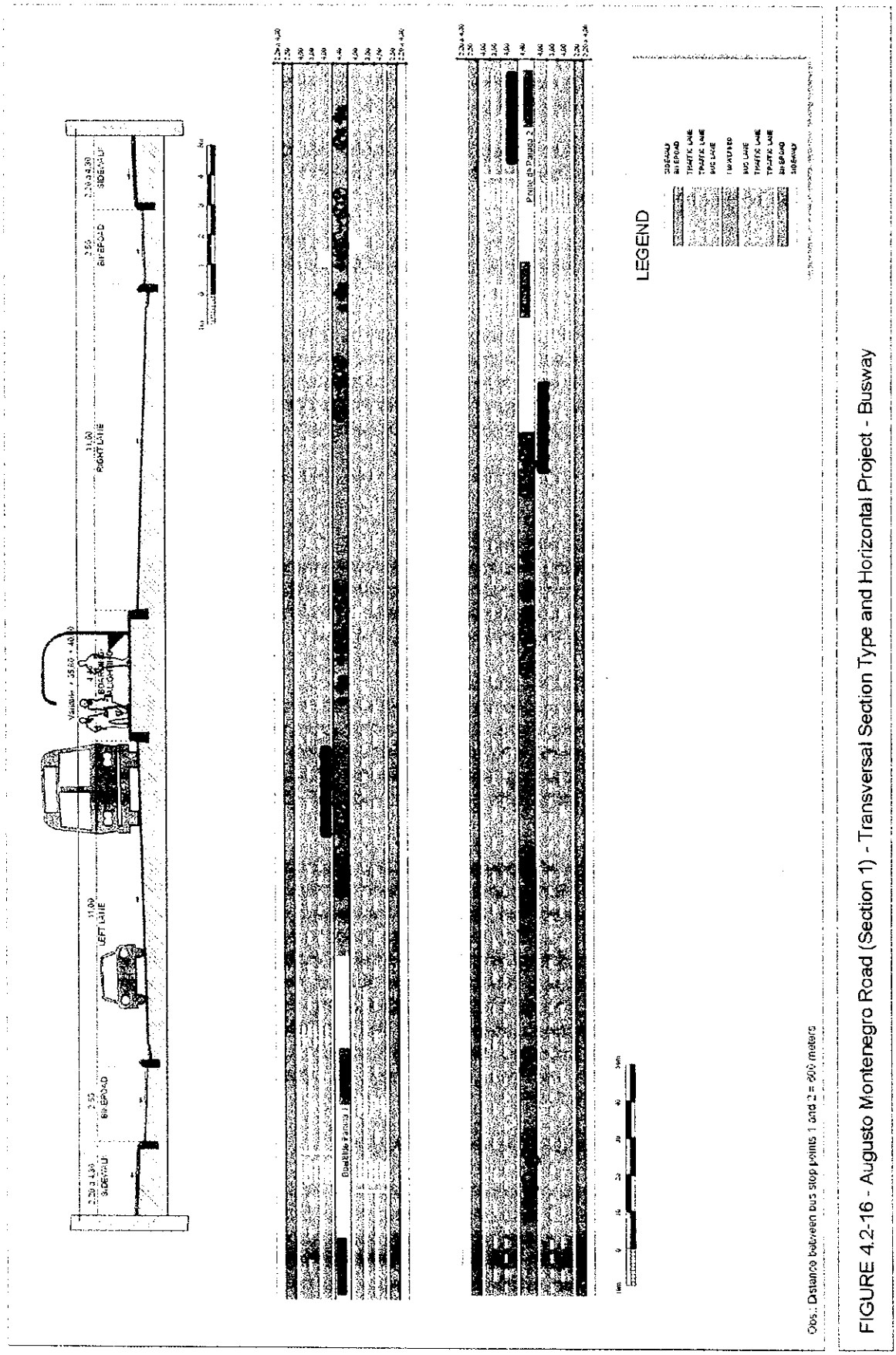

FIGURE 4.2-16 - Augusto Montenegro Road (Section 1) - Transversal Section Type and Horizontal Project - Busway

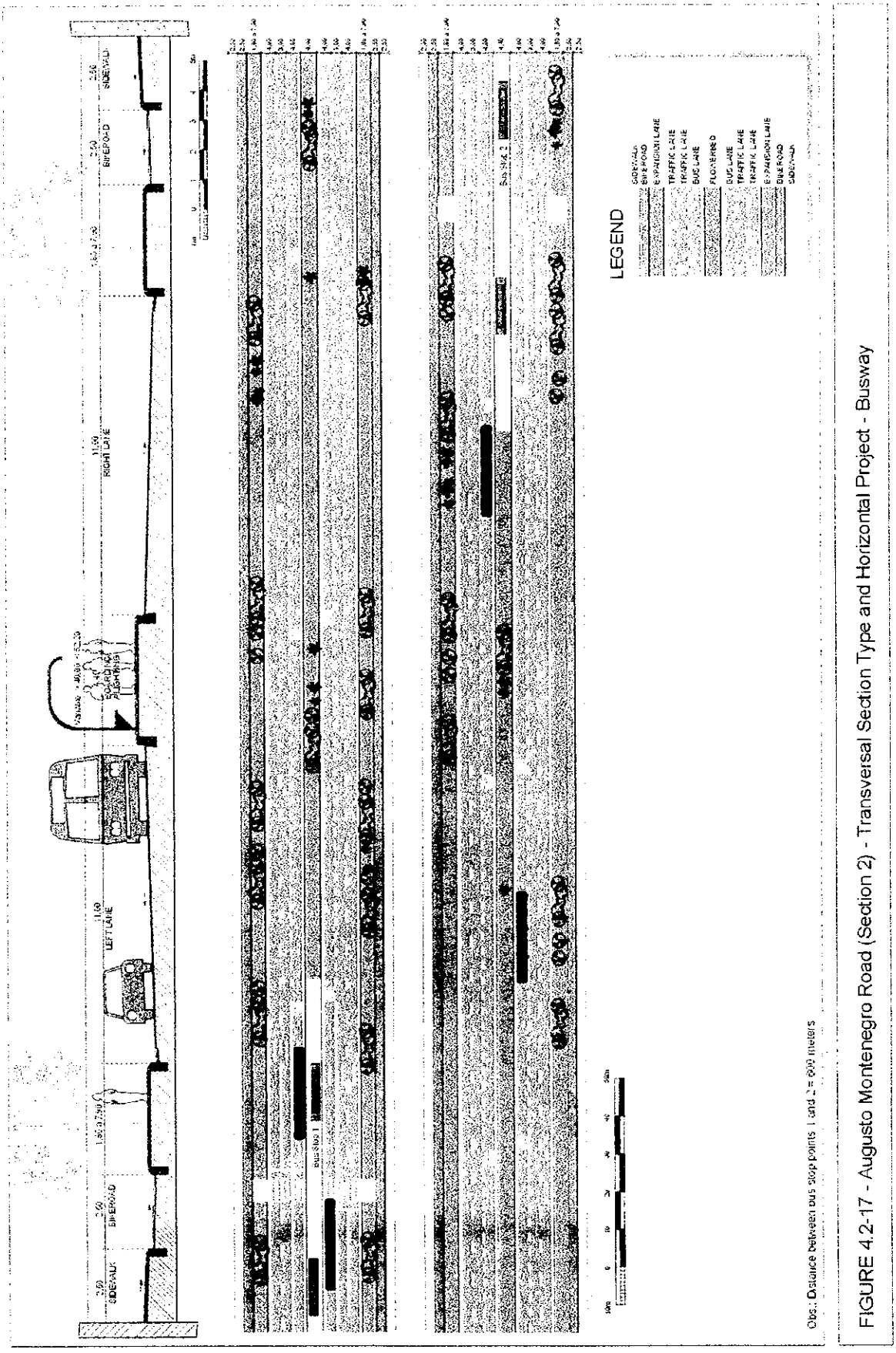

FIGURE 4.2-17 - Augusto Montenegro Road (Section 2) - Transversal Section Type and Horizontal Project - Busway

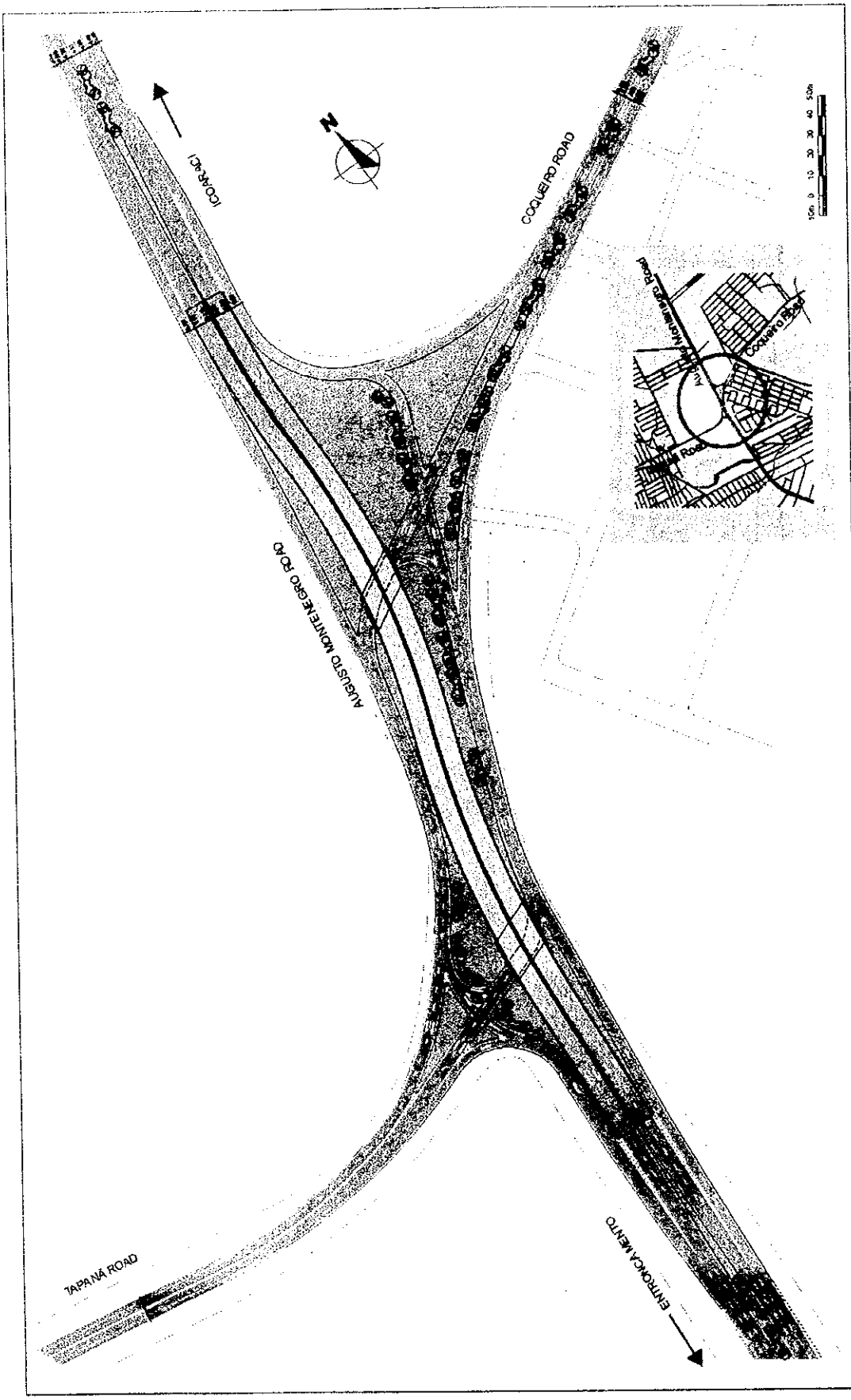

FIGURE 4.2-18 - Intersection Augusto Montenegro Road / Coqueiro Road / Tapanã Road

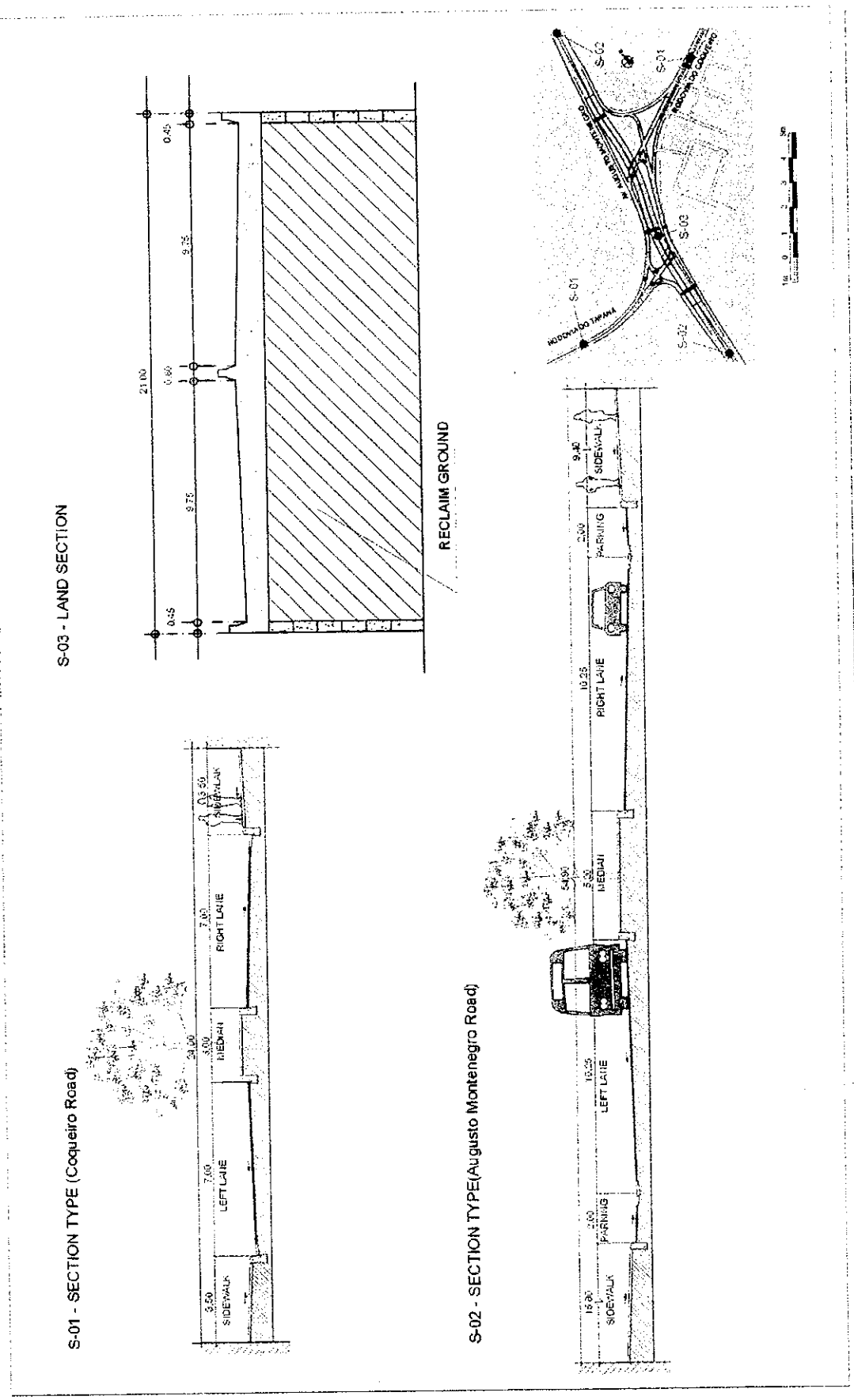

FIGURA 4.2-19 - Intersection Augusto Montenegro Road / Coqueiro Road / Tapanã Road - Section Type

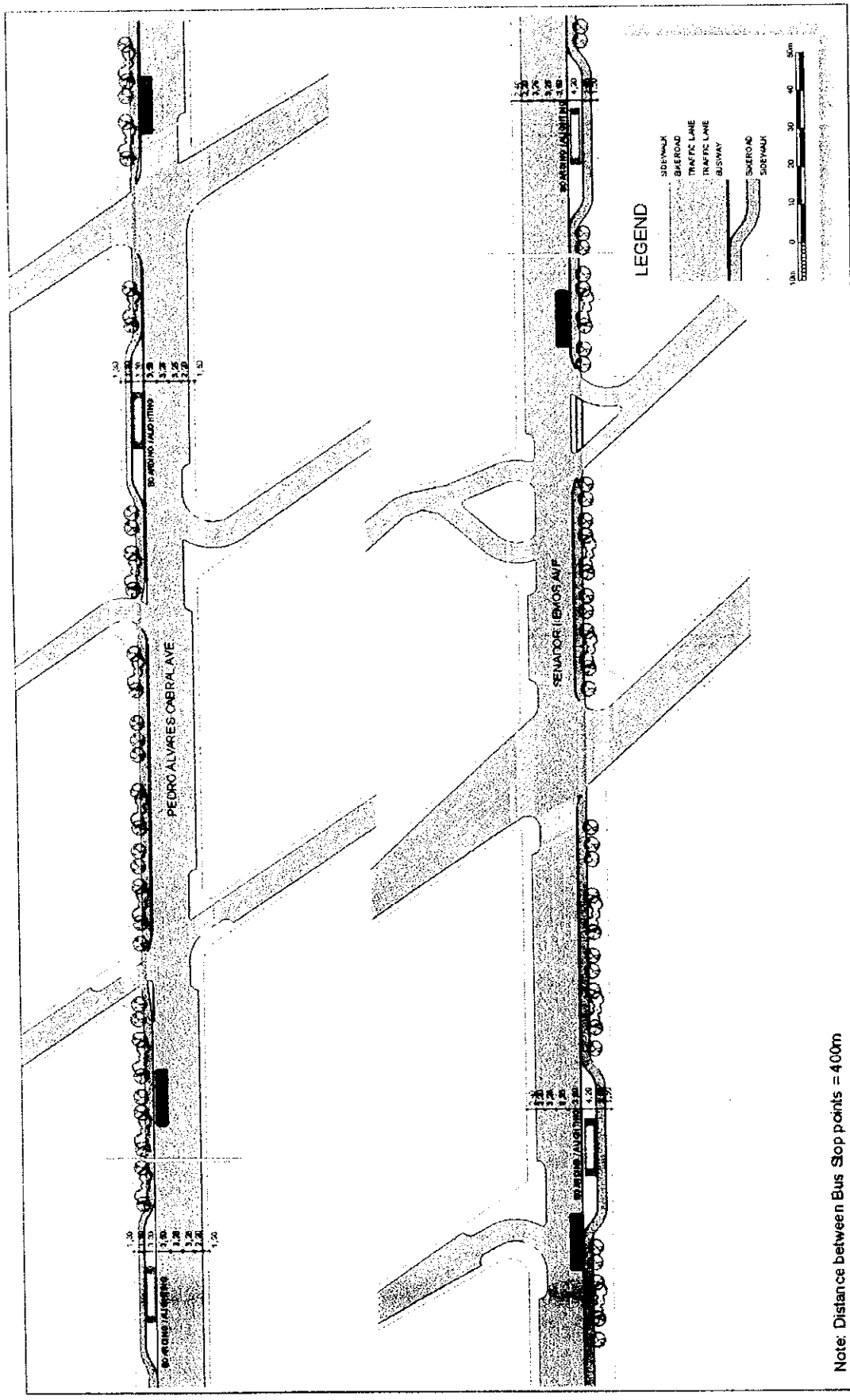

FIGURA 4.2-20 - Binary Pedro Álvares Cabral Ave. / Senador Lemos Ave. - Type of Access Detail

This binary also should attend the secondary trunk lines and its roads should have these characteristics:

1) Pedro Alvares Cabral Avenue - district/center direction (FIGURE 4.2-21):
- One lane, with one exclusive busway on the right, in a traffic direction, and two traffic lanes for vehicles with minimum width of 10.00m;
- Parking lane on the left side of the lanes for vehicles, with minimum width of 2.20m;
- Bikeroad with physical separator, on the right side the exclusive lane, with width minimum of 2.50m;
- Sidewalk on the right side of bikeroad, with width minimum of 3.60m;
- Sidewalk on left side of parking lane, with width of 1.50m.

2) Senador Lemos Avenue - center-district direction (FIGURE 4.2-22):
- One lane, with one exclusive busway on the right, in a traffic direction, and two more traffic lanes for vehicles with minimum width of 10.00m;
- Parking lane on the left side of the lanes for vehicle, with minimum width of 2.20m;
- Bikeroad with physical separator, on the right side of the exclusive lane, with width minimum of 2.50m;
- Sidewalk on the right side of the bikeroad, with width minimum of 5.50m;
- Sidewalk on the left side of parking lane, with width of 2.40m.

The bays for boarding and alighting passengers would be located along the exclusive lane with a length of approximately 400.0m. The vehicle access without crossing the road should be confined by channelized paths for smooth traffic flow, protecting the pedestrian crossing lane. At all intersection with dual way road traffic light should be installed. It should be prohibited to turn left except in special cases, where, the road system does not allow alternative road.

The construction of the binary and the exclusive busway to receive the Trunk System of Transport, would require a partial reformulation of the Pedro Alvares Cabral and Senador Lemos Avenues structures, including relocations of network of infrastructure and public services.

PDTU/2001 also recommend the creation of public transport fluvial roads that should operate with rapid boats (cruise speed of 25 knot) and 140 passenger capacity. These lines should be integrated physicaly, and operationally to the road system to facilitate the demand for transference between the two modes. It is not recommended any type of economic subsidies to the system.

The public transport system also should be provided with other facilities as information system to the users, improvement of the shelters, bus stop, special services for handicap.

4.3. THE TRAFFIC SYSTEM

Th set of recommendations for the road system and public transport prior mentioned requires improvement in traffic management and operation in Belem Metropolitan Area. This improvement should be done through training for human resources to prepare for the new reality as well as through the acquisition of equipment for more efficient supervision control.

4.3.1 MODERATED MEASURES OF TRAFFIC

Among the proposed recommendations for the circulation system, the model project for the implementation of measures for moderating traffic, *"Traffic Calming"* stands out. These measures are extremely efficient in cities like Belem, where the rapid process of urbanization together with the increase of vehicles provoke deep changes in the road structure. Also creating costs from the accidents and environmental degradation caused by the excess of traffic volume and by the high speed in residential areas. This scenario can be avoided or recuperated through a macro road plan that determines a well defined hierarchic direction to rationalize ways and uses of the road system.

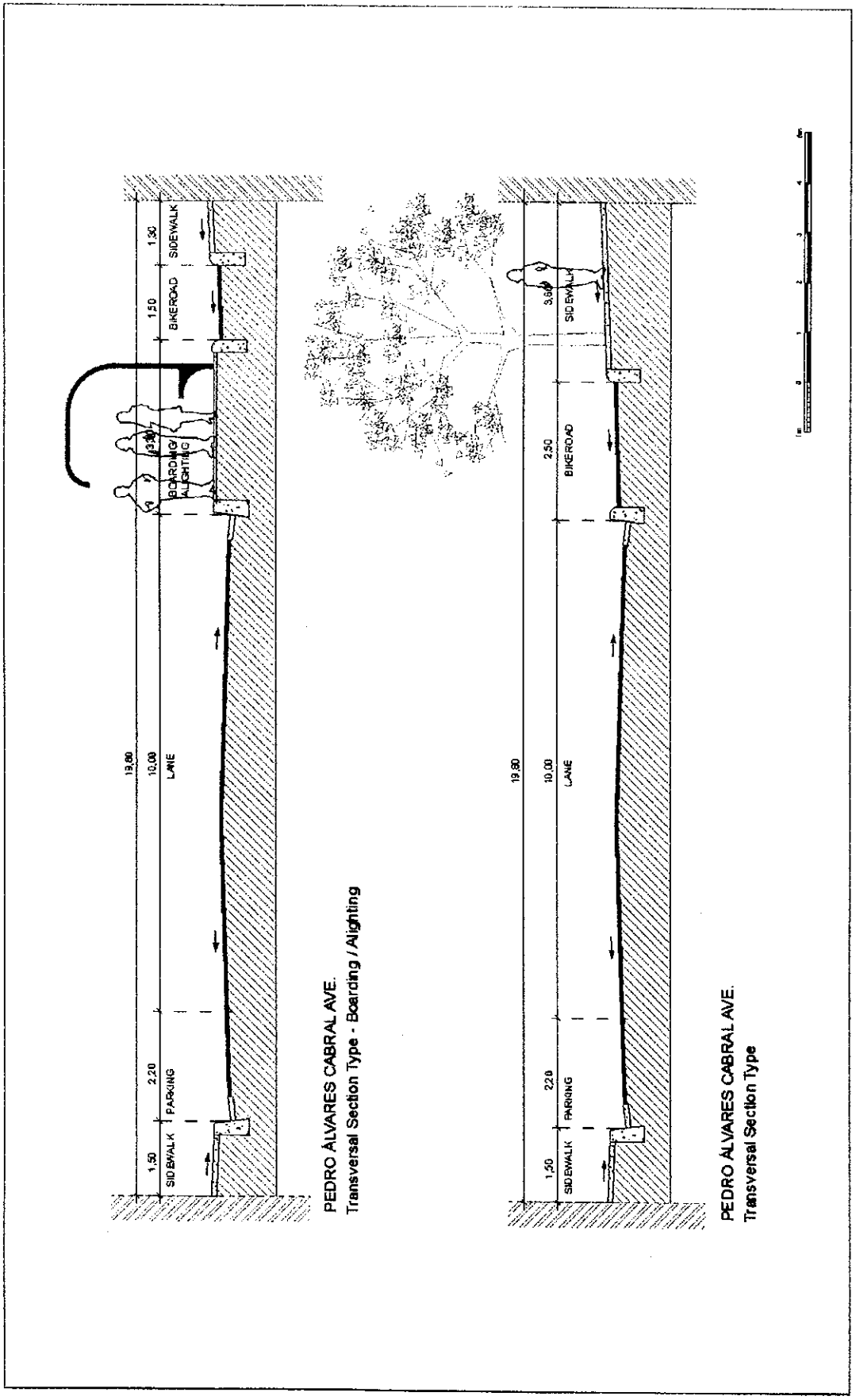

FIGURE 4.2-21 - Binary of Pedro Álvares Cabral Ave. / Senador Lemos Ave. - Section Type of Pedro Álvares Cabral Ave.

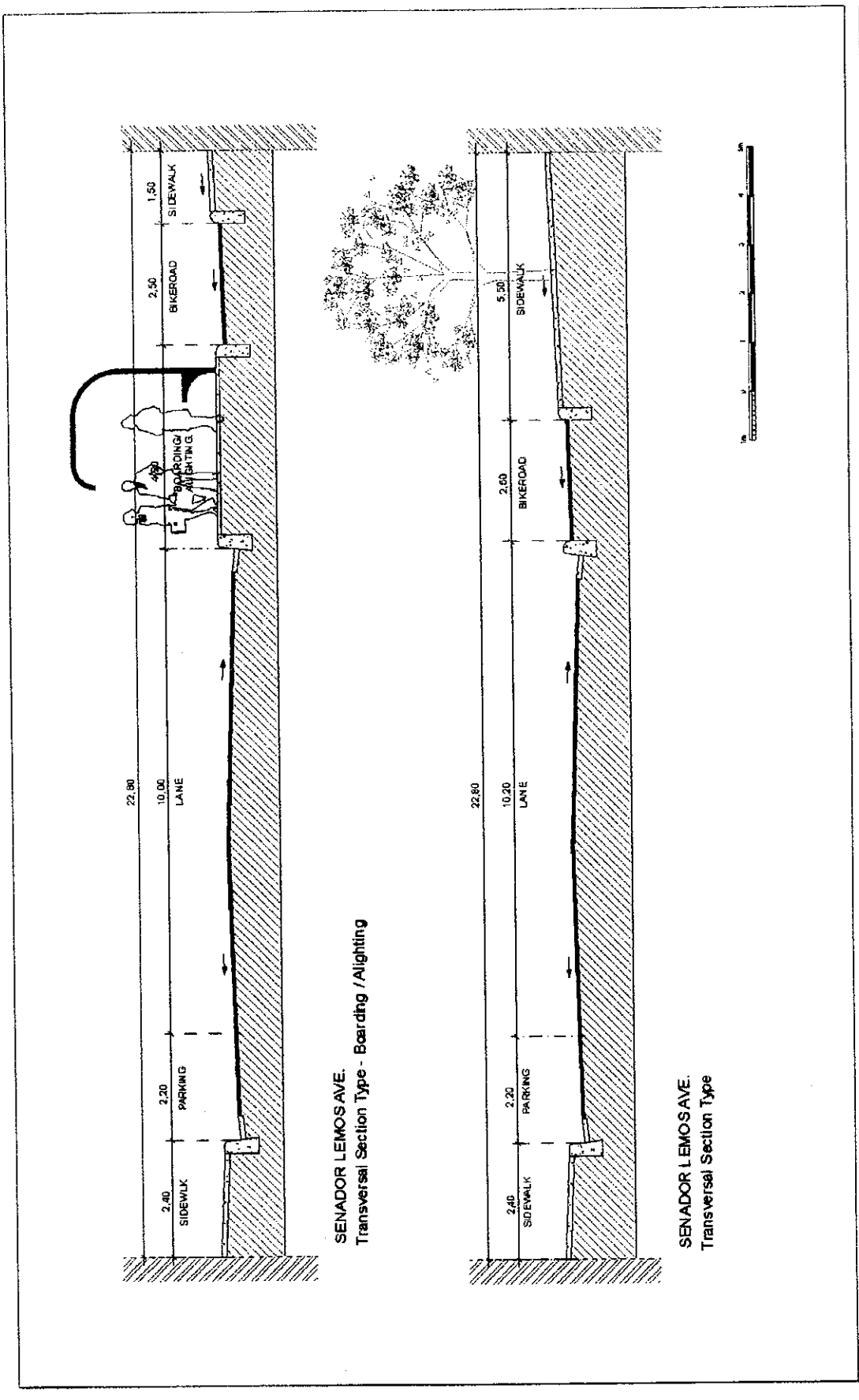

FIGURE 4.2-22 - Binary of Pedro Alvares Cabral Ave. / Senador Lemos Ave. - Section Type of Senador Lemos Ave.

Experiences obtained from monitoring drivers' conducts of vehicle, show that a simple change of circulation through the graphic regulation like signpost do not show the expected benefit to the velocity reduction and crossing traffic.

The consolidation of residential environmental areas in nucleus densely urbanized can be obtained through the traffic engineering with physical measures and regulation implemented in the road system, called "Traffic Calming". These actions are developed to control the speed by leading drivers to a more appropriate way of driving for the security and environment.

The utilization of "Traffic Calming" in large urban centers is growing due to its positives results related to the accident reduction; its efficiency in strategy of transit organization and its benefits in residential area recuperation. This recuperation is based on the velocity reduction, crossing traffic elimination; turning the local traffic with positive consequence for the security and environmental quality .

The chosen area for the model project is located in Marco district in a quadrilateral marked by: Duque de Caxias, 25 de Setembro Avenues, Timbó and Mariz e Barros Street. This project after its implementation, should be monitored considering the model of similar treatments for future expansion in other RMB areas as macrodrenagem areas recently paved, sets of residential area with medium and large sizes as Cidade Nova, Medici etc.(FIGURE 4.3-1 and 4.3-2)

The recommended physical interventions contributes to the minimization of pavement areas creating landscape management and installation of urban devices, changing roads and sidewalks adequately to the functions of habitation and community use, with the creation and expansion of leisure areas.

Adapted guideline for the basic study is an effective width of lanes of ≅ 4.50m, parallel parking with 2.50m and parking of 45° with 6.00m width. The marks in the road through *occasional strips to* be made with different material related to lanes, which has the purpose of reducing the lane width and lead the drivers (car, bus and truck) to reduce the speed through the visual effect from the lanes already refered. The delimitation of the areas for the parking would be consolidated through the differentiated material on grounds.

Next to the platform on the road for of traffic moderation (chicanes, etc.), the parking is prohibited due to the narrow road. The installation of sidewalk is used in strategic points along the roads aiming to facilitate the pedestrian crossing and at the same time delimit the parking areas. These installations are combined with others ways as platform (see detail type on FIGURES 4.3-3 to 4.3-6), aiming an effective reduction of velocity.

The use of alternate parking is sometimes parallel, sometimes 45° in the same road side, as well as the use of platform that allows a great variety of semi-circles form, and determines the velocity reduction of the vehicles at the pedestrian crossing points. The location of this platform in the road should be calculated for not to allow abrupt accelerations and reduction the vehicle flow, pushing the driver to keep security velocity for the road.

The intersections are handled through sidewalk installation aiming for narrowing the lane. In these segments, the lane ground is raised aiming to warn the drive that the priority is for the pedestrian. The sidewalk installation should receive ground treatment with cement, tile and others. These should be in different colors from the lane pavement to highlight the pedestrian crossings and strategic points needed to velocity reduction (FIGURE 4.3-3 to 4.3-6).

The success of the measure depends on the clearness of its benefits to the resident, of the effective control after the implementation including control of use and occupation of land by the competent city organization .

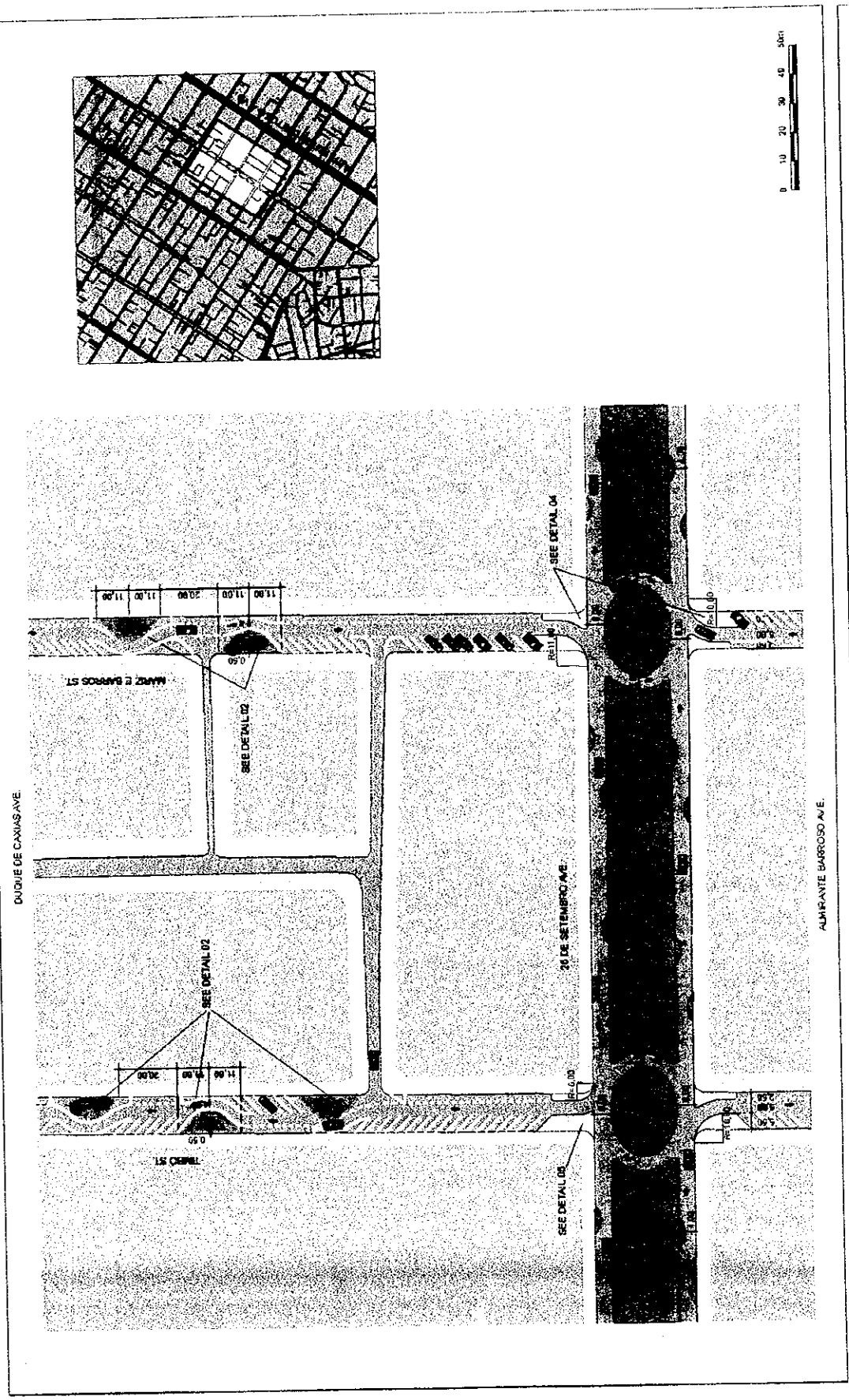

FIGURE 4.3-1 - Traffic Calming - Creation of Environmental Areas in Marco District - Detail 1

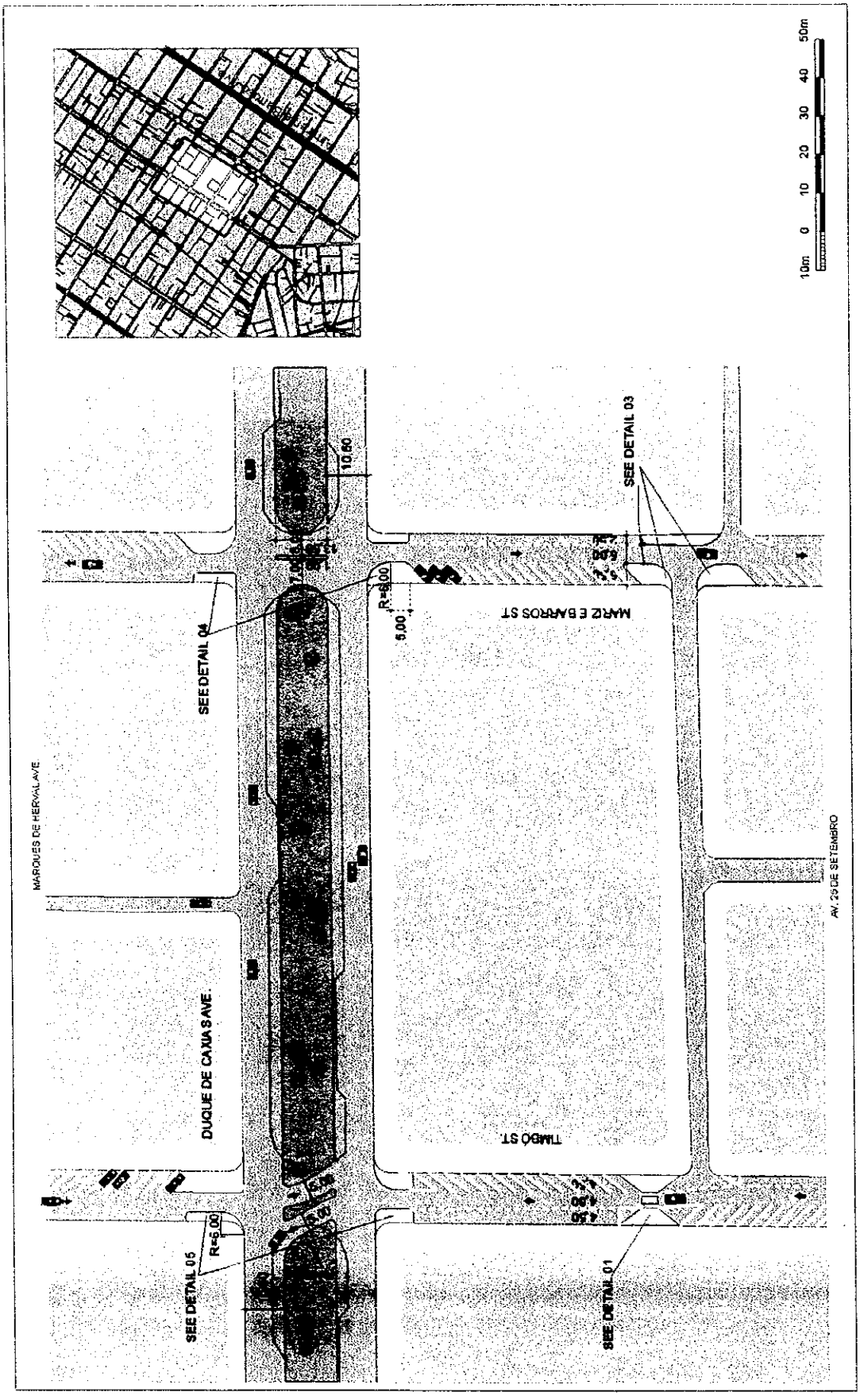

FIGURE 4.3-2 - Traffic Calming - Creation of Environmental Areas in Marco District - Detail 2

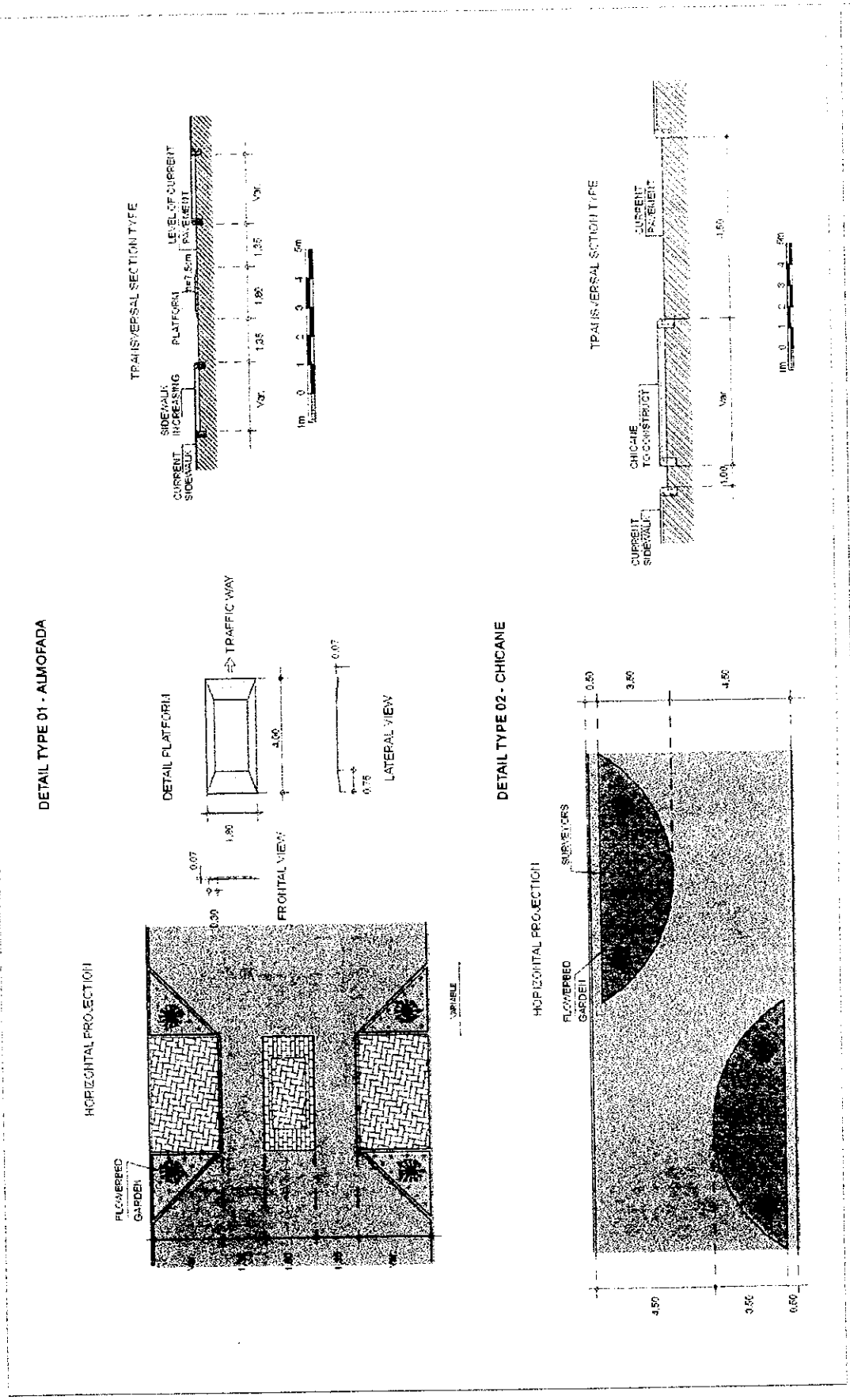

FIGURE 4.3-3 - Traffic Calming - Details Type 1 and Type 2

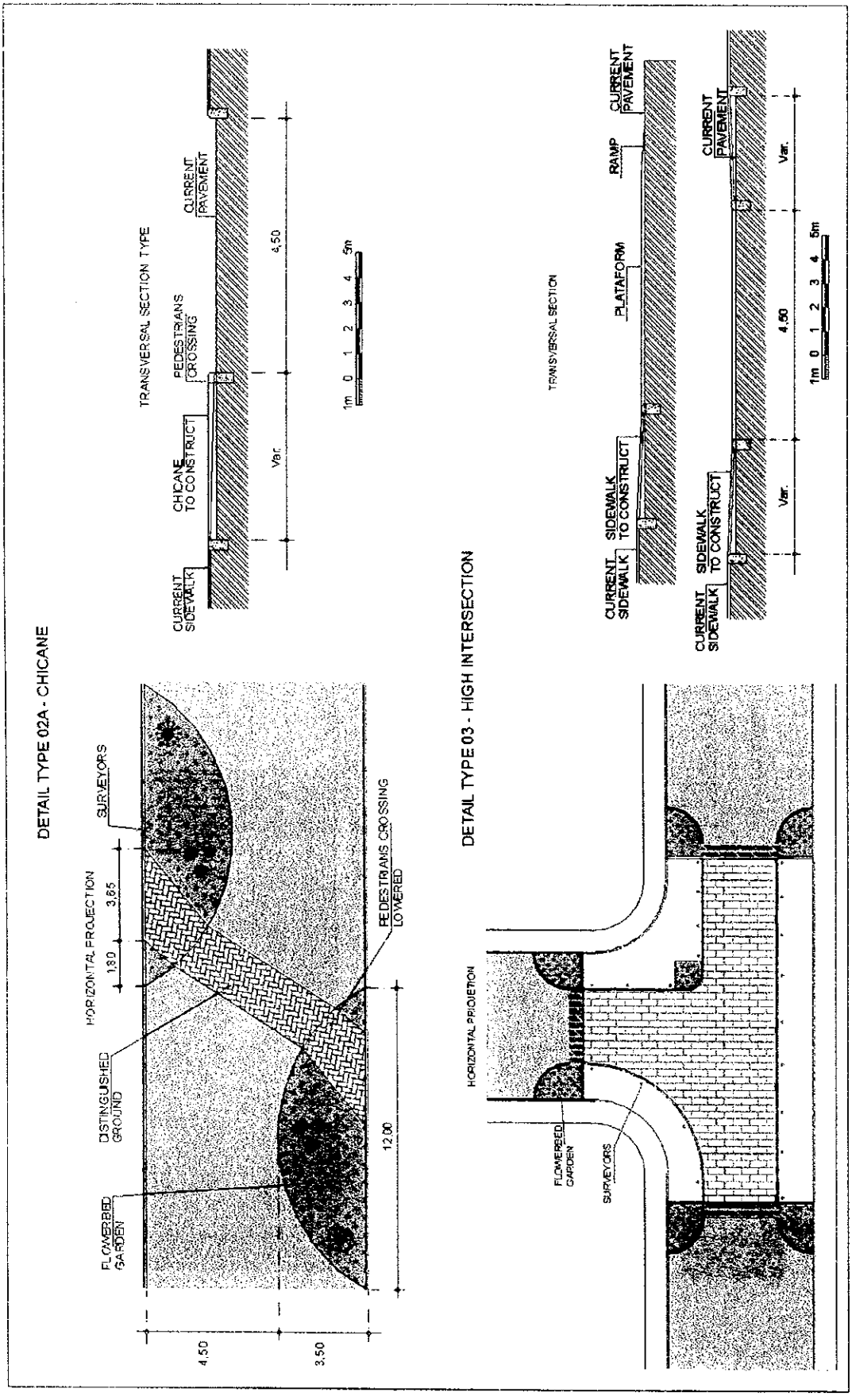

FIGURE 4.3-4 - Traffic Calming - Details Type 2A e Type 3

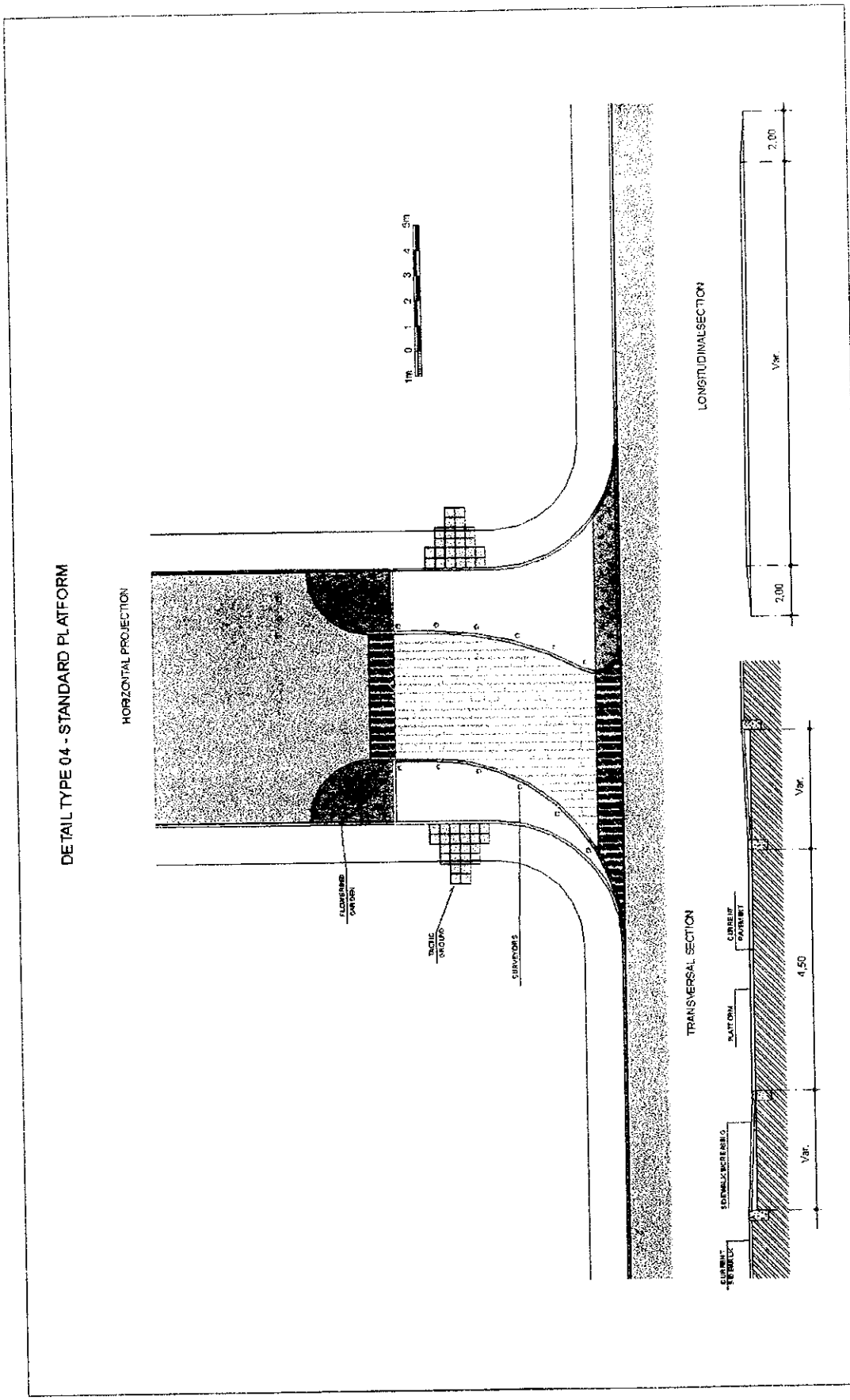

FIGURE 4.3-5 - Traffic Calming - Detail Type 4

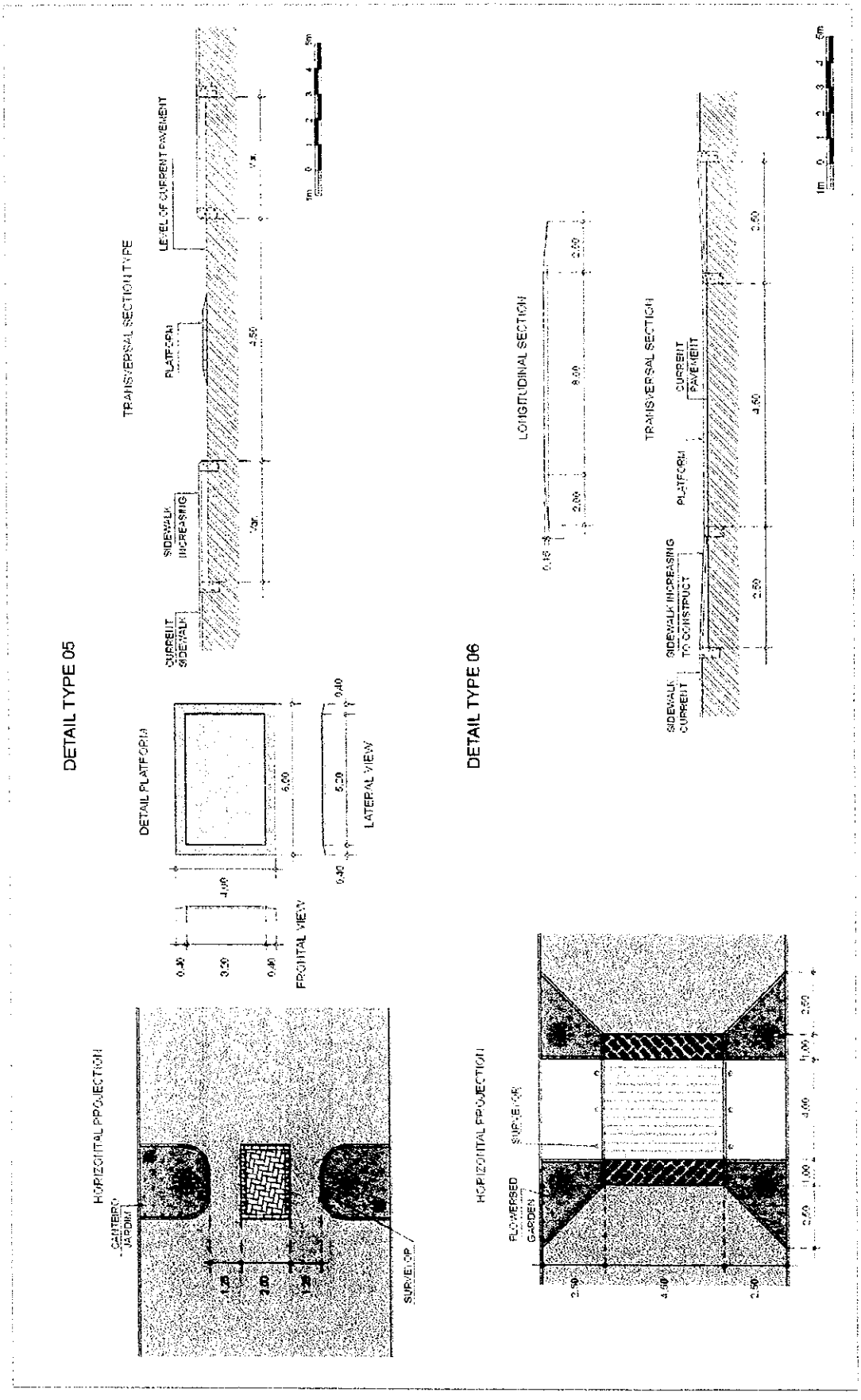

FIGURE 4.3-6 - Traffic Calming - Details Type 5 and Type 6

4.3.2. MANAGEMENT OF ROAD PARKING

- Effects of Parking in Roads Capacity

The preponderant factor in determining the road capacity is the width for vehicles circulation; the more width of the road for vehicles circulation, the more is its outflow capacity. In that manner, when a road is chosen for parking, consequently its outflow capacity is reduced.

The influence of width reduction for circulation is not restricted only to the run lane affected, but to the other lanes since the vehicles have to keep away from the others. The parking and road capacity trouble worsen when there are many interruptions in the traffic, reflecting its effects in the traffic jams.

In urban roads of medium and high traffic, the permission for car parking causes the loss of 2.00m for each side. If this permission is for heavy vehicles, the width loss can be until 50.0% more than car parking.

- Effects of Parking in Intersections with Traffic Lights.

The influence of parking in intersections with traffic lights can be stated through the loss of useful width for capacity. It basically depends on the distance of the first parked vehicle until the stop line and of the green time of signal.

Maintaining the green time constantly concludes that, when the distance between the first car parked and the stop line increases, the width loss is almost null. On the other hand, maintaining the close distance constantly between the first car parked and the stop line, concludes that when the green time offer increases, the effect of width loss will be larger, consequently number of vehicle-circulation damaged by the parking will be larger.

- Operational Control of the Parking

An effective control of the parking does not mean that the problem of road capacity as well as the parking offers are solved. These problems will be solved through a deep study of the road use and measures in road system to balance the offer of parking area with the service level of traffic flow capacity, trying to establish the balance between the road use for circulation and for parking.

For development of the study and adoption of ways for operational control of parking, it is necessary to search the road use data as follows:

- Selection of areas that have tertiary activity concentration and present significant traffic demand;
- Classification of these areas as their characteristics of land use (commerce, banks, hospitals, cinemas, restaurants, etc.);
- Implementation of model study on utilization of available spaces along the roads to measure the occupation rate;
- Identification of the type of potential user in the area through questionnaires;
- Evaluate and establish (from these results) the necessary offer and current demand related to the number of parking space and to the average permanence time needed: 1 hour, 2 hours, 4 hours, etc.

Certainly will be detected that these spaces are insufficient and inadequately used, causing trouble to traffic and especially to the pedestrians' security. As part of solution for this problem, it will be inserted the model of parking in public roads called "rotate parking".

- Parking and Circulation in Belem

The studies done in PDTU/2001 show the fast growing of the number of vehicles as well as the employment aggregated surrounding the inner-center. This fact determines the growing demand for parking. This is a challenge for the management organization of the transit.

The most serious problems on parking in Belem were detected in Central Area, especially the Ver o Peso area in the morning, 15 de Novembro Street and Presidente Vargas Avenue during all day. In these locations, parking demand is larger than its offer, causing the road system overloaded due to the searching for parking or stops in double line; which causes damage to the traffic flow.

A big challenge to the management organization of transit is to give parking conditions for the users, at the same time assure the free circulation of vehicles, pedestrians and merchandises. In this context the equally right of the road use should be guaranteed. That could be realized by introducing the time parking system, determining the maximum parking time from monitoring average parking.

The parking rules along the road, depend fundamentally on the functional classification of the use and area where they are located. In PDTU/2001 there are two different conditions for parking that causes circulation troubles:

- Central Area - The parking problem is the same as that of other Brazilian big urban centers, characterized by the high demand, intensity of tertiary uses, inadequate and insufficient road network for off-street parking.
  The permission of parking on roads in central area causes constant traffic jam, due to high search time for parking places. It is recommended the prohibition of road parking.
- Residential Areas - Usually there is no problem in residential areas parking, however, in the older streets located near the central area where the houses do not have garage, they use the off-street parking. This custom causes trouble to circulation, especially in narrow streets that blocks the vehicle passage. In these areas usually there are old community building that also do not have garage. In these cases, circulation problems is aggravated, and the management organization prohibits the road parking.

To assure free circulation of person and merchandise at the same time in Central Area, parking conditions for the users who pass by should be offered.

The solution of these problems is not always feasible, due to the small dimensions of most of the Central Area roads and its surrounding, as well as the lack of garage and off-street parking. The decision of allowing or not the parking is related to the intended service level planned to the roads.

Currently, in Belem, there is no effective control of parking in the Central Area and its surrounding and still there is a repressed demand of parking necessity.

The vision and the solutions of the parking problem in these areas should consider the general aspect of the circulation policy for transport, and land use in city. Aiming to balance the situations with the analysis of several involved factors together with the intended road system capacity, creating then, an effective Operational Control of the Parking.

4.3.3. CENTRALIZED CONTROL OF TRAFFIC LIGHTS

The fast growth of the number of vehicles together with the impossibility of road capacity extension has aggravated the traffic jam problems in the big cities, increasing its duration and extension, causing damage for the moving of users and characterizing as an essential factor for the loss of life quality.

Belém is not different from that situation, there is an increase of motorized index, with radial demand to the central area, which contributes to the increase of the saturation in the arterial and collector road system in 1.ª Legua and main connections of the structural corridors to the regional road system. From the view that it is not enough to regulate the parking and to define the ways of road circulation (the traffic jam are more frequently), it is necessary intervene through the organized activities to get improvement of traffic flow and security levels.

The Centralized Control of Traffic Lights as CTA - Traffic Control in Area in real time, is one of the main ways to improve this flow and security. Because the traffic volume is extremely variable in Belem central area, as in hour, day or even week, the efficiency of the Control in Real Time, is superior to the Control in Fixed Time regarding the improvement of the traffic flow.

Since the 50's decade, the volume increase and complexity of the aggravating factors of the traffic conditions in urban areas are inducing the developed countries to accept the Control Traffic in Area - CTA. The latest generation of this system is so sophisticated that it enables a real time control, in other words, a control of traffic flow adjusting duration of green time of traffic lights. The maximum capacity of the structural, arterial and collecting roads, and a reduction in the trip time could be obtained (TABLE 4.3-1).

TABLE 4.3-1 – Improvement of the Capacity Traffic Outflow in Cities with CTA Installation

City	Improvement in outflow capacity (%)	Source
Glasgow	11	TRL
Coventry	29	TRL
Worcester	10	TRL
Southampton	15	TRL
Pequim	20	Search Inst. Traff. of Pequim
Toronto	22	Prefecture of Toronto
Average	18	

São Paulo was the first city in Brazil to implement a traffic control system. The first was, one in fix time only in one area, in 1978, and recently bought a modern system, in real time, with detection of vehicle counters in all accesses.

Later in the beginning of 80's decade, Curitiba City bought a centralized control, in fix time, without detectors, that are the concerns of any effective management in improvement of flow levels.

In 90's decade, the Rio de Janeiro-RJ, Juiz de Fora-MG and Uberlândia-MG cities, introducted its traffic control systems, with detectors operating in dynamic selection of plans. In the present it is in progress the installation of CTAs in Belo Horizonte-MG and Fortaleza-CE cities.

Some cities introduced centralized controls of simplified technology without possibility of evolution, but centralizing only the program equipment, which are not the installed systems in São Paulo, Rio de Janeiro, Juiz de Fora and Uberlandia cities and having its impossibility of "upgrade" as main disadvantage. The cost of this system type is around 60.0% of a CTA operating with detectors that select and calculate the traffic plans in real time. The difference is smaller if compared to the benefits from this type of CTA.

The PDTU showed the necessity of modernizing the current traffic control, aiming to minimize the traffic jams and to increase the operational speed of all system, with positive aspects not only for the public transport system but also for the general traffic.

Following this philosophy, the system proposed to Belem is of latest generation, using detectors operating in the choice of green times of signal, adapting the green time offer to the vehicles real demand at the moment. It is harmonious with importance of the city and estimated average improvement of 15.0% in outflow capacity (TABLE 4.3-2).

TABLE 4.3-2 – Parameters of Traffic Lights in Brazilian Cities

City	Population Nearl.(inh.)	Number of vehicles	Number of Traffic Lights	Traffic Lights per 100.000 inh.	Traffic Lights Per 10.000 vehic.
Sao Paulo	10,000,000	4,400,000	3,850	38.5	8.8
Salvador	2,400,00	380,000	320	13.3	8.4
Belo Horizonte	2,000,000	700,000	342	17.1	4.9
Natal	700,000	120,000	99	14.1	8.3
Belem	1,800,000	157,000	225	12.5	14.3

Source: Management Organization of County Transit

The traffic management in real time in CTA form proposed to Belem should attend as follows:

- Traffic Lights Control System only in one central control;

- Transit management through video camera;
- Operation of a panel set of variable massages;
- Transit information in all cover area;
- Vehicle detectors strategically located;
- Information processed by computers;
- Calculation of the best traffic light times;
- Traffic light control of latest generation.

In the following text it is not considered control systems in real time, based on vehicle performance, where the green times of signal are determined from the number of "extensions" by the vehicle detectors. It is not considered control systems in real time that use ideal combination of vehicle performance with dynamic selection of plans or vehicle performance system with difference between intersections, even if these differences would be calculated by computer in control center.

4.3.3.1. Description of the Minimum Functions of CTA

The transit dynamic and its variations indicate a modern control system that has big flexibility as essential factor for the transit management.

Under the technical-economic aspect, the centralization project should:

- Supply facilities of supervision and management;
- Minimize the operation and maintenance costs;
- Keep its operation at highest level possible;
- Enable adaptations of several strategies control;
- Contemplate equipment that operates with large number of plans on autonomic operation or local mode;
- Proceed permanent counting of the flow in main roads for actualization of the traffic plan.

Related to traffic, the objective of the centralized control is to organize the vehicle and pedestrians outflow. It should has a managing capacity of :

- conflicts;
- outflow capacity;
- saturation degree of access;
- priorities of implementation plans;
- demand.

Considering these aspects, the centralized system proposed for Belem, is a "on-line" system, in real time, with traffic lights times variant according to the vehicles demand, based on algorithms calculations through the installed detectors data in all the network intersections.

4.3.3.2. General Specification of the System

Specification of the minimum functions of the CTA System to be introduced in Belem City as follows:

- The software of the Control Central should have an operational system multi-user and multi-task preemptive, including the facilities of opening the minimum two virtual terminals, that make possible the same time execution of useful functions together with the normal operation of the System;
- To have graphic software to visualize the flow level of intersections, corridors, under lands and all the controlled area (FIGURE 4.3-7);
- To allow to obtain the data from the detectors and statistics treatment of the traffic volume and to visualize the conduct and to performance of the flow in centralized area;
- To monitor the vehicle control and detectors, to force the plan to enter and change program of any controller network in real time;
- To detect and register all the faults done in the detectors work, controllers, "fronts" and network of data communication in magnetic media;
- To proceed automatic start of "alert" in case of irregular work of controllers, "servers equipment" and detectors;
- To proceed the automatic set of controller clock with the Central of Control in time intervals of maximum 5 min (five minutes);

- To provide managerial and operational reports referring to the program and occurs;
- To provide statistics reports and graphics (printed and in video) of any type of fail;
- To provide the security to the non authorized accesses;
- To manage the security parameters and operation of the traffic lights program;

- To incorporate the programming idea with interaction between sub-lands independent of the physical network (logic sub-area);
- To allow security and integration of the data used by the System;
- To execute the automatic "reset" of controllers, when gets yellow intermittent by problems related to energy fault;
- To allow alteration and exclusion of parameters of traffic light programming kept in magnetic way or CVD by digital signal;
- To process data of traffic counting detectors and elaborate statistics reports of the vehicles volume;
- To work in real time, that means, alter the green times of signal, synchronizing with vehicles volume that are passing by the detectors, in each cycle.

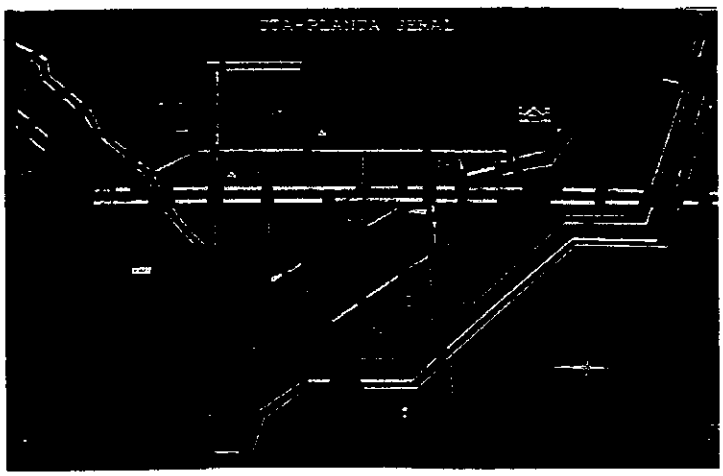

FIGURE 4.3-7 – CTA – Example of Utilized Graphic Software

4.3.3.3. Main Conditions for the Implantation of CTA

The basic premises to reduce the introduction costs of a Traffic Control of CTA, without losing the transit management quality, are:

- The use of network of the Local Telephone Company for data communication. This type of transmission had its operation approved with efficiency in several Brazilian cities.

  Due to the above item, the necessary civil work is only to interconnect from the controller passage box to the point next to the telephone network, for each intersection. The controller should be located always next to the telephone point to minimize civil work execution. The cables interconnection and maintenance should be the telephone company's responsibility, the line supplier.

- The use of only a inductive lace (detector) per access, in the intersection to be centralized: instead of traditional use of a strip, reducing to 1/3 of the quantity of laces necessary in System.

  Exhaustive studies were made in the systems already introduced to verify the reliance of the steps adopted. The result was satisfactory, because the lower index found comparing to the real volume that passes in the road was of 93 %, after the laces were calibrated and deliberated. This percentage is acceptable to the type of use given to the lace.

4.3.3.4. Implementation Stages of CTA

- Previous study of transit situation;
- Elaboration of centralization project;
- Elaboration of classified counting surveys of the vehicles in movement, to define which intersections should be centralized; the measurement of functional characteristics and the elaboration of traffic plan, through the Transit Program; the saturation flow surveys that also serves to measure the traffic plans and the Velocity/Deceleration to evaluate the traffic conditions and to enable the analysis after CTA installation;
- Elaboration of Edict of the CTA contract with all technical specifications, and accompanying of bidding process;
- Elaboration of traffic plans;
- Elaboration of data bases;
- Implementation of plans;
- Supervision and accompanying of CTA installation.

4.3.3.5. Advantage of CTA implementation

The advantage of a CTA implementation, in synthesis:

- Is a tool extremely useful in transit management, obtained from the road system, its maximum in outflow capacity of the vehicle flow;
- Permit the verification in real time, the level of road flow through the detectors laces;
- Permit the complete vision of all equipment in traffic control, and the immediate detection of technical problems and making possible quickly and efficient interventions of the maintenance groups;
- Permit visualization of sub-areas and intersections with current data of volume, occupation rate and several statistic graphics offered by the System, through collected data by detectors, that offer systematically, volume information that actualize constantly the data base;
- The Central permit the operator direct intervention in the operational problems of fluidity preventing the extension of probable traffic jam;
- Is a project with great advantage, because of the high benefit/cost relation, since its cost is lower comparing with the other projects in transit control area;
- Give subsidies for the elaboration of several traffic projects, involving circulation changes, land use, redefinition of cargo and delivery areas use, etc. offering its acceptability by community through the technical basement of the CTA data;
- Offer increase in operational speed in centralized corridors and increase in number of trips with same number of public vehicles;
- Give permanent volume and occupation rates data in all detector laces. These data are treated to several forms, allowing observance of the traffic jam curve comparing to the volume in all accesses, and to follow the plans of automatic selection in all sub-areas. The permanent volume evaluation allows the constant traffic plans actualization to adequate the demand to the green offer. As a consequence, it is observed an increase in capacity of intersection flow and a reduction in trips time;
- The taken actions related to the lane next to the curb, parking, cargo and delivery prohibition; become easier to be implanted and accepted by users, because of CTA credibility, through visualization of traffic jam at the locations where the action is being installed.

4.3.3.6. Composition of CTA System

a) Central of Control

Besides the central physical installation with specific equipment, the Centralized Control should process through two computers sets and its tools, in a way that one operate the centralization and the other has a function of "standby", besides to be used for calculations of plan and others necessities that demand the traffic operation.

The computers and its tools should be specified to have a high speed of processing and transmission, compatible with the volume of data proposed for the System, and the central should have data projection in video, also being equipped an autonomy energy system to give more security in it operation.

b) Concentrator of Data

The data concentrator should be an intermediate system level and should have the function of manager the data transmission between the central and the traffic controllers, representing the link of local controllers and the data central.

Basically, almost all the programmable functions of the control center are also implemented in the service equipment that constitutes in second hierarchical level of the System. In case of problems of communication with central, the service equipment continues with function of coordinating and maintaining the synchronism and the program of all the equipment linked.

c) Local Controller

The controller operates the intersection commanding the traffic light phases. It should be a resistant and flexible equipment against any electrical interference with capacity to receive reliabl detector data. When it is operated in local mode, it has a larger number of plans in its memory.

The controller should present the following characteristics for the program:

- Eight phases being anyone programmed as vehicle or pedestrian phase;
- Eight minimum stages, in hypothesis of controller operate as the strategy of stages or twenty-four intervals, with the controller operating the strategy of light intervals.
- The time of each stage could vary, at least, between one and ninety-one seconds.
- The program order of stages and/or phases should be flexible, and can vary the each plan.
- The number of stages should be variable and have a specific sequence for each plan.
- The same phase can present two green periods with different times between them, occurring inside the same cycle.
- Make possible the programming of any phase as dependent of pedestrians and/or vehicles demand.
- In case of operation in activate mode, the controller should allow "jump" of phases that does not present demand.
- Keep, minimum, thirty traffic plans, in autonomic mode.
- Allow the plan of programming in intermittent mode.
- The controller should present the table of plan change, which can be specified, in minimum, 100 (hundred) week change. Each plan should be activated from a schedule and parameter that specified for which weekdays this activation will be valid.
- The local controller should have a password level for local and remote programming.
- The detector should be partly integrated with controller.

d) Implantation of System of TV Close - Circuit– CFTV

The CFTV will be responsible for the visual traffic monitoring in CTA area, through video camera installed in selected locations, its color images will be visualized in Control Center monitors, in real time (FIGURE 4.3-8).

The main CFTV characteristics should be:

1) The central command with keyboard type "joystic" should execute the following basic commands:

- Turn on and off each video camera;
- Select manually any video camera in one selected monitor;
- Request that the video camera group images be presented in a selected monitor, one after other, in an automatic process of sweeping cyclic;
- Locate a video camera, moving horizontally and vertically;

FIGURE 4.3-8 - CTA – Control Center

- Adjust the zoom of a video camera;
- Turn on and off the windscreen wiper and the water jet of a video camera, or equivalent mechanism, that does the window cleaner on the lens;
- Eliminate or introduce the identification message of the video camera in monitor;
- Operate the research that makes possible to show images of distinct video cameras in the same monitor.

2) The control and management unit of the system should have at least of the following functions:
- Program the attribution table between video cameras and monitors, making possible that all the video cameras be associated to the same monitor, if wished.
- Program the sequence in which that will be extended the video cameras, in process of automatic sweeping, and the time of image presentation.
- Determine the basic position and the focal basic distance for each video camera, that will retake automatically after manual operation.
- Associate, for each video camera, message of alphanumeric identification. This identification should have at least three lines with twenty characters each and will appear in monitor that shows the image.
- Associate to one monitor, four images of distinct video cameras, in a way that these images are shown at the same time in the same monitor.

3) Referring to the transmission of signs, the data communication should be in individual fiber optical for each camera.

4) Referring to the video cameras, they should have the follow functions:
- The video camera should have sensor of image in solid state type of CCD 1/2", with "zoom" lens of 8 to 120mm.
- The video camera should present minimum pattern of 525 lines and 60 characters per second, in colors and image presentation in real time.
- The video camera sensibility should be compatible with night operation, presenting images with quality and adequate solution.
- The video camera should present automatic compensation for image taken against bottom light, with auto-iris lens and automatic focus adjusts.
- The video camera should move around in movement of horizontal rotation ("PAN") from angle at least 340 degrees, and in movement of vertical rotation ("TILT") from a minimum similar to 90 degrees.
- The video cameras should be installed in the top of poles.
- Should use concrete pole, with at last 8m high (between the base of the protection box to the ground).

e) Data Communication of CTA Central with controllers

The data communication system of local network of telecommunication should be used because it is more efficient and practical, involving minimum of public work.

The data communication of all system will use "non specialized circuits" that should be rented by the management organization of Belem Transit at the concessionaire of local telephone.

The necessary public work are the interconnection of passage box from the network that support the traffic lights, to the next telephone network point indicated by concessionaire for each intersection. The controller is always located next to the telephone point, to do the minimum public work. In this way, the work extension is very small, because usually all the interconnection points are located closed to each other, in same sidewalk.

The cables interconnection and maintenance is the responsibility of concessionaire, that gives the line. The service equipment should be installed in telephone network of, concessionaire to make easier the maintenance and access.

4.4. GENERAL RECOMENDATIONS

It is important also emphasize some general recommendations, necessary to the plan implementation. These recommendations were found along the project elaboration, through the surveys and its result analysis, such as the open seminars to the general community.

4.4.1. MANAGEMENT OF METROPOLITAN TRANSPORT SYSTEM

In Belem Metropolitan Area there are public transport systems for municipalities that have its itineraries covering only on municipality, and itineraries for metropolitan cover the lines passing for more than one municipality. The current management model of these systems has been extremely inefficienct, and it is accumulating operational, tariff and institutional problems, that reflect the bad quality of the services done to population.

The PDTU/2001 guidelines for the Public Transport System of RMB, requires the definition at short term, of a management model for this system. This model should contemplate the participation of the State and the five metropolitan municipalities to define which organization will have the responsibilities to implement and manage the metropolitan transport system, since there are the following institutional, financial and operational issues involved in this question:

- According to Federal Constitution, Chapter III, of Federal States, Art. 25, § 3° "The States could, according to complementary law, create metropolitan regions, urban concentrations and micro regions by grouping of borderline municipalities to integrate the organizations, public planning and execution functions of common interest" including public transport;
- The estimated value for the execution of road and transport projects indicated in PDTU-2001, requires the State participation in the loan contracts that make possible its implementation;
- The creation and consolidation of an integrated transport system, where there are trunk lines predominantly in metropolitans, connected to feeder lines predominantly in municipalities, requires the common understanding among the several related administration in terms of the solution of tariff, operational and institutional matters concerning to metropolitan transport systems with big complexity.

The State of Para Government in accomplishment of its constitutional attributions, elaborated proposal of a law that establishes the Management System of Belem Metropolitan Area, creating management mechanism of the metropolitan interest such as transport, environment, water supply, etc. This project can constitutes the first management instrument and should indicate the ways for the sector actions where the public transport is included.

4.4.2. URBAN LAND USE

Among municipalities in the Metropolitan Area municipalities, only the Belem has the up dated urban legislation as the Master Plan and the Complementary Law of Urban Control. These instruments were evaluated and considered in the Master Plan elaboration of PDTU-2001. It is very important to follow urban processes for the projects implementation indicated in PDTU, including creation of integration terminals, construction of new roads, and the *traffic calming* installation, in a way to maximize its positive effects to the organizations of the municipal territory.

The other metropolitan municipalities that do not have the Master Plan nor legislation of urban control, should begin urgently the elaboration, considering the Master Plan of the metropolitan transport system defined in PDTU, and complementing in its municipalities, Master Plan that covers the territorial coordination and the urban control of use and occupation of the land.

4.4.3 SECURITY

Another important aspect pointed frequently in the Seminar and in the user opinion survey, is about the problems of lack of security in the public transport system, since these problems affect directly the system performance; PDTU recommend some mitigate measure to these problems:

The magnetic card use in the public transport system and consequent reduction of coin circulation will minimize the bus robbery which has been happening in other Brazilian cities.

In the bikeroad system, the implementation of a structural network for bikes with more intense flow of bikes and lighting facilities will improve the security conditions for users.

4.4.4. NEXT STAGES

The State of Para Government has already sent to JICA with approval of the Brazilian Cooperation Agency - ABC, and requested for implementation of the Feasibility Study on proposed projects in this plan, with technical cooperation. This study is important for the finance from the international agencies. Basic projects of the main recommendation in the plan are expected to be studied farther including detailed cost estimation.

PDTU/2001, however, indicates some possible guideline of implementation independently of the realization of the Feasibility Study such as: traffic moderate measures, "traffic calming"; preservation of dominion area of the road projects indicated, and the restrictive measures to central area parking.

It is also emphasized that actions for operation of public transport system and traffic should have the same concept as this Master Plan in order to avoid aggravation of the detected problem.

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ANNEXES

ANNEX A

Origin and Destination Matrix by Macro Zone

Matrix (Person / Peak Hour) – All Modes / All Proposes - 2000

O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	26145	5634	4184	5783	975	642	165	227	358	151	674	727	111	639	50	0	0	104	268	80	46897
2	18374	26991	2484	9513	897	172	380	371	179	19	40	151	0	277	0	58	0	93	57	86	60142
3	15117	1917	25339	7500	2849	675	193	208	620	355	690	275	0	351	0	86	0	0	0	0	56175
4	10928	3017	4342	15484	2028	198	284	493	428	157	925	590	106	948	0	57	0	108	58	176	40326
5	6054	720	3712	3421	18006	1518	114	963	2047	110	1203	820	366	784	0	222	0	0	139	327	40506
6	2373	81	3340	1116	1338	8379	0	54	533	103	187	0	0	0	0	0	0	0	0	0	17484
7	0	527	0	227	145	0	0	0	0	107	111	289	0	0	0	0	0	111	0	0	1517
8	2607	59	315	1359	3792	197	304	14666	569	0	671	1796	364	454	0	0	0	0	0	0	27153
9	3352	430	1201	1919	5017	754	0	1427	18818	634	1692	543	188	52	0	60	0	0	0	0	36087
10	1209	19	184	633	282	671	0	0	181	3044	299	0	0	0	0	0	0	0	0	0	6502
11	1240	90	348	435	1037	179	0	296	1859	743	20394	108	46	170	0	554	0	0	0	144	27643
12	5159	1097	889	4093	3200	246	60	1569	879	0	749	33677	591	1015	0	0	0	0	55	0	53079
13	1204	205	252	1466	1283	125	0	854	0	0	294	902	8521	953	0	0	0	0	70	0	16129
14	1498	230	192	1327	923	0	0	823	0	0	102	1263	776	16722	273	66	0	0	558	93	24846
15	0	0	0	117	65	0	0	0	0	0	0	0	0	0	230	0	0	0	0	0	412
16	257	0	0	298	150	0	0	0	0	0	424	0	0	0	0	3164	0	0	0	0	4293
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	109	0	0	247	122	0	0	61	0	0	0	0	0	0	0	0	0	3528	0	0	4067
19	442	50	96	494	590	0	0	211	42	0	0	84	142	1309	0	0	0	0	9704	150	13314
20	659	223	182	41	0	0	0	0	0	0	0	0	0	73	0	0	0	0	0	245	1423
TOTAL	96727	41290	46840	55473	42699	13756	1500	22023	26513	6423	28435	41226	11211	23725	553	4267	0	3944	10909	1281	477794

Matrix (Person / Peak Hour) – All Modes / "To Home" Propose - 2000

O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	5963	2111	1828	2341	381	277	69	98	150	63	269	308	46	272	21	0	0	0	97	25	14319
2	6804	3207	982	3068	361	53	93	157	74	8	17	66	0	116	0	24	0	42	24	38	15134
3	5622	747	4442	2634	924	290	83	87	264	151	298	116	0	133	0	38	0	0	0	0	15629
4	4289	1164	1549	2954	725	85	119	211	162	66	398	250	44	414	0	24	0	45	24	24	12519
5	2483	305	1327	1353	3092	506	33	341	556	46	505	341	158	294	0	78	0	0	29	142	11589
6	986	36	690	470	479	1292	0	22	97	22	72	0	0	0	0	0	0	0	0	0	4166
7	0	72	0	97	65	0	0	0	0	48	48	124	0	0	0	0	0	0	46	0	498
8	1053	26	132	577	1382	56	130	1777	215	0	282	643	53	114	0	0	0	0	0	0	6420
9	1365	161	507	810	2118	315	0	445	2422	211	625	298	79	22	0	25	0	0	0	0	9403
10	460	8	69	239	118	284	0	0	0	645	103	0	0	0	0	0	0	0	0	0	1926
11	501	38	148	183	415	80	0	123	255	216	3339	45	20	76	0	151	0	0	0	62	5652
12	2103	418	290	1688	1351	103	25	510	258	0	244	4895	231	332	0	0	0	0	0	0	12448
13	476	29	105	816	514	56	0	213	0	0	127	209	1483	190	0	0	0	0	29	0	4047
14	630	101	80	557	390	0	0	161	0	0	46	283	250	1953	0	27	0	0	260	42	4800
15	0	0	0	26	27	0	0	0	0	0	0	0	0	0	82	0	0	0	0	0	135
16	108	0	0	124	63	0	0	0	0	0	108	0	0	0	0	159	0	0	0	0	562
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	22	0	0	104	51	0	0	26	0	0	0	0	0	0	0	0	0	618	0	0	821
19	185	21	40	207	246	0	0	89	0	0	0	0	21	214	0	0	0	0	1270	67	2360
20	290	95	77	18	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	103	614
TOTAL	33320	8639	12266	18066	12682	3397	552	4280	4453	1478	6469	7578	2385	4161	103	526	0	751	1733	503	123242

Matrix (Person / Peak Hour) – All Modes / "Work" Propose - 2000

O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	6095	1502	1040	1565	256	166	33	52	72	33	203	156	22	140	10	0	0	0	94	12	11451
2	4510	8237	651	1968	243	85	150	81	37	5	11	37	0	56	0	12	0	25	11	23	14142
3	3307	474	5046	1743	673	119	44	41	139	80	164	54	0	122	0	23	0	0	0	0	12029
4	2502	543	788	3400	576	45	57	112	129	38	192	125	21	233	0	11	0	22	12	11	8817
5	1388	151	867	838	3231	405	61	267	375	22	247	165	87	206	0	72	0	0	84	79	8575
6	550	22	716	236	239	1148	0	11	155	11	41	0	0	0	0	0	0	0	0	0	3129
7	0	242	0	49	39	0	0	0	0	29	22	64	0	0	0	0	0	22	0	0	467
8	535	16	63	295	830	90	69	2779	109	0	141	276	144	237	0	0	0	0	0	0	5584
9	725	80	249	399	1100	153	0	436	2845	170	476	92	38	10	0	12	0	0	0	0	6785
10	230	5	37	176	58	143	0	0	60	595	115	0	0	0	0	0	0	0	0	0	1419
11	295	21	80	87	206	48	0	59	347	248	4364	22	10	46	0	236	0	0	0	35	6106
12	1147	210	142	889	668	49	12	431	220	0	180	5941	198	276	0	0	0	0	55	0	10418
13	305	149	50	300	335	34	0	358	0	0	67	281	1629	207	0	0	0	0	14	0	3729
14	311	57	39	267	194	0	0	279	0	0	27	261	267	4383	0	13	0	0	103	25	6226
15	0	0	0	68	13	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	93
16	51	0	0	59	30	0	0	0	0	0	120	0	0	0	0	1191	0	0	0	0	1451
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	11	0	0	48	25	0	0	12	0	0	0	0	0	0	0	0	0	1160	0	0	1256
19	88	10	19	100	119	0	0	42	0	0	0	0	102	292	0	0	0	0	3428	41	4241
20	168	50	40	11	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	49	333
TOTAL	22218	9789	9857	12498	8837	2485	426	4960	4488	1231	6370	7474	2518	6223	22	1570	0	1229	3801	275	106251

Matrix (Person / Peak Hour) – All Modes / "Study" Propose - 2000

O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	8699	698	409	653	88	62	20	23	43	16	57	82	13	69	6	0	0	0	22	7	10967
2	2821	11221	262	2049	88	8	80	41	21	1	3	14	0	34	0	7	0	7	7	6	16670
3	2721	249	10754	1161	481	120	19	24	65	37	65	32	0	26	0	6	0	0	0	0	15760
4	1701	486	1018	5857	271	20	34	50	41	14	106	66	13	84	0	7	0	13	7	7	9795
5	611	82	685	386	8055	297	5	69	688	13	138	97	34	80	0	22	0	0	8	29	11319
6	255	6	811	127	325	3731	0	6	123	56	14	0	0	0	0	0	0	0	0	0	5454
7	0	170	0	26	10	0	0	0	0	8	13	29	0	0	0	0	0	13	0	0	268
8	333	4	38	146	481	16	31	7767	54	0	75	402	134	32	0	0	0	0	0	0	9605
9	426	94	140	224	798	90	0	250	10187	93	256	48	23	6	0	7	0	0	0	0	12642
10	242	1	17	70	33	75	0	0	121	1085	24	0	0	0	0	0	0	0	0	0	1668
11	142	9	37	53	167	13	0	35	828	149	8770	13	5	12	0	87	0	0	0	13	10334
12	628	220	79	475	364	30	7	309	167	0	64	16675	44	155	0	0	0	0	0	0	19217
13	129	8	29	167	128	9	0	105	0	0	31	226	3512	307	0	0	0	0	8	0	4659
14	175	20	23	161	106	0	0	52	0	0	7	421	118	5770	273	8	0	0	62	7	7203
15	0	0	0	7	8	0	0	0	0	0	0	0	0	0	120	0	0	0	0	0	135
16	31	0	0	36	16	0	0	0	0	0	31	0	0	0	0	1204	0	0	0	0	1320
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	62	0	0	28	15	9	0	7	0	0	0	0	0	0	0	0	0	977	0	0	1089
19	53	6	12	59	71	0	0	25	0	0	0	84	6	377	0	0	0	0	3847	11	4551
20	54	23	20	3	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	29	138
TOTAL	19083	13297	14534	11689	11507	4471	196	8773	12338	1472	9654	18189	3903	6961	399	1348	0	1010	3961	109	142694

Matrix (Person / Peak Hour) – All Modes / "Others" Propose – 2000

O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	5384	1328	908	1230	253	139	42	55	94	38	144	182	29	157	13	0	0	104	54	16	10170
2	4237	6330	586	2426	208	26	58	92	47	4	8	35	0	72	0	15	0	20	15	18	14199
3	3465	439	5097	1958	766	145	46	53	152	88	160	70	0	68	0	18	0	0	0	0	12523
4	2481	826	986	3272	454	47	74	119	94	35	237	148	27	217	0	15	0	28	15	134	9188
5	1567	182	801	845	3626	309	15	264	428	29	309	216	85	180	0	48	0	0	18	76	8998
6	580	17	1123	285	293	2110	98	14	157	14	38	0	0	0	0	0	0	0	0	0	4729
7	0	41	0	57	31	0	0	0	0	23	29	71	0	0	0	0	0	29	0	0	281
8	663	12	62	338	1118	35	74	2355	189	0	170	475	33	71	0	0	0	0	0	0	5635
9	832	96	307	492	1235	198	0	299	3130	160	336	107	50	14	0	16	0	0	0	0	7270
10	277	4	40	148	73	626	0	0	0	280	57	0	0	0	0	0	0	0	0	0	1485
11	306	21	83	112	247	38	0	77	427	129	3921	28	12	36	0	81	0	0	0	33	5551
12	1273	248	178	1035	814	63	15	318	233	0	261	6184	117	254	0	0	0	0	0	0	10973
13	291	18	66	375	302	26	0	175	0	0	72	186	1894	246	0	0	0	0	18	0	3689
14	383	52	49	343	233	0	0	111	0	0	22	299	141	4617	0	17	0	0	133	20	6420
15	0	0	0	16	17	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	49
16	67	0	0	77	39	0	0	0	0	0	165	0	0	0	0	609	0	0	0	0	957
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	14	0	0	64	32	0	0	16	0	0	0	0	0	0	0	0	0	774	0	0	900
19	115	13	26	128	154	0	0	55	42	0	0	0	13	426	0	0	0	0	1161	32	2164
20	144	55	46	9	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	83	335
TOTAL	22079	9682	10377	13210	9895	3760	422	4003	4993	778	5929	7981	2401	6377	29	819	0	955	1414	392	105496

Matrix (Vehicles / Peak Hour) – "Car" Mode / All Proposes - 2000

O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	2224	1292	1112	171	1661	26	0	44	0	15	189	59	0	81	0	0	0	0	45	0	6901
2	1598	400	168	131	386	57	0	42	0	9	19	44	0	0	0	0	0	44	0	41	2938
3	1303	155	781	170	695	33	39	0	94	60	177	0	0	94	0	41	0	0	0	0	3642
4	1730	90	402	292	1216	42	0	90	50	50	40	47	0	293	0	0	0	0	0	0	4341
5	716	53	185	887	359	47	35	68	118	0	48	0	97	29	0	0	0	0	0	94	2734
6	229	38	102	54	69	221	0	0	0	0	53	0	0	0	0	0	0	0	0	0	768
7	0	28	0	69	24	0	0	0	0	51	0	48	0	0	0	0	0	0	0	0	220
8	250	28	0	151	148	0	50	171	53	0	41	0	0	0	0	0	0	0	0	0	892
9	111	28	63	300	85	0	0	178	574	100	133	41	0	0	0	0	0	0	0	0	1615
10	66	9	19	0	0	48	0	0	0	154	51	0	0	0	0	0	0	0	0	0	347
11	32	19	66	78	0	85	0	0	120	42	639	0	0	81	0	89	0	0	0	41	1290
12	239	85	26	186	78	0	0	0	59	0	47	1086	186	47	0	0	0	0	0	0	2043
13	47	0	0	140	57	59	0	93	0	0	47	0	606	48	0	0	0	0	0	0	1100
14	58	74	0	58	0	0	0	0	0	0	48	0	97	568	0	0	0	0	0	44	946
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	131	71	249
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	323
20	245	39	19	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30348
TOTAL	8847	2340	2943	2689	4798	618	124	686	1070	480	1512	1325	989	1288	0	130	0	44	176	291	30348

Matrix (Vehicles / Peak Hour) – "Car" Mode / All Proposes - 2010

O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	1594	1225	1178	1324	163	4	0	41	0	7	275	184	0	106	0	0	0	0	293	0	6394
2	1885	763	226	413	157	9	0	64	0	7	11	41	0	0	0	0	0	99	0	0	3675
3	980	171	975	735	141	8	87	0	0	53	222	0	0	26	0	0	0	0	0	0	3378
4	2066	103	364	894	208	5	0	152	84	84	110	11	0	200	0	0	0	0	0	0	4281
5	1070	86	331	678	1125	44	92	199	382	0	46	26	58	50	12	30	0	29	41	0	4299
6	599	155	323	174	38	234	0	0	0	0	58	0	0	0	0	0	0	0	0	0	1579
7	0	10	0	3	7	0	0	0	0	3	0	59	0	0	0	0	0	0	0	0	82
8	594	76	1	647	168	14	110	376	27	0	22	11	5	13	5	12	0	11	16	0	2108
9	495	103	110	144	346	31	1	607	606	204	405	83	10	35	11	28	0	27	36	0	3282
10	51	8	18	0	0	254	0	0	0	64	168	0	0	0	0	0	0	0	0	0	563
11	205	87	277	10	268	84	2	64	256	91	1010	53	22	129	26	357	0	61	82	0	3084
12	473	476	79	156	285	71	3	65	338	0	111	1737	71	122	26	63	0	62	86	0	4226
13	186	4	4	111	265	190	1	116	45	0	52	17	839	117	9	20	0	20	28	0	2024
14	132	313	2	2	83	29	1	27	58	0	193	23	75	1308	11	27	0	26	35	0	2345
15	0	0	0	0	4	8	0	6	13	0	4	4	2	6	3	7	0	6	9	0	72
16	3	6	5	3	23	49	3	44	91	0	33	36	16	50	19	42	0	40	61	0	524
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	3	7	6	3	29	52	3	48	101	0	35	41	17	56	19	47	0	47	64	0	578
19	6	6	5	4	23	38	1	35	72	1	26	31	12	336	14	35	0	33	624	0	1302
20	178	51	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	279
TOTAL	10500	3662	3929	5326	3331	1124	304	1844	2073	804	2781	2357	1127	2554	166	668	0	461	1375	0	44065

Matrix (Vehicles / Peak Hour) – "Car" Mode / All Proposes - 2020

O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	2014	1317	1484	1757	149	1	0	32	0	5	501	159	0	131	0	0	0	0	238	0	7789
2	2337	844	274	551	118	3	0	90	0	7	8	28	0	0	0	0	0	78	0	0	4334
3	1198	162	1223	1060	144	3	76	0	0	52	325	0	0	11	0	0	0	0	0	0	4254
4	2696	124	501	1247	178	1	0	212	59	71	58	9	0	211	0	0	0	0	0	0	5368
5	1809	110	483	993	1260	45	71	333	474	2	66	50	55	81	13	36	0	35	67	0	5783
6	776	165	507	263	41	264	0	0	0	0	136	0	0	0	0	0	0	0	0	0	2171
7	0	29	0	12	14	0	0	0	0	7	0	69	0	0	0	0	0	0	0	0	131
8	1006	139	7	1092	248	16	134	578	34	1	31	19	6	23	5	13	0	13	25	0	3390
9	643	184	209	253	409	42	3	831	827	209	517	96	16	63	14	36	0	36	69	0	4456
10	108	13	32	0	0	418	0	0	0	86	149	0	0	0	0	0	0	0	0	0	807
11	307	145	447	34	394	80	6	95	301	137	1455	95	29	193	24	493	0	68	123	0	4426
12	1065	775	149	378	404	63	6	104	429	5	174	2238	68	166	27	73	0	72	136	0	6352
13	424	14	13	275	490	222	2	228	65	2	91	38	1173	172	9	26	0	26	49	0	3319
14	177	463	16	16	86	38	3	47	63	2	308	47	129	2222	12	33	0	33	61	0	3778
15	5	6	5	5	7	10	1	13	22	0	13	12	3	16	4	9	0	9	16	0	155
16	24	24	22	23	36	47	3	59	102	3	56	59	17	72	14	40	0	41	76	0	721
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	21	22	20	21	36	46	3	57	99	3	55	57	17	70	15	39	0	39	74	0	693
19	20	19	17	18	32	40	3	51	86	2	50	51	15	451	13	35	0	36	846	0	1789
20	229	65	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	359
TOTAL	14659	4638	5441	8031	4049	1359	311	2731	2584	592	3992	3028	1528	3883	149	835	0	485	1780	0	60073

Matrix (Passenger / Peak Hour) – "Bus" Mode / All Proposes - 2000

D O	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	7139	1782	1594	1718	517	486	165	134	358	119	264	602	111	467	50	0	0	0	131	60	15697
2	12436	3602	1974	6083	589	0	222	283	179	0	0	58	0	277	0	58	0	0	57	0	25798
3	10499	1437	6531	4625	1714	501	111	208	421	229	317	275	0	104	0	0	0	0	0	0	26972
4	6302	2215	2542	2833	1081	110	284	303	276	51	841	491	106	328	0	57	0	108	58	57	18043
5	4223	608	2397	2420	3666	1107	0	665	1060	110	1103	820	162	642	0	188	0	0	69	128	19368
6	1841	0	1304	971	1027	1436	0	54	234	54	54	0	0	0	0	0	0	0	0	0	6975
7	0	111	0	177	0	0	0	0	0	0	111	187	0	0	0	0	0	111	0	0	697
8	1956	0	315	1046	2766	134	198	1873	393	0	585	1369	126	272	0	0	0	0	0	0	11033
9	3015	319	1088	1739	3825	754	0	660	2096	277	1058	341	188	52	0	60	0	0	0	0	15452
10	953	0	124	572	282	569	0	0	0	505	131	0	0	0	0	0	0	0	0	0	3136
11	1123	50	212	435	818	0	0	296	335	425	2521	108	46	0	0	158	0	0	0	58	6585
12	4491	807	834	3858	2804	246	60	1217	351	0	476	5077	130	685	0	0	0	0	0	0	20838
13	1036	70	252	1346	918	0	0	300	0	0	196	501	563	347	0	0	0	0	70	0	5599
14	1377	74	192	1327	801	0	0	432	0	0	0	675	379	2524	0	66	0	0	512	0	8359
15	0	0	0	61	65	0	0	0	0	0	0	0	0	0	61	0	0	0	0	0	187
16	257	0	0	298	150	0	0	0	0	0	257	0	0	0	0	382	0	0	0	0	1344
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	53	0	0	247	122	0	0	61	0	0	0	0	0	0	0	0	0	0	684	0	1167
19	442	50	98	494	590	0	0	211	0	0	0	0	50	406	0	0	0	0	1220	0	3559
20	141	141	141	0	0	0	0	0	0	0	0	0	0	73	0	0	0	0	0	245	741
TOTAL	57284	11266	19378	30250	21715	5343	1040	6697	5703	1770	7916	10504	1861	6177	111	969	0	903	2117	548	191550

Matrix (Passenger / Peak Hour) – "Bus" Mode / All Proposes - 2010

D O	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	8612	3315	355	2242	1220	811	336	149	419	82	309	809	181	1183	505	0	0	0	251	0	20779
2	11418	7217	540	2227	4759	0	443	444	513	0	129	141	107	377	60	213	0	108	229	0	28925
3	7658	2209	927	6690	2762	282	144	154	592	214	327	98	0	99	0	0	0	0	0	0	22156
4	5264	3101	458	2659	2084	94	357	248	383	91	849	252	61	189	0	259	0	83	22	0	16434
5	4733	1370	2106	2865	2321	1297	0	748	1372	214	899	879	747	1027	0	404	0	0	259	0	21241
6	1809	331	804	1820	918	2310	0	44	616	96	92	0	0	0	0	0	0	0	0	0	8840
7	0	65	0	0	43	0	0	0	0	0	36	26	0	0	0	0	0	100	0	0	270
8	2663	168	2313	383	887	222	541	2123	823	0	1961	1943	103	502	0	0	0	0	0	0	14632
9	4235	899	3428	2210	2354	734	0	946	4717	487	1855	494	436	32	0	120	0	0	0	0	22947
10	1015	0	249	246	529	783	0	0	0	779	145	0	0	0	0	0	0	0	0	0	3746
11	2310	2022	1395	380	1589	0	0	751	1325	1286	8481	314	220	0	0	418	0	0	0	0	20471
12	8762	3836	3897	1605	8117	597	115	3155	893	0	632	7044	278	1063	0	0	0	0	0	0	39994
13	2233	891	887	401	1801	0	0	571	0	0	139	687	2668	1025	0	0	0	0	49	0	11352
14	2679	1685	1401	442	2225	0	0	1178	0	0	0	2181	1025	8648	0	161	0	0	1294	0	22919
15	0	67	239	0	2	0	0	0	0	0	0	0	0	0	204	0	0	0	0	0	512
16	916	293	81	0	890	0	0	0	0	0	840	0	0	181	0	1295	0	0	0	0	4496
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	11	374	51	0	295	0	0	65	0	0	0	0	0	0	0	0	0	0	2223	0	3019
19	1417	1550	1925	557	709	0	0	391	0	0	0	0	282	1372	0	0	0	0	4628	0	12831
20	169	169	0	169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169	676
TOTAL	65904	29562	21056	24896	33485	7130	1936	10967	11633	3249	16694	14868	6108	15698	769	2870	0	2514	6732	169	276240

Matrix (Passenger / Peak Hour) – "Bus" Mode / All Proposes - 2020

O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
1	9253	3566	2797	1332	285	714	269	134	412	62	212	743	116	1222	435	0	0	0	248	0	21800
2	12017	7533	2431	4897	447	0	349	479	465	0	205	124	101	309	46	156	0	94	190	0	29843
3	8228	2334	7328	2883	727	269	117	139	490	160	227	74	0	106	0	0	0	0	0	0	23062
4	5749	3245	3018	2300	383	68	300	257	335	68	996	193	62	144	0	169	0	37	14	0	17318
5	6040	1743	3726	2877	2027	1304	0	877	1546	184	1063	868	780	1223	0	333	0	0	214	0	24805
6	2301	448	2363	1161	778	2463	0	46	582	87	67	0	0	0	0	0	0	0	0	0	10296
7	0	90	0	62	0	0	0	0	0	0	48	44	0	0	0	0	0	60	0	0	304
8	4426	246	645	1257	2739	242	677	2928	1013	0	3841	2624	101	740	0	0	0	0	0	0	21279
9	5855	1248	3243	3396	3405	829	0	1171	5033	473	2400	477	435	28	0	84	0	0	0	0	28077
10	1415	0	362	669	249	887	0	0	0	0	716	107	0	0	0	0	0	0	0	0	4405
11	3994	2915	712	3088	1893	0	0	1208	1857	1737	10818	470	322	0	0	465	0	0	0	0	29477
12	14278	6110	2704	13117	4722	771	143	4522	1040	0	774	8361	347	1427	0	0	0	0	0	0	58316
13	3620	1463	571	2776	1116	0	0	783	0	0	176	922	3342	1612	0	0	0	0	69	0	16450
14	4156	2524	808	3624	1906	0	0	1588	0	0	0	2867	1349	12934	0	154	0	0	1538	0	33446
15	0	115	0	20	266	0	0	0	0	0	0	0	0	0	212	0	0	0	0	0	615
16	1545	378	0	1561	149	0	0	0	0	0	979	0	0	248	0	1539	0	0	0	0	6399
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	27	422	0	504	80	0	0	139	0	0	0	0	0	0	0	0	0	2272	0	0	3444
19	2498	2227	1163	1279	2542	0	0	654	0	0	0	0	302	2013	0	0	0	0	5356	0	18034
20	221	221	221	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	221	884
TOTAL	85623	36828	32092	46803	23696	7547	1855	14923	12773	3487	21711	17767	7257	22006	693	2900	0	2463	7829	221	348274

ANNEX B

Operational Data of RMB Public Transport Lines

Company		Line		Bus		N.° Trip./ Day	Trip Time (min)	Kilom. Operat. (km)	Kilom. Nule (km)	Kilom. Total/ Day (km)	Headway Peak H. (min)	Frequenc. Peak H. (vehc./h)	Passang. Day
Cod.	Name	Cod.	Name	Total	Op.								
AA	Transportadora Arsenal Ltda.	318	Arsenal	26	24	225	80	22.12	0.70	4,993.80	4	15	28,910
		328	Cipriano Santos – Presidente Vargas	11	10	85	90	22.40	3.00	1,934.00	12	5	2,635
		Total		**37**	**34**	**310**		**44.52**	**3.70**	**6,927.80**			**31,545**
AB	Transbcampos Ltda.	230	Pedreira – Felipe Patroni	12	11	105	70	20.06	1.30	2,120.60	7	9	11,764
		229	Pedreira – Condor	27	24	182	100	32.70	1.30	5,982.60	4	15	28,910
		Total		**39**	**35**	**287**		**52.76**	**2.60**	**8,103.20**			**40,674**
AC	Transportes Belém Lisboa. Ltda	759	Conjunto Maguari – Cidade Velha (Almirante Barroso)	10	9	63	125	46.30	25.50	3,146.40	15	4	7,637
		753	Conjunto Maguari-Cidade Velha (Pedro Álvares Cabral)	5	5	30	115	43.90	25.50	1,444.50	25	3	5,091
		761	Satélite – Felipe Patroni	21	19	126	110	42.50	13.30	5,607.70	6	10	16,681
		783	Tenoné – Praça da Bandeira	8	7	49	115	43.74	6.09	2,185.89	15	4	6,002
		767	Satélite – Presidente Vargas	7	6	43	105	43.45	21.60	1,997.95	20	3	3,720
		755	Jardim Sideral – Praça Dom Pedro II	17	15	97	115	40.00	18.00	4,150.00	8	8	6,166
		762	Satélite – Ver-o-Peso	17	15	111	110	42.00	21.60	4,986.00	8	8	14,097
		768	Satélite – UFPA	9	8	56	100	41.00	2.05	2,312.40	6	10	6,269
		Total		**94**	**84**	**575**		**342.89**	**133.64**	**25,830.84**			**65,663**
AD	Transporte Alcindo Cacela Ltda.	417	Alcindo Cacela – José Malcher	14	13	135	80	32.73	3.03	4,457.94	6	10	11,355
		422	Alcindo Cacela – Domingos Marreiros	13	11	119	70	24.67	3.03	2,969.06	8	8	9,774
		Total		**27**	**24**	**254**		**57.4**	**6.06**	**7,427.00**			**21,129**
AE	Transurb Ltda.	321	UFPA – Cidade Nova 6	9	8	56	100	47.12	4.81	2,677.20	6	10	10,212
		319	Terra Firme – Ver-o-Peso	8	7	70	80	30.83	2.37	2,174.69	10	6	2,078
		320	Tamoios	22	20	179	90	32.78	2.37	5,915.02	4	15	21,049
		305	UFPA – Icoaraci	4	3	23	120	55.00	2.85	1,273.55	15	4	3,172
		Total		**43**	**38**	**328**		**165.7**	**12.4**	**12,040.46**			**36,511**

Company		Line		Bus		N.° Trip Day	Trip Time (min)	Kilom. Operat. (km)	Kilom. Nule (km)	Kilom. Total/ Day (km)	Headway Peak H. (min)	Frequenc. Peak H. (vehc./h)	Passang. Day
Cod.	Name	Cod.	Name	Total	Op.								
AF	Viação Forte Ltda.	986	Jibóia Branca – Ver-o-Peso	15	13	104	115	37.90	3.80	3,991.00	8	8	10,427
		905	Guajará – São Braz	11	11	74	100	42.57	20.16	3,371.94	10	6	7,775
		960	Jaderlândia - Felipe Patroni	15	14	98	100	32.20	2.00	3,183.60	7	9	10,737
		900	Cidade Nova 4 – Ver-o-Peso	18	16	120	103	36.20	7.50	4,464.00	6	10	9,917
		903	PAAR – São Braz	12	11	86	90	37.00	7.00	3,259.00	9	7	9,769
		904	Cidade Nova 8 – Presidente Vargas	21	19	117	95	35.30	8.60	5,816.87	5	12	15,414
		902	Cidade Nova 6 – Presidente Vargas	20	18	139	113	40.70	13.40	5,898.50	6	10	16,503
		906	Guajará – Ver-o-Peso	21	19	154	120	48.32	15.16	7,729.32	5	12	20,541
		901	Cidade Nova 5 – Ver-o-Peso	24	22	126	100	40.39	8.25	6,782.78	5	12	20,502
		487	Guanabara – Presidente Vargas	13	12	81	90	28.20	3.00	2,320.20	7	9	5,552
		548	Marambaia – Ver-o-Peso	27	25	206	110	31.08	12.06	6,703.98	4	15	22,729
		985	Rio 40 Horas – Ver-o-Peso	14	13	106	110	44.23	9.13	4,807.07	8	8	11,877
		907	PAAR – Ver-o-Peso	23	21	105	140	46.50	7.00	5,029.50	6	10	12,490
		I 503	Estação Coqueiro – Presidente Vargas	13	12	120	90	36.90	0.00	4,428.00	8	8	7,255
		I 504	Estação Coqueiro – Ver-o-Peso	13	12	120	90	36.80	0.00	4,416.00	8	8	7,820
		999	Curuçambá – UFPA	15	13	89	120	55.00	2.75	4,930.75	10	6	–
		911	Icuí – Ver-o-Peso	6	6	45	115	47.00	2.35	2,129.10	20	3	7,820
		Total		**281**	**257**	**826**		**676.29**	**122.16**	**73,444.74**			**197,128**
AG	Transp. Rápido Dom Manoel Ltda.	441	CEASA – Felipe Patroni	17	15	114	100	33.18	14.40	3,998.52	7	9	9,225
		442	CEASA – Ver-o-Peso	16	14	102	100	30.70	14.14	3,329.36	7	9	9,394
		439	Pedreira – Nazaré	30	27	262	80	27.88	14.14	7,686.34	3	20	37,542
		440	Castanheira – Presidente Vargas	21	19	171	80	25.38	16.28	4,649.30	4	15	15,376
		908	Curuçambá – CEASA	10	10	70	120	52.80	2.64	3,722.40	12	5	4,018
		444	Castanheira – Ver-o-Peso (Moça Bonita)	8	7	37	80	29.95	18.06	1,234.57	15	4	3,465
		Total		**102**	**92**	**756**		**199.9**	**79.66**	**24,620.49**			**79,020**

Company		Line		Bus		N.° Trip Day	Trip Time (min)	Kilom. Operat. (km)	Kilom. Nule (km)	Kilom. Total/ Day (km)	Headway Peak H. (min)	Frequenc. Peak H. (vehc./h)	Passang. Day
Cod.	Name	Cod.	Name	Total	Op.								
AH	Transp. Aero Club Ltda.	996	Estação BR-316 – Icoaraci	4	3	26	90	42.50	2.13	1,111.39	10	6	2,213
		526	Aero Club – Presidente Vargas	24	22	173	90	24.00	14.80	4,477.60	4	15	21,053
		494	Guanabara – Centro (Presidente Vargas)	13	12	97	95	32.95	0.00	3,196.15	8	8	9,169
		890	Conjunto Eduardo Angelim – Ver-o-Peso	5	5	37	115	47.00	2.35	1,750.75	12	5	–
		Total		**46**	**42**	**333**		**146.45**	**19.28**	**10,535.89**			**32,435**
AI	Viação Guajará Ltda.	307	UFPA – Padre Eutíquio	15	13	168	60	18.41	1.30	3,109.78	5	12	18,077
		308	UFPA – Alcindo Cacela	13	13	171	56	16.72	1.30	2,876.02	5	12	16,204
		309	UFPA – Ver-o-Peso	11	10	123	60	17.80	1.30	2,202.40	7	9	5,468
		310	UFPA – Presidente Vargas	15	14	158	70	19.82	1.30	3,149.76	5	12	15,330
		914	Marituba – UFPA	6	5	35	105	52.00	2.60	1,833.00	12	5	3,606
		315	UFPA – Praça da Bandeira							EXTINTA			
		306	UFPA – Pedreira	13	12	124	75	25.00	1.30	3,115.60	7	9	7,144
		321	UFPA – Cidade Nova 6	9	8	56	100	47.12	1.30	2,649.12	6	10	9,103
		305	UFPA – Icoaraci	4	3	23	120	55.00	2.75	1,273.25	15	4	3,091
		860	Tapanã – UFPA	4	3	25	100	44.00	2.20	1,106.60	15	4	2,708
		Total		**90**	**81**	**883**		**295.87**	**15.35**	**21,315.53**			**80,731**
AJ	Expresso beira Alta Ltda.	R 123	Vila – Baía do Sol	6	5	28	45	55.84	3.5	1,581.02			1,583
		R 124	Vila – Paralso	2	1	12	45	41.08	3.5	496.46			1,476
		R 125	Carananduba	2	2	14	70	29.4	3.5	418.60			534
		R 126	Circular – Vila Nova	2	1	9	45	18.00	3.5	165.50			389
		R 127	Furo da Marinha	3	2	11	100	56.8	3.5	631.80			559
		Total		**15**	**11**	**74**		**201.1**	**17.5**	**3,293.38**			**4,541**

Company		Line		Bus		N.° Trip./ Day	Trip Time (min)	Kilom. Operat. (km)	Kilom. Nule (km)	Kilom. Total/ Day (km)	Headway Peak H. (min)	Frequenc. Peak H. (vehc./h)	Passang. Day
Cod.	Name	Cod.	Name	Total	Op.								
AK	Viação Perpétuo Socorro Ltda.	202	Estação Marex – Outeiro	12	11	89	122	66.00	6.00	5,940.00	12	5	7,442
		549	Djalma Dutra	22	21	156	100	29.61	1.48	4,650.24	3	25	19,769
		200	Estação Marex – Benguí	7	6	72	62	9.58	6.00	725.76	12	5	3,588
		631	Estação Marex – Ver-o-Peso	21	19	168	90	29.50	6.00	5,070.00	4	15	15,094
		632	Estação Marex – Felipe Patroni	24	22	236	90	29.05	6.00	6,987.80	4	15	21,307
		634	Estação Marex – Arsenal	24	22	236	85	31.31	6.00	7,521.16	4	15	18,867
		636	Estação Marex – Presidente Vargas	13	12	168	52	17.94	6.00	3,085.92	5	12	11,423
		201	Estação Marex – Promorar / CDP	2	2	50	15	5.00	6.00	262.00	15	4	1,586
		633	Estação Marex – Praça da República	7	7	80	65	22.65	1.13	1,819.91	10	6	5,846
		638	Pratinha – Presidente Vargas	12	12	80	115	38.00	1.90	3,062.80	10	6	5,996
		915	Pedreirinha – Presidente Vargas	6	6	59	85	31.20	1.61	1,850.46	15	4	–
		876	Fama	1	1	19	30	10.00	0.50	593.54	30	2	651
		Total		**151**	**141**	**1413**		**319.84**	**48.62**	**41,569.59**			**111,569**
AL	Auto Viação Monte Cristo Ltda.	227	Sacramenta – Humaitá	23	21	181	100	26.98	3.34	4,953.52	5	12	13,521
		635	CDP / Providência – Ver-o-Peso	24	22	192	105	30.00	6.00	5,892.00	5	12	13,713
		443	Pedreira – Lomas	27	25	206	80	23.90	3.00	4,998.40	3	20	19,462
		237	Sacramenta – Presidente Vargas	11	10	143	65	18.40	3.34	2,664.60	7	9	5,935
		Total		**85**	**78**	**722**		**99.28**	**15.68**	**18,508.52**			**52,631**
AM	Transp. São luiz Ltda.	323	Canudos – Praça Amazonas	32	27	250	80	21.42	1.60	5,398.20	4	15	34,609
		324	Canudos – Presidente Vargas	17	14	162	65	15.87	0.60	2,579.34	5	12	16,319
		325	Canudos – Ver-o-Peso	8	7	79	60	17.00	4.50	1,374.50	10	6	4,602
		Total		**57**	**48**	**491**		**54.29**	**6.70**	**9,352.04**			**55,530**
AN	Transp. Transpará Ltda.	550	Telégrafo	18	16	168	75	26.62	9.71	4,627.52	5	12	12,011
		Total		**18**	**16**	**168**		**26.62**	**9.71**	**4,627.52**			**12,011**
AP	Viação Rio Guamá Ltda.	311	Guamá – Conselheiro	19	18	232	55	14.66	1.30	3,424.52	3	20	10,124
		312	Guamá – Montepio	20	18	164	80	22.10	1.30	3,647.80	4	15	22,655
		316	Guamá – Presidente Vargas	14	13	135	75	18.60	1.30	2,527.90	6	10	6,367
		768	Satélite – UFPA	9	8	56	100	41.00	2.05	2,312.40	6	10	5,710
		Total		**62**	**57**	**587**		**96.36**	**5.95**	**11,912.62**			**44,856**

Company		Line		Bus		N.° Trip/ Day	Trip Time (min)	Kilom. Operat. (km)	Kilom. Nule (km)	Kilom. Total/ Day (km)	Headway Peak H. (min)	Frequenc Peak H. (vehc./h)	Passang. Day
Cod.	Name	Cod.	Name	Total	Op.								
AQ	Transportes Esperança Ltda.	102	Jurunas – Pedreira	19	17	109	100	28.26	4.32	3,153.78	6	10	10,227
		103	Jurunas – Conceição	18	16	86	110	33.89	0.40	2,920.94	6	10	9,641
		104	Jurunas – Marambaia	26	22	132	110	30.73	4.32	4,151.40	4	15	13,393
			Total	**63**	**55**	**327**		**92.88**	**9.04**	**10,226.12**			**33,261**
AR	Auto Viação Icoaraciense Ltda.	870	Icoaraci – PresidenteVargas (Cristovão Colombo)	7	7	54	115	52.90	6.00	2,898.60	15	4	10,135
		873	Icoaraci – Presidente Vargas (Berredos)	8	8	58	115	45.00	14.24	2,723.92	15	4	8,052
		871	Icoaraci – Ver-o-Peso	11	10	70	115	49.00	7.80	3,508.00	12	5	10,413
		875	Icoaraci – São Braz (Berredos)	10	9	62	115	45.00	14.24	2,918.16	12	5	9,374
		874	Icoaraci –São Braz (Cristivão Colombo)	7	7	52	100	51.50	6.00	2,720.00	15	4	11,028
		872	Icoaraci – Almirante Barroso	16	15	93	130	57.00	14.24	5,514.60	8	8	17,132
		757	Jardim Europa – Presidente Vargas	13	12	82	120	55.01	17.62	4,722.26	10	6	8,310
		881	Outeiro – Estação Marex (Praia)	3	3	26	100	42.71	13.07	1,149.67	30	2	2,096
		882	Outeiro – Estação Marex (Itaiteua)	4	3	26	100	39.85	13.07	1,075.31	30	2	1,704
		876	Fama	1	1	19	30	10.00	0.50	593.54	30	2	651
		758	Conjunto Maguari – Ver-o-Peso (Almirante Barroso)	9	8	58	115	44.52	10.34	2,664.88	15	4	8,742
		752	Conjunto Maguari – Ver-o-Peso (Pedro Álvares Cabral)	6	6	41	110	41.50	10.34	1,763.54	20	3	8,742
		777	Tenoné – Presidente Vargas	8	7	56	100	43.56	7.52	2,492.00	15	4	4,368
		878	Icoaraci – Cidade Nova	9	8	61	100	43.12	13.07	2,734.88	12	5	7,527
		879	Outeiro – Belém (São Braz)	3	3	21	135	74.07	17.58	1,608.21	45	1	4,262
		880	Outeiro – Belém (Presidente Vargas)	2	2	15	140	79.05	17.58	1,220.91	70	1	2,350
			Outeiro – Belém (Presidente Vargas)	4	3	18		80.92	29.37	1,544.67	50	1	–
		851	Outeiro–Tapanã (Augusto Montenegro)	2	2	20	100	38.90	9.30	796.60	45	1	1,197
		549	Djalma Dutra	9	8	68	100	29.61	1.48	2,025.32	3	25	4,707
		890	Conj, Eduardo Angelim – Ver-o-Peso	5	5	37	115	47.00	2.35	1,750.75	12	5	–
			Total	**137**	**127**	**937**		**970.2**	**225.71**	**46,425.82**			**120,790**

Company		Line		Bus		N.° Trip/ Day	Trip Time (min)	Kilom. Operat. (km)	Kilom. Nule (km)	Kilom. Total/ Day (km)	Headway Peak H. (min)	Frequenc. Peak H. (vehc./h)	Passang. Day
Cod.	Name	Cod.	Name	Total	Op.								
AS	Transbel Rio Ltda.	113	Cremação I – Estrada Nova	21	16	199	60	16.11	0.00	3,205.89	4	15	14,096
		114	Cremação II – Alcindo Cacela	20	15	197	55	13.18	0.00	2,596.46	4	15	15,070
		Total		**41**	**31**	**396**		**29.29**	**0.00**	**5,802.35**			**29,166**
AT	Transp. Nova Marambaia Ltda.	845	Tapanã – Outeiro (Arthur Bernardes)	4	4	42	90	38.90	11.10	1,678.20	20	3	1,779
		664	Benguí – Ver-o-Peso	13	12	97	110	39.65	10.70	3,974.45	9	7	10,249
		663	Benguí – Felipe Patroni	13	12	94	110	40.15	10.70	3,902.50	9	7	11,380
		756	Catalina – Presidente Vargas	12	11	74	110	43.64	4.80	3,282.16	10	6	8,008
		654	Benguí – Presidente Vargas (Arthur Bernardes)	7	7	61	115	48.75	10.68	3,048.51	15	4	2,111
		666	Conjunto Tapajós – Presidente Vargas	8	8	68	115	49.95	15.60	3,521.40	15	4	4,222
		665	Cordeiro de Farias – Presidente Vargas	20	18	130	100	30.00	14.92	4,168.56	5	12	16,439
		866	Tapanã – Ver-o-Peso	17	15	114	105	43.47	16.70	5,206.08	7	9	14,517
		869	Tapanã – Presidente Vargas	10	9	71	100	42.50	16.86	3,169.24	10	6	9,162
		862	Tapanã – Praça da Bandeira	12	11	85	110	43.30	16.86	3,865.96	10	6	–
		860	Tapanã – UFPA	4	3	25	100	44.00	2.20	1,106.60	15	4	–
		861	Tapanã II – Ver-o-Peso	10	10	82	105	40.35	16.70	3,475.70	12	5	–
		Total		**130**	**120**	**943**		**504.66**	**147.82**	**40,399.36**			**77,867**

Company		Line		Bus		N.° Trip/ Day	Trip Time (min)	Kilom. Operat. (km)	Kilom. Nule (km)	Kilom. Total/ Day (km)	Headway Peak H. (min)	Frequenc. Peak H. (vehc./h)	Passang. Day
Cod.	Name	Cod.	Nome	Total	Op.								
AU	Transportes Marituba Ltda.	996	Estação BR-316 – Icoaraci	4	3	26	90	42.50	2.13	1,111.39	10	6	2,213
		992	Júlia Seffer – Presidente Vargas	12	11	79	105	42.55	9.76	3,468.81	10	6	8,087
		919	Curuçambá – Centro	13	13	85	110	50.10	16.11	4,467.93	9	7	14,249
		920	Curuçambá – Ver-o-Peso	8	8	55	110	52.30	16.11	3,005.38	15	4	–
		990	Distrito Industrial – Centro	21	19	121	105	47.16	12.05	5,935.31	6	10	19,966
		991	Distrito Industrial – São Braz	16	16	102	90	37.18	12.05	3,985.16	6	10	12,944
		917	Distrito Industrial – Ver-o-Peso	8	8	85	110	47.40	12.05	4,125.40	15	4	–
		988	Ananindeua – Presidente Vargas	16	15	80	100	40.70	6.50	3,353.50	10	6	13,841
		998	Maguari – Centro	18	16	96	115	48.07	14.35	4,844.32	9	7	13,093
		914	Marituba – UFPA	6	5	35	105	52.00	2.60	1,833.00	12	5	3,606
		910	Marituba – Centro	21	19	136	110	49.00	15.20	6,952.80	4	15	16,308
		913	Marituba – São Braz	16	15	107	90	38.20	15.20	4,315.40			9,944
		918	Marituba – Ver-o-Peso	8	8	55	110	51.00	15.20	2,926.60	15	4	–
		916	Águas Lindas – Ver-o-Peso	8	8	55	100	43.00	2.15	2,382.20	12	5	–
		915	Águas Lindas – Iguatemi	8	8	55	100	42.00	2.10	2,326.80	12	5	–
		993	Júlia Seffer – Felipe Patroni	12	11	74	105	43.41	2.17	3,236.21	10	6	8,965
		Total		**195**	**183**	**1246**		**726.57**	**155.73**	**58,270.21**			**123,216**
AV	Transportes N. S. do Carmo Ltda.	924	Che Guevara – Praça dos Estivadores	6	5	70	90	49.20	0.00	3,444.00	10	6	6,000
		970	Mosqueiro – Praça da Bandeira	6	6	25	200	150.00	7.50	3,795.00	15	4	3,500
		925	Residencial Che Guevara – Centro	6	5	70					10	6	–
		Total		**18**	**16**	**165**		**199.2**	**7.50**	**7,239.00**			**9,500**
AZ	Autoviária Bragantina Ltda.	996	Estação BR-316 – Icoaraci	4	3	26	90	42.50	2.13	1,111.39	10	6	2,213
		305	UFPA – Icoaraci	4	3	23	120	55.00	2.75	1,273.25	15	4	3,091
		770	Conjunto Tapajós – Ver-o-Peso	8	8	55	100	41.00	15.90	2,382.20	12	5	–
		Total		**16**	**14**	**104**		**138.5**	**20.78**	**4,766.84**			**5,304**

Company		Line		Bus		N.° Trip/ Day	Trip Time (min)	Kilom. Operat. (km)	Kilom. Nule (km)	Kilom. Total/ Day (km)	Headway Peak H. (min)	Frequenc. Peak H. (vehc./h)	Passang. Day
Cod.	Name	Cod.	Name	Total	Op.								
BB	Expresso Izabelense Ltda.	973	Santa Bárbara –Presidente Vargas	6	6	25	130	95.00	4.75	2,403.50	22	3	–
		972	Murinim / Benfica – Presidente Vargas	8	8	50	120	84.00	4.20	4,233.60	16	4	–
		971	Benevides – Iguatemi	15	15	100	115	76.00	3.80	7,657.00	8	8	–
		Total		**29**	**29**	**175**		**255**	**12.75**	**14,294.10**			–
BC	Expresso Michele Ltda.	970	Mosqueiro – Praça da Bandeira	4	4	18	200	150.00	7.50	2,730.00	15	4	3,500
		Total		**4**	**4**	**18**		**150**	**7.50**	**2,730.00**			**3,500**
BD	Belém Rio Transp. Ltda.	547	Médici – Presidente Vargas	23	21	158	110	31.37	2.60	5,011.06	5	12	17,764
		546	Sacramenta – Nazaré	33	30	193	110	35.31	2.60	6,892.83	3	25	39,046
		795	Cabanagem – Presidente Vargas (Senador Lemos)	19	18	114	120	31.26	10.77	3,757.50	7	9	2,700
		Total		**75**	**69**	**465**		**98**	**16**	**15,661.39**			**59,510**
		Total do Sistema / Dia		1,855	1,686	12,783		5,944	1,102	485,324.81			1,328,088
		Total/Mês								13,006,704.91			35,592,758

Fonte: CTBel, Março 2000.