parking lots

and public parking facilities through new construction as follows, parking capacity of these parking facility types in the Area will increase about by 3,000 vehicles a day.

Employment increase	:	6,000 persons
New office building	:	20 sites
Public parking facility:		50 vehicles, 5 new places
Private parking lots	:	25 vehicles, 20 new lots
Parking turnover	:	5 times a day
Occupancy rate	:	80 per cent
Parking capacity	:	$750 \times 5 \times 0.80 = 3,000$ veh./day

46. Parking restriction shall be enforced on major roads such as arterial and collector roads and also on the several roads in Central Area as shown in Figure 4.1-1. In the Central Area, curb parking spaces shall be prepared in order to supplement the capacity of public/private parking facilities for growing parking demand.

47. Introducing the restriction of curb parking duration, for example less than one (1) hour (About 65 % of the total parking cars is less than 1 hour parking based on the curb parking survey done by Study Team.), can be expected to increase the capacity by some five (5) thousand.

48. Therefore, parking capacity increase for the total of about eight (8) thousand vehicles per day is available inside the Central Area by 2010. The balance of 5 thousand vehicles per day shall park outside the Central Area.

49. The locations for parking facilities outside the Central Area are designated at the following points;

- a. Chambacu area,
- b. Cabrero, and
- c. Tourist Terminal area.

About one (1) thousand parking spaces are totally required in these locations to fulfill the demand.

50. Curb parking in the designated spaces in the Central Area shall be charged. Curb parkings in other spaces than designated spaces shall be fined. This measure will become the useful tool for the restriction of vehicle entrance into Central area as well as the financial resource for the improvement of traffic management system in Cartagena.

51. As mentioned above, the curb parking space in Central Area is estimated about 8 thousand at present and can be in-

creased to 11 thousand in future if parking control is carried out strictly.

52. Toll curb parking will reduce unnecessary vehicles from entering into Central area, however, a very high parking charge may adversely influence the economic activities in the Area. Details of toll curb parking system including the fine on illegal parkings is to be carefully investigated taking into consideration the regional economy, resident opinions as well as vehicle owner behavior.

4.3 Pedestrian Facilities

53. Current pedestrians' traffic facilities such as pedestrian signal, crosswalk, pedestrian crosswalk overbridge, etc. are in very poor condition in the Study Area. Only one pedestrian bridge on Av. Pedro Heredia is available near the stadium. Except on Av. Venezuela, a pedestrian cross walk is not clearly assigned and a pedestrian is frequently interrupted by right/left turn vehicles when crossing at the green light.

54. The pedestrian safety facilities and traffic flow efficiency have a competing relationship which should be adjusted according to the local conditions. In the downtown area, pedestrian facilities shall have priority so that sufficient pedestrian crosswalks and exclusive pedestrian signal cycle shall be established. On the other hand, on urban arterials outside the downtown area, priority has to be put on traffic flow efficiency, followed by pedestrian safety with crosswalk overbridge to be constructed at the places where people gather.

55. For the following streets the exclusive pedestrian signal system has to be introduced;

- a. Av. Venezuela,
- b. Av. San Martin, and
- c. Av. del Concejo.

56. For the following arterials the pedestrian overbridges have to be constructed;

- a. Av. Pedro de Heredia,
- b. Carretera Troncal de Occidente, and
- c. Diagonal 22.

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