Synthesis of Movement:
Transit Oriented Development for Urban Growth in Lima, Peru

by

Mariana Rubio

B.Arch. (2000)
Universidad Peruana de Ciencias Aplicadas (UPC), Lima, Peru

Submitted to the Department of Architecture in Partial Fulfillment of the Requirements for the Degree of
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Signature of Author _____
Department of Architecture
May 22, 2003

Certified by _____
Paul Lukez
Assistant Professor of Architecture
Thesis Advisor

Accepted by _____
Julian Beinart
Chairman, Department Committee on Graduate Students

Readers:

Michael Dennis
Professor of Architecture
Department of Architecture
Massachusetts Institute of Technology

Ken Kruckemeyer
Research Associate
Center for Transportation and Logistics
Massachusetts Institute of Technology

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ABSTRACT

As urban transportation deteriorates, chaos increases putting aside urban patterns, systems and networks to prioritize the implementation of modern technologies. As a consequence of this situation and as a means to fulfill the requirements of the growing city, the larger built forms in the city are put in the spotlight and made busier and more complex. The connectivity that once ordered the transportation networks throughout the urban form diminishes, almost vanishes. There are different scales of movements, at different paces and levels (in all three dimensions), which need to be understood in order to get a good reading of the activity of the city.

The site is located in the district of San Martin de Porres in the city of Lima, Peru and this thesis aims to fill the existing void represented by it in its context. It also aims to re-connect and re-vitalize the area of study by using transit-oriented development and spatially identifying elements. Another goals is to meet the needs of transportation networks and people through spatial relations, so as to generate a prototype that establishes processes and results to promote urban growth.

This thesis presents the possibility to synthesize such movements (now scattered and unintelligible) and to provide a space for the junction and strengthening of the existing links between people and transit that occupy the urban landscape. The implementation of a Multimodal Passenger Terminal to serve both local (urban) mass transit and regional transportation is the main compositional element of the project. This will be complemented by other programmatic elements such as: a civic plaza and a communal green space, a series of smaller, more intimate open spaces, community services, retail and office space, movie theaters and a hotel. They will as a whole serve as supporting activities for the area and as a point of destination for the neighbors.

The analysis of the transit network – regional and local – as well as of the area's land use and green space systems will allow for the better understanding of the context and will set the stage for the remainder of the study. Pedestrian behavioral patterns in the area also provide necessary information that is used to determine accesses and paths or concentration points in the project. The resulting elements are distilled and categorized into several design guidelines and are placed in a timeline for phased development. A series of organizational and distribution diagrams have been produced to reflect the findings. All of these could serve as a starting point for future development in other locations with similar conditions in the city or the country. They could be used individually or jointly depending on the demands and needs of the project, the people, the existing systems and the site, at a given time.

Thesis Advisor: Paul Lukez
Title: Assistant Professor of Architecture

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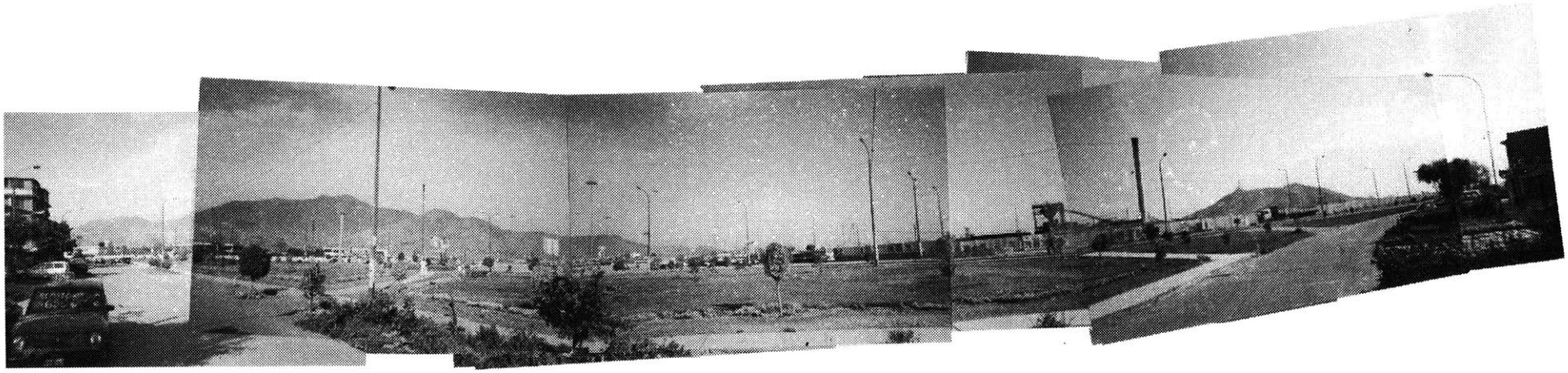


Panoramic View of the area around the site
District of San Martin de Porres
Lima, Peru

CHAPTER 1: INTRODUCTION

INTRODUCTION

During the past twenty-five to thirty years, urban transit in Lima has suffered great transformations as a result of the pressures created by the demands of a growing population. It is a fact that the intensive need for services and the lack of infrastructure, both administrative and physical, have led to the development of an informal market that now represents nearly 80% of the total transit system.[1]

Figure 1: Informal Bus Station – along the Pan-American Highway

Due to this uncontrolled growth and to the years of negligence on behalf of Ministry of Transportation and Communications (MTC), mass transportation companies have filled the resulting void by designing and implementing their own routes and schedules without complying with the regulations established by the MTC. In addition to this, they have established bus stations and bus stops (street stops with no shelters, local storefronts or wherever people are gathered or a passenger hails them) that often exist in precarious conditions. Generally they do not fulfill the regulations and requirements set up by the related authorities, nor do they provide for a basic level of service and safety for the passengers.[2]

It could be said that the only requirements by which they abide are those regarding license plates and registration of vehicles and companies in the Department of Motor Vehicles (DMV). The DMV and the Metropolitan Police have conducted several investigations regarding the way in which these companies operate, all of which have come to the conclusion that none of the security requirements concerning passengers or third parties are met. These conclusions have been supported by the fact that a significant percentage (approximately 18%)[3] of transit accidents in Lima every year are caused by the informal or 'poorly regulated' means of transport.

Other important components of the transit system that have been facing problems in the last decade are the Inter-Regional Bus companies. They expanded greatly as a consequence of extensive migration of the rural population to the city. Although some of the largest carriers are well established and comply with the requirements set by the Ministry of Transport, most of the smaller companies, as well as all the informally run companies, operate under their own terms. This situation affects not only the "official" organizations but also most importantly the public they serve.

According to numbers reported by the Ministry of Transportation as of September 2000 [Appendix A-2], there are fourteen registered inter-regional bus companies in Lima, all of which have their headquarters in Lima and operate mainly moving passengers between this city and other parts of the country (and vice versa). There are, however, approximately 450 unregistered small and medium sized bus companies that could be using the Terminal being proposed. This number shows that the need for the formalization of the transportation services is larger than expected. There are, of course, several other companies registered in some of the major provincial cities and although some of them do serve long-distance routes most of them operate locally or within neighboring provinces.[4]

Objectives

It is the intention of this thesis to:

- Synthesize different scales of movement that currently take place in the area – bi-dimensionally (on the horizontal plane in the tensional relationships established between

networks and users) and tri-dimensionally (vertical relations between built environment, users and transit) – taking into account the factors that affect them and the effects they have on the environment they work in, filling an existent void in the urban pattern.

- Make a statement with the built environment without overshadowing and competing with the context, allowing it to act as a complement of the existing surroundings.

- Provide a pleasant and interesting urban setting that is adequate in human scale and can be accommodating for different groups of users and their activities, at the same time that it is flexible and thus able to adapt to varying circumstances as time goes by.

- Incorporate the proposal for this multiuse complex (and Multimodal Passenger Terminal) into the city grid making it part of the existing green network and a more actively involved part of the transit system, prioritizing both pedestrians and vehicles when the particular situation requires it.

- Deal with two scales of intervention (urban and architectural) that make up the whole in this project and enable them to function both as individuals and parts of the larger scheme. These target either the regional or local levels with respect to the site and allow for a better analysis and more specific results.

- Establish guidelines that will help set the basis for design not only for this particular scheme but for other projects that face similar issues and are embedded in contexts that present similar conditions.

Motivation

Having known the conditions in which the transit in Lima operates, first hand, it just seems logical to want a better understanding of the issues behind them and the extent to which they can be improved, bearing in mind that the available funds for projects such as this will always be limited, the time frame in which they will develop usually longer than expected, and what most certainly works in other countries in terms of infrastructure and implementation will probably not be undertaken or fully respected, due to cultural differences.

Travel by bus in countries like Peru, which are developing, as well as culturally strong and geographically challenging, should be a pleasant, exciting experience, but is most of the time disappointing. This is due to a lack of infrastructure to serve passengers with average standards, a disinterest (from the companies' standpoint) in maintaining or raising the level of service for the passengers and a lack of resources to buy new buses and/or give them the maintenance required to diminish the wear and tear.

Lima as any other city has problems that affect the standard of living of its people and deprives them from living adequately and from being served appropriately. Lima is a city that has great potential to attract tourism but is restrained and does not exploit its resources to the maximum.

There is a desire to provide solutions for these problems, devise catalysts for change, to create simple elements that interact with each other to maximize benefits and minimize side effects.

Figure 3: Large informal terminal, Lima

CHAPTER 2: HISTORY AND CONTEXT OF THE AREA

HISTORY AND CONTEXT OF THE AREA

The District of San Martin de Porres lies on a hillside area of approximately 36.9km^2 (22.92 sq.miles) and 123 meters above sea level. Between the years of 1936 and 1950, the creation of "Worker Neighborhoods" was promoted and the buildings subsidized by the government, as a reaction to the housing problems that resulted from the growth of the city during the first three decades of the twentieth century and the non-conformity expressed by the Worker's Unions to the government as a consequence of a lack of support to their activities. Such neighborhoods rapidly spread throughout the outskirts of the city and later were formally grouped and included in newly created districts.

San Martin de Porres was officially created in 1950 and was called "Worker District 27 of October." At that time it consisted mainly of small settlements along main roads surrounded by desert and bounded by the Pacific Ocean. The district's population comes to 459,139[5] and has grown at a rate of 1.8% between the years 1982-1993 (in 1993 the population was 380,384). The comparison of the current density of the district (1243.94 inhabitants per km^2) to that of the City (222.6 inhabitants per km^2) can give us a better understanding of the context that is being dealt with for this specific situation and some indication of how to approach the design project.[6]

The average level of income in the district is among the lowest in the city and the main economic activities are either directly related to primary industry or independently established businesses. Only recently has the economy started shifting to accommodate demand and has turned more towards service oriented activities.

During the 1970s rural to urban migration accounted for most of the city's growth and over the years represented, an enormous problem the government has not known how to deal with appropriately.

At its peak, the population in Lima was growing by approximately 550,000 persons per year, which meant that it would come to double its size (at the time) in the next 15 years. The areas around the site I am studying, were at the time privately owned agricultural lands, but were taken (invaded) illegally – most likely overnight and then progressively occupied – and never able to be reclaimed by their owners.

As usually happens in this kind of situation, after the initial aggressive (defensive) settling period where the migrants subdivide the lots and roughly lay out streets and public areas, such as parks or plazas, the government gets involved in a more passive manner to try and work with the settlers in giving them the basic services and starting the formalization process. This path to legalization and ownership can take up to 15 years and encompasses several stages of development in the built form of the area.[7]

The area around my site was rapidly populated over a 25 year period and is still growing, although now, at a slower pace. Over the years there have been several migrant movements and they have all had different impacts on the area. In terms of the formal disposition of the streets, the ruling elements have been the three hills that embrace the district, not only because they are the tallest elements in the skyline but because they have been totally taken over and built on, becoming urban landscape.

The fact that the hills become buildings themselves, housing thousands of people and their activities and responding to their needs is reflected in the way in which the streets are laid on them as well as on how the houses interact with each other and the open spaces around them. Depending on the period of time in which each of the sections was developed, they were built to follow either organic or gridiron patterns, one totally blending in with the hillside, the other imposed on it, both tightly holding on to it.

Figure 4: Figure Ground Plan of the Area

Culturally and socially, the migrants all come from very similar backgrounds and they strongly advocate for the creation and up keeping of open spaces as a way of maintaining for themselves a small part of what they left behind in the agricultural towns, which is why the green space networks in the area are so vast and the built to open space ratios much smaller than expected. The parks usually have a school adjacent to them (they are used as playgrounds at recess time) and most of them are formally planned with paths and small religious icons set up in shrines.

They don't tend to have large trees but small shrubs and greenery and the residents are responsible for their maintenance. They represent a source of pride and they reflect their interest in establishing in a new area, a sense of belonging.

Although the Pan-American Highway is a very important element in the composition of the area and was built years before the settlers arrived, it seems to have had minor influence in the laying out of the later streets and arterial roads, for hardly any of them are either parallel or perpendicular to it, in fact most of the streets seem to follow a topography that is really non existent (besides the hills

themselves). There is, of course, no need to follow a strict grid, but the patterns appear to have been randomly formed, not as response to the environment as had been done before.[8]

The lot I am working with for this thesis was originally and until recently a local brick factory. When the factory was initially built, its location was actually far in the outskirts of the city and considered suburban, but over the years the city's expansion engulfed it into its built environment and made it part of the system and regulations. Currently, the lot is the property of a local bank, as a result of unpaid mortgages and interest on long-term loans. As a consequence, the bank has set the lot up for auction and the government has called a competition for the design of the "Northern Bus Terminal", one of two that will be built to improve overall passenger service and the existent network of massive transport in the city.[9]

Figure 5: Panoramic view of the area from the Avenida Tomas Valle (looking South)

CHAPTER 3: MULTIMODAL PASSENGER TERMINALS

MULTIMODAL PASSENGER TERMINALS

As a means to better understand the kind of infrastructure I am proposing here, I have searched for a good definition of what a Multimodal Passenger Terminal (MPT) is and what it implies, who it affects and how, as well as what are the effects of such a structure in a built environment and what benefits and drawbacks it might present at different stages of development. I have found two definitions of what terminals are, which I consider are worth taking into account.

The first one relates more to the urban relations that such a structure can generate and encourage. *"Specialized urban infrastructure with great functional impact that can act as a strategic dynamic element and as a generator of various activities that will in turn consolidate metropolitan sub-centers in the short and long run."*[10]

The second one is stated in a report prepared by Eric Darwin[11], and the definition of what an MPT is reads as follows: *"Passenger facility shared by two or more modes making it easier for a traveler to complete his journey by changing from one intercity carrier to another or from the intercity mode to the local area mode."* This definition establishes the technical and functional requirements of an MPT. It also points out that due to the specific and complex programmatic and infrastructural requirements presented by airports, these are not usually considered MPTs, although they most certainly can become part of the new transit system if they are effectively interconnected and serviced the appropriate way.

Darwin's report has dealt with different issues that might be brought up during the process of design, consolidation and further management of an MPT, by the various parties involved and has provided alternative solutions or better said, alternative means of approaching the project to maximize the benefits and minimize the side effects for each of the groups involved.

A proposal like the one made in this thesis plays an important role on the actions taken by the different players (directly or indirectly) as well as on the different levels of transit it interacts with. An important part of the design process and of the final product for this project is that which deals with simultaneous movements. Simultaneous movements of people, cars, buses and trains that need to be understood in their nature.

First of all there is the relationship between mass and space, which defines space as the dominating force, and matter as the product of movement within that space. Secondly, there is the nature of the continuity of space, which is defined as a continuous experience as one moves through it. Finally, there is the nature of those movements that deal with simultaneous continuities, which states that one must attempt to see the continuity of space as a series of movement systems that are based on different rates of speed and different modes of movement. These are each interrelated with each other and contribute as a whole to the living experience of the city.[12]

This last definition of the simultaneity of movements is most closely related to the types of relationships I propose in this thesis, for it not only deals with the experience of people within a certain space, but with the tri-dimensionality generated by the different modes at different levels of transit.

For the purposes of this document we are going to take the Canadian report and use it as the basis for the analysis of the current situation in the City of Lima, mainly because there are no local precedents similar to the infrastructure being proposed but also because the report is broad enough in its terms that it can be applied to other contexts, and specific enough that it provides the necessary outlines to be able to run such analysis in a specific context other that the one originally looked into.

For this specific project:

- The players include: The bus carriers, the travelers, the immediate community (residents and storeowners) and the government.
- The levels of transit involved are: Local transit, intercity buses, metro lines, local airlines and pedestrians.
- The overall benefits of an MPT in comparison to separate unimodal terminals are:

The fact that an MPT is more than just a connection point to the local transportation system, and due to the fact that the Terminal's location is key and the focus of transit and other activities in the area, it allows for better connections; hence easier access from different parts of the city to the area. It also provides the opportunity to complete different multi-stage trips successfully and efficiently, as well as to allow the possibility to have coordinated schedules for different modes making the transfers and trip planning easier.

In a more local level, it acts as a catalyst for new development of construction and businesses in the area, providing the people in the nearby communities with more jobs (short and long term) and increasing the tax revenues for the Municipal Government.[13]

According to Darwin, the main issue MPTs deal with is the massive transportation of people and how to facilitate and simplify this; therefore rail modes should be included in the system to complete the cycle and make the connection of all available modes possible. In a city like Lima where people are not used to having an efficient transportation network, much less a metro system,[14] the rail mode's profile needs to be raised and promoted to attract more passengers. The Multimodal Terminal serves that purpose by gaining users through complementarity[15]. That is, by providing the service of two or more modes in one place.

However, one of the disadvantages this kind of setting presents is that of competition between modes to the point where one of them might be discontinued or could seriously lose patrons due to the convenience (price, service or time/schedule wise) the other modes offer the users.

Traditionally in cities around the world, train stations have been grand, solid, pleasant structures, whilst bus carriers and users have had to deal with modest, plain buildings with hardly any proper commodities. Therefore in terms of image, the MPT presents more benefits than disadvantages to all modes. For some, it makes the mode more appealing to users and for others it gives a higher profile and better appearance, which in both cases means more passengers and as a consequence more income.

Advantages and Disadvantages of MPTs

The advantages and disadvantages presented by MPTs vary from mode to mode, due to which reasons we should look at them separately, although they are closely knit at certain points and share common grounds.

Buses are one of our main concerns because they are part of a very disorganized system. They are the only means of mass transport in the city[16] and currently have no stations where to pick up or drop off passengers, roadside stops and storefronts are their origin/destination points and there is an incredible overlap in routes serviced which forces to drop prices (competition) and with that, level of service. A Multimodal Terminal would allow the carriers to coordinate their schedules and regulate their fares, compete fairly with the future metro system, attract more captive users, and provide all users with better services in an adequate and comfortable environment.[17]

In Peru, due to the lack of a long distance train system, buses serve both short and long distance purposes, in contrast to other countries around the world. The implementation of this MPT in Lima would encourage passengers who don't trust or want to rely on bus services today to use them more often or use them instead of flying to their destination, which in Peru definitely proves to be more expensive than land transportation and for that reason less affordable for lower income population.

Bus terminals are usually built and run by the carriers themselves and because of the very small margin of profit the business allows they are either very modest or non-existent.

A Multimodal Terminal would allow smaller carriers to have a shared terminal and benefit from all the services it provides without necessarily having the direct burden of its costs. The construction of an MPT also raises the profile of buses as a viable transportation mode and diminishes the negativity that has affected their image, because of the informality they have been operating in for the past years.[18]

As a way of encouraging local transit and activate the area, the complex being proposed includes more than just the services and facilities for the Terminal, adding value to it and generating a new destination point, an additional point of interest from which everyone benefits. Local urban transit (buses and taxi companies) benefits greatly from the Terminal because it allows it to take advantage of what is proposed, include it in their routes (make it an important stop) and promote it while making a profit out of it.

The fact that the implementation of the terminal is targeting approximately 450 intercity bus carriers[19] and planning to provide for their accommodation is enough to believe that if it is successful, it will provide a steady flow of passengers that when traveling with luggage will most likely be reluctant to walk to their destination and will need a means of transport, hence requiring the services offered in the Terminal. The other interesting issue that comes in to play is that whether arriving or departing, passengers tend to be accompanied by family and friends who also need to be driven to and from the terminal.[20]

In terms of the benefits presented to the rail mode, the MPT raises its profile and makes it more easily accessible to people. It also provides enough connections to other modes that allow the rail system to attract more passengers and feed from them. Currently, Lima does not have a transit system that fulfills peoples' needs, much less that meets their expectations. The services provided are basic and in some cases precarious. They get people places, that is true, but the way in which this happens and what is at stake when this is being done, is exactly what this proposal seeks to improve.

Given that rail transportation is virtually unknown to people in Peru, therefore it is absolutely necessary to exploit its benefits and create a link with the existent transit network so as to allow the population to gradually make this mode making part of their daily commute.

Another benefit is that the MPT offers (for all modes) not only adequate facilities but also complementary services, such as retail, storage or administrative offices, which would probably be very expensive to obtain if aiming to obtain them individually. The division and partial subsidizing of the construction costs makes them very accessible and the sharing of the monthly maintenance costs affordable. The fact that the bus carriers are actual shareholders in this business and are an active part of the company, acts as an incentive for the proper maintenance and further development of the complex and the area. By doing so, the participants get the sense of security and ownership that is necessary to ensure interest in the project and promote further investment on their behalf.[21]

Regarding disadvantages, the MPT users have to deal with the fact that by having all modes concentrated in one building competition is highly increased and one mode might feed from the

other to the point where modes might be really affected by this and forced to be reduced or completely disappear from this specific location and have to relocate. Carriers and users also have to be aware that the constant flow of passengers and visitors to the area will generate congestion and this in turn will create delays both for public and private transit.[22]

On the other hand, the surrounding areas benefit from this newly generated traffic because it will provide the businesses along the main roads with more potential clients and will attract the attention of investors and developers, encouraging them to build upon the existing fabric.

This newly directed attention to the area might also be of interest to the local authorities, which could see an asset in the upgrading of the public infrastructure, which in turn would result in benefits for the neighbors without requiring them to make direct contributions towards the improvements obtained.

As previously mentioned, the Multimodal Passenger Terminal offers several advantages for the traveling public, such as coordinated schedules, more choices of modes concentrated in one place (comparison shopping), more ease of transportation due to improved transfers and overall improved transit accessibility.

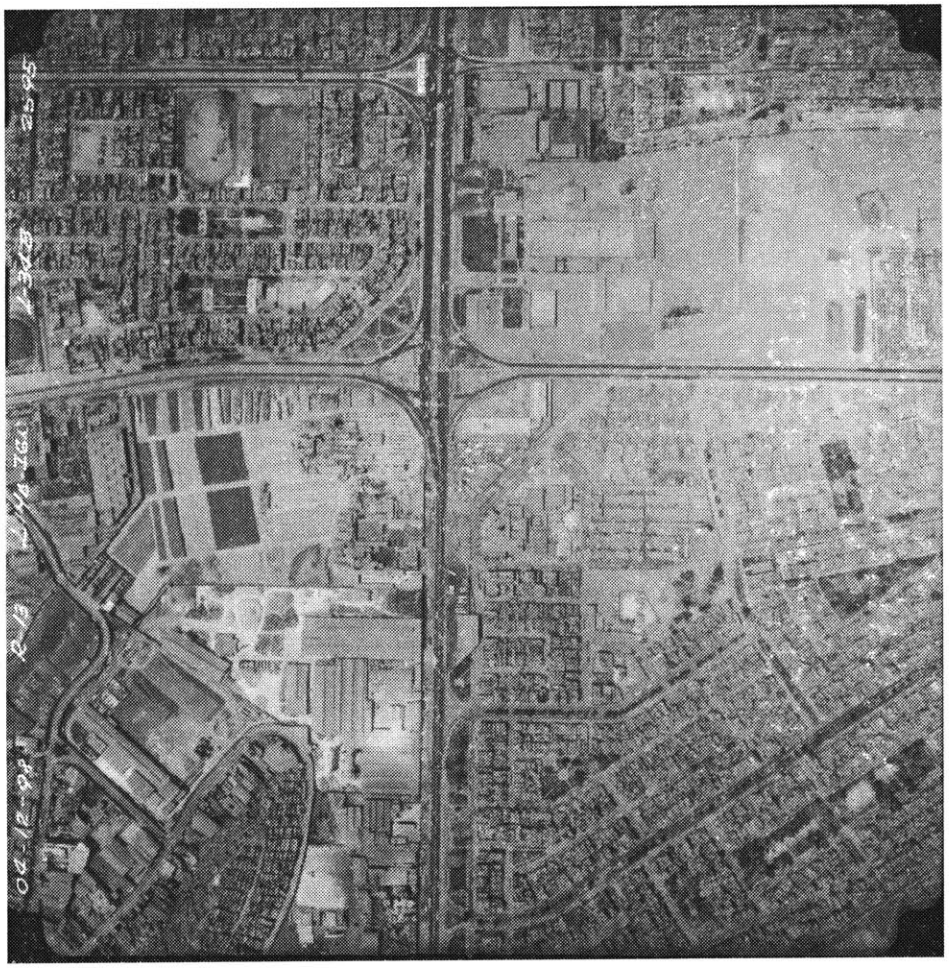


Figure 6: Aerial Photograph of the site and its immediate surroundings
Source: Instituto Geografico Nacional

SITE ANALYSIS: CURRENT SITUATION

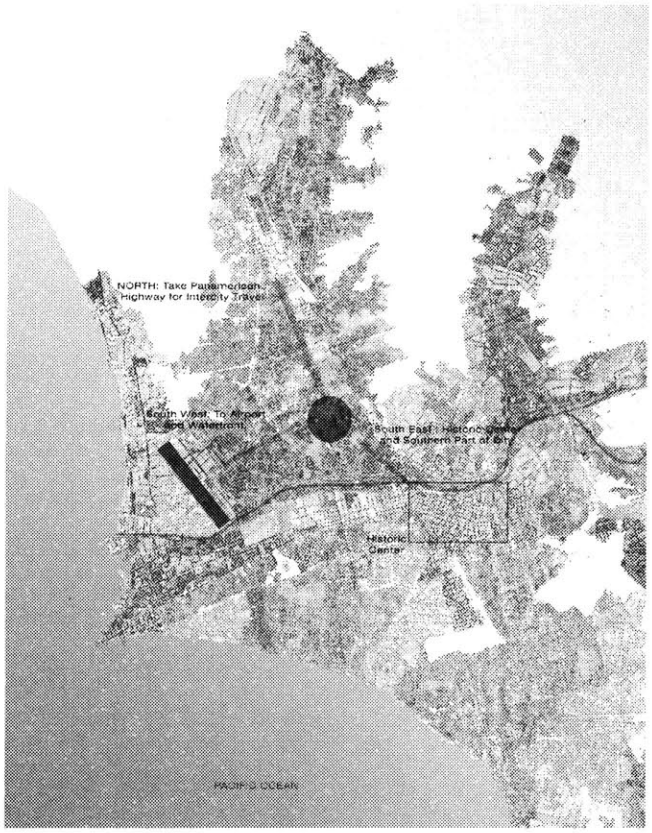


Figure 7: Location of Site in City with respect to Airport, Historic Center and Pan-American Highway.

The Multimodal Terminal requires a key location regarding accessibility and supporting services in order to maximize its efficiency. The project's site was chosen for its relationship to major transit infrastructure, such as the airport and the highway, as well as for its relationship to both the historic center and the developing areas of the city, which allow for a more coherent design of the new transit system. As has been already mentioned, there is a proposal for the implementation of a Terminal in the Southern part of the city and similar considerations will have to be taken into account when designing it in future years.

Site: Due to the fact that the site is located in the conversion of axis of two sets of green space networks in the city's grid, it could be said it is a natural pivoting point in the system and therefore has potential as public space and as offering exposure to the interweaving and connectivity we are promoting with this design. There are several elements that define its boundaries, two of which are arterial roads: the Pan-American Highway[23] and Tomas Valle Avenue. The site is also limited by an urbanized hill and by the strong presence of almost exclusively residential areas (in many cases still in process of development – still expanding and changing).

The land directly behind the site is still very much undeveloped and serves mainly as an access road to the higher parts of the 'New Towns' ("barriadas") that occupy the hillside. There are no tall buildings in that area and the roads are not paved, and although there is a small hill within the perimeter of the site (it covers a 35 foot difference from the base to the top) it does not represent a

design problem. More likely, it represents a design opportunity, for it can be exploited and incorporated into the proposal as a composition and ordaining element.

The southeastern portion of the site is adjacent to a ceramic tile factory that like many other factories in the area due to the nature of their business, has temporary structures rather than massive buildings. These structures do not create or represent landmarks in the skyline; they are too transparent and lack strength and presence to do so.

As a result of the area's growth over the years, the changes in laws and regulations and the fact that the area's income is very low, the overall appearance is not very pleasant and the maintenance of existing buildings and infrastructure is not performed as often as it should be; therefore it is counterproductive to the image of the district, which is actually potentially strong but has not been given the opportunity or been presented with the resources to be exploited.

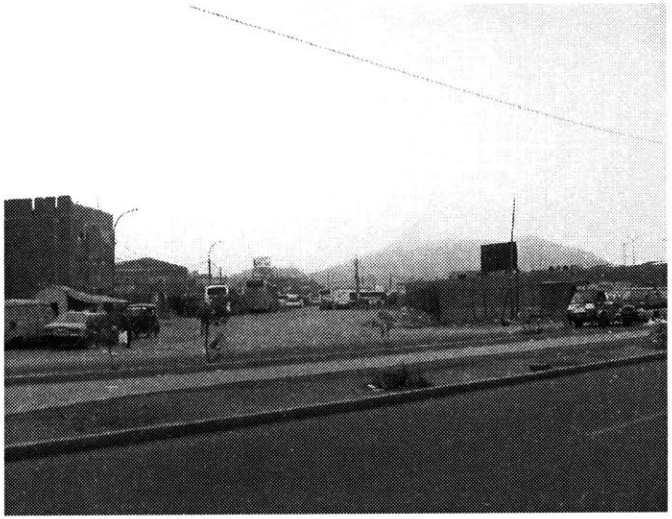


Figure 8: View of the back part of the site. Access road to hillside Development. View of informal Bus Station.

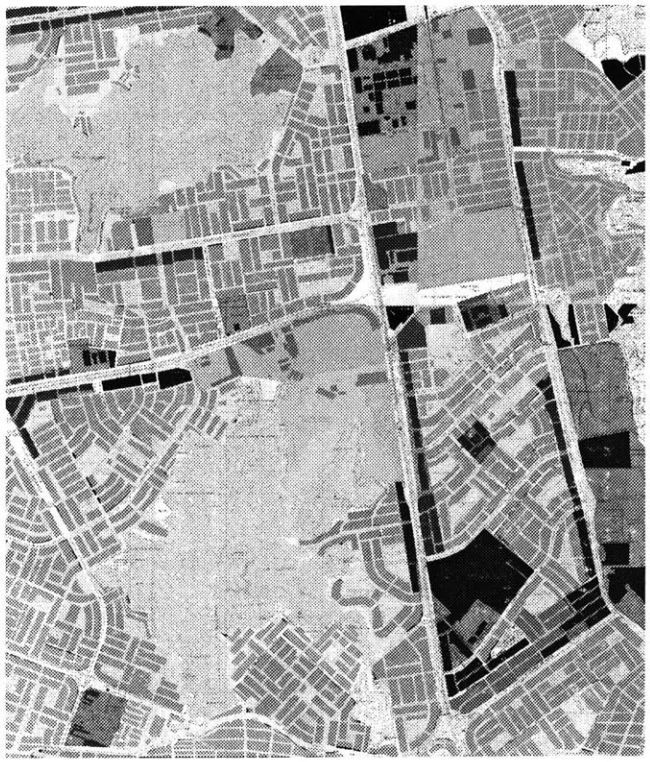


Figure 9: Land Use Map
(Yellow – Residential / Red – Commercial / Orange – Industrial
Blue – Educational / Purple – Special uses)

Zoning: Although portions of the area are dedicated to light industry and retail (mainly local), the area is primarily residential. There are some larger industrial uses such as a radio assembling plant or storage facilities for Customs (due to its closeness to the airport and the Country's Main Port of el Callao) but these are limited and over the years have been displaced by the residents and by the changes made in municipal dispositions and zoning regulations. On matters concerning retail, there is a new Commercial Center located on the opposite side of the highway and although it serves a large population and encompasses a diverse set of stores and restaurants, it operates mainly on a local level.

In terms of the residential use of the area, most of the edges directly in contact with major arterial roads are R-4/5, while the inner, more private parts of the blocks are kept low density with a permit of R-1/3. This classification has enabled the preservation of the area as predominantly residential and has provided local authorities and residents themselves with the possibility to develop and maintain recreational areas and public spaces.

Figure 10: Accessibility- Private transit and pedestrian

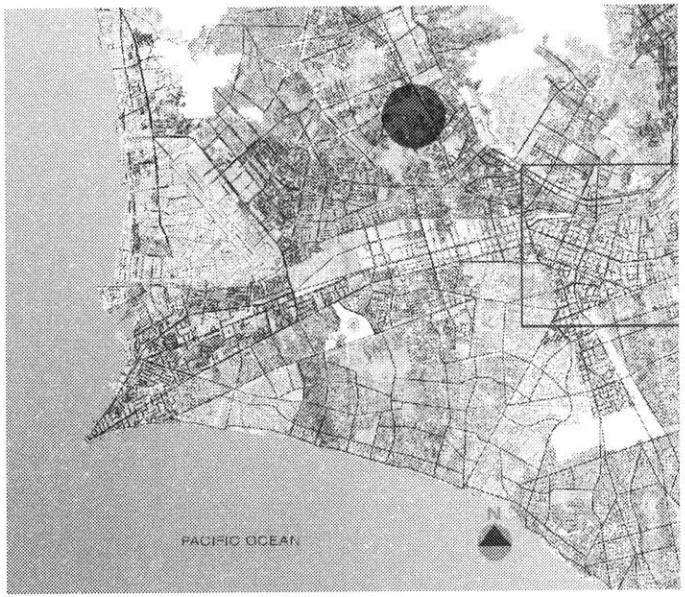


Figure 11: Accessibility - Main bus routes

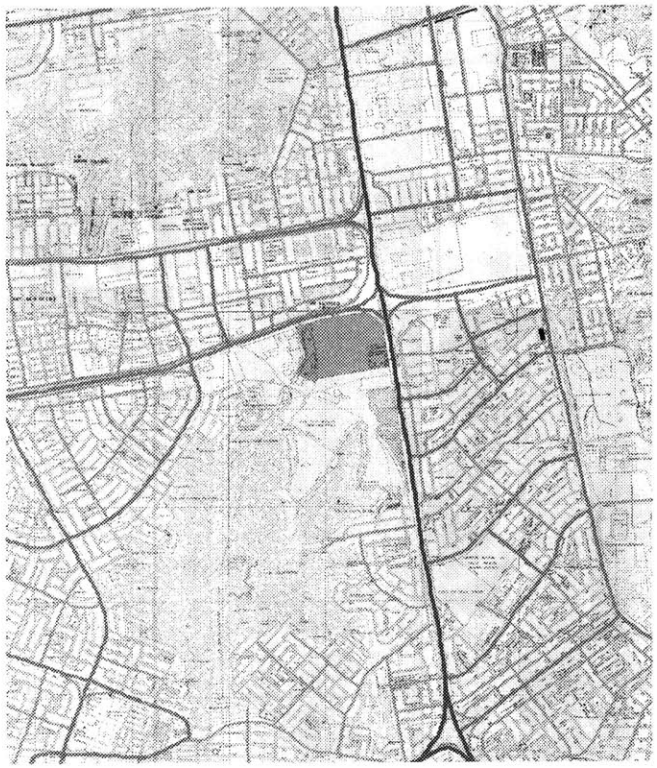


Figure 12: Street Hierarchy map
Pan-American Highway – Red
(North – South)

Pedestrian accessibility, however, is more difficult due to the nature of the roads. Of regional importance, they are very wide, present off-peak high-speed transit and carry massive numbers of vehicles that cause congestion and back up the system in the area. Jay walking is very common (there are hardly any crosswalks and no bridges or underground passages) and often dangerous.

Therefore in order to provide for better pedestrian access it is necessary to propose new transit infrastructural design for the area, bearing in mind that the budget is going to be small, the time frame long, and the outcome only as successful as the infrastructure simple and pedestrian friendly. Prioritizing pedestrian access will enhance the connectivity of the project with surrounding areas and integrate it in a better way to the green network that is being brought up as a part of the proposal.

Proposals and Projects for the Area

The Municipal Government for the Lima Metropolitan Area issued in 1997 a report containing the Master Plan for the Urban Development of the City's Historic Center and Immediate Surroundings, in which among others, a new ring road network was proposed.

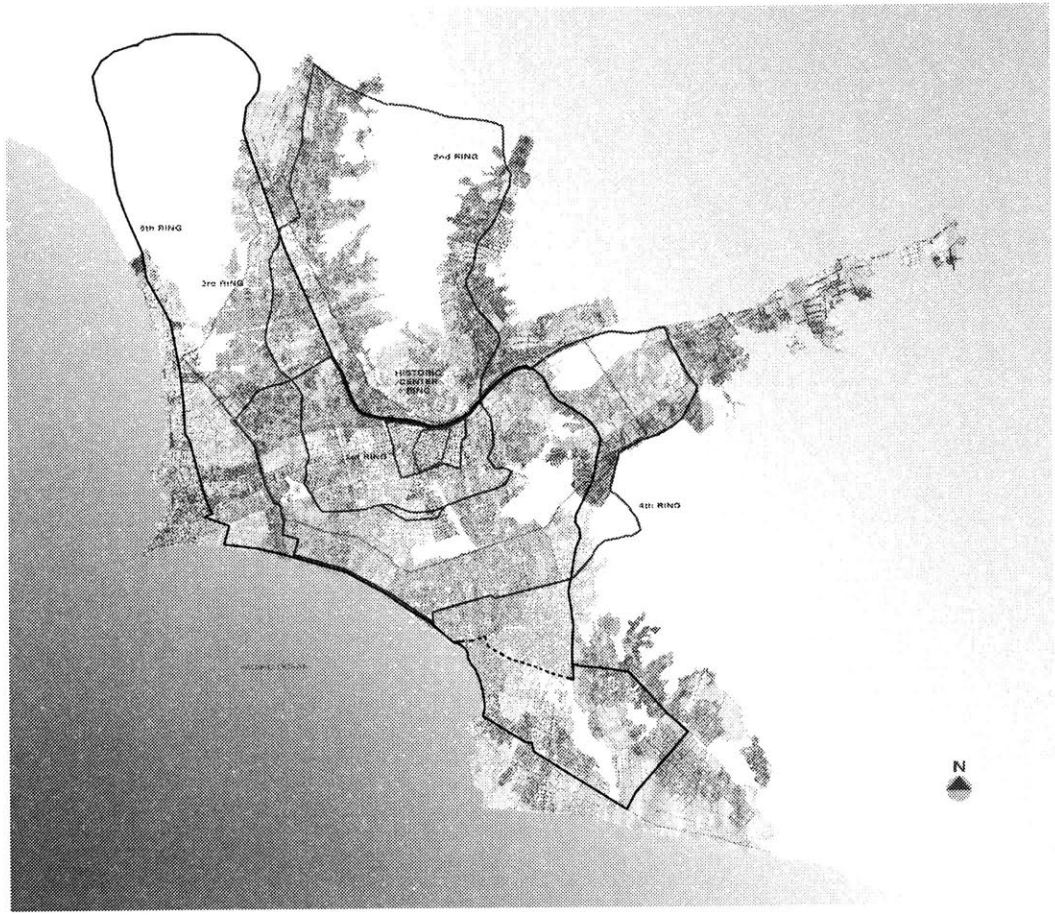


Figure 13: Ring Road Plan

The proposal consists of five urban rings that incorporate existing roads into them and improve the connectivity of different areas of the city by providing alternative routes for transit and allowing for smoother flow of traffic. This plan covers the downtown core area of the city and the adjacent neighborhoods in a precise way but the outer rings have not yet been completely mapped due to the fact that they are including areas of future expansion of the city; hence non existent or in early stages of development.

My site is included in the Fourth Ring Road (Tomas Valle Avenue is immediately adjacent to the site and an important part of the ring's network) and this constitutes an advantage point for the proposed location of the MPT because as the potential and value of the site increase with the perspective implementation of the ring roads.

Another important proposal is that of overflow areas, new city centers (sub-centers) for the decongestion of the downtown core, within the existing urban fabric[24]. As shown in Figure , these centers were identified depending on their importance to the context and their current density, as well as on the services they provide the population with. Other factors considered were: their capacity for future expansion and the flexibility of the immediate surroundings included in the possible "spillover" zones, proposing open spaces, retail and entertainment centers and incorporating local streets in the ring road network to make it a more coherent approach.

According to this report, the city of Lima reflects the creation of a fragmented society with evident problems of urban disorganization. It reflects as well the absolute clear relationship that exists between the structure and the characteristics presented by the street systems, the transportation

networks and the typology and intensity of land uses, with which come the quality of the space produced. These are consequences of the absence of reorganization and redesign of the city networks and systems that should have accompanied the explosive growth of Lima and that, despite

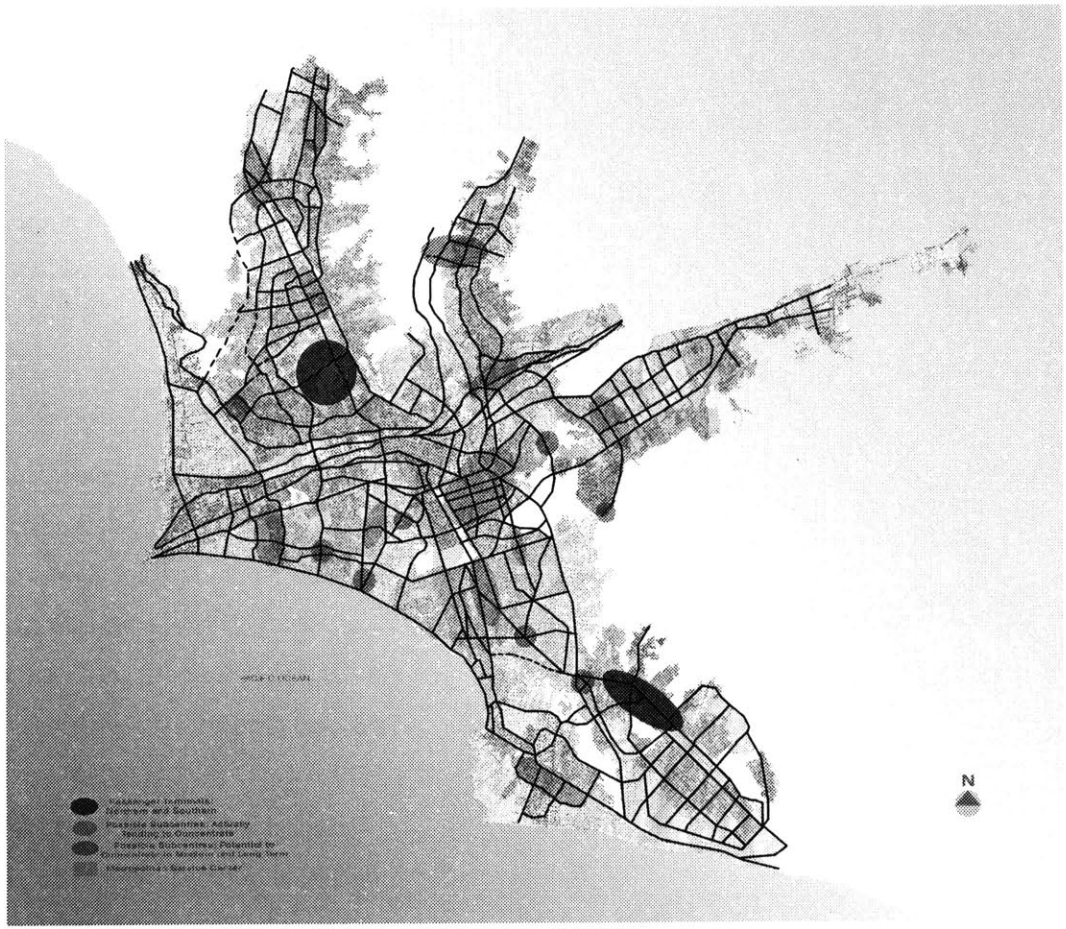


Figure 14: Sub-Centers Plan

Legend
Red: New bus stations
Dark Orange: Potential sub-centers with present tendency to concentration.
Orange: Potential sub-centers that currently are concentration areas.
Yellow: Central Business District areas

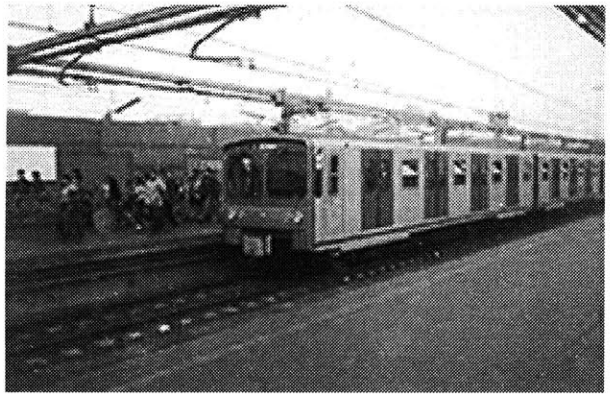


Figure 15: Metro Station in Lima

Source: www.geocities.com/cesarjimenez.geo

having a centralized system appropriate for a small (controlled) city, continued to be served by it and proved to be inefficient and substandard for a metropolis of such dimensions. [25]

Another important project proposed for the city that includes the site I am working with, is that for the creation of two new Transit Terminals. In 1995, the Metropolitan Institute for Urban Development made an analysis of the transit situation for Lima and determined that if the services provided by the Transportation Agencies were to be improved there was a critical need for specialized and up to date infrastructure. This is why two new Transit Terminals (Northern and Southern) were proposed. The areas for their location were outlined taking into consideration trip patterns, population concentration and origin/destination of passengers, as well as the actual location of existent bus terminals – both local and intercity. Important arterial roads and expressways were also taken into account, given that traffic would have to be re-distributed to the rest of the city and other cities in the rest of the country from each of them.[26]

Along the same lines, the Ministry of Transport and Communications has been working on the implementation of the first of five Metro Lines the city will have over the next decade. This is a project that was originally started in the 1980s and although the construction of the tracks was partially completed and some of the trains bought, the system was never put to work and the project was dropped temporarily. Five years ago, the Central Government and the Ministry of Transport decided to revive the project, adapting it to the current situation of the transportation network and to the actual population, planning it in such way that it would be flexible enough to adapt to future population growth and city expansion. [27]

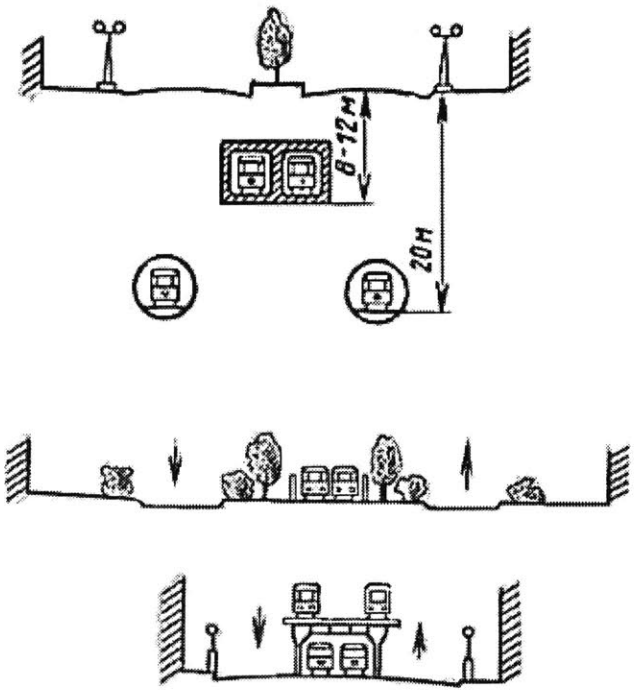


Figure 16: Alternatives considered for the design of at grade, below grade or elevated metro stations for the new "MetroLima." Transit Network
Source: www.geocities.com/cesarjimenez.geo

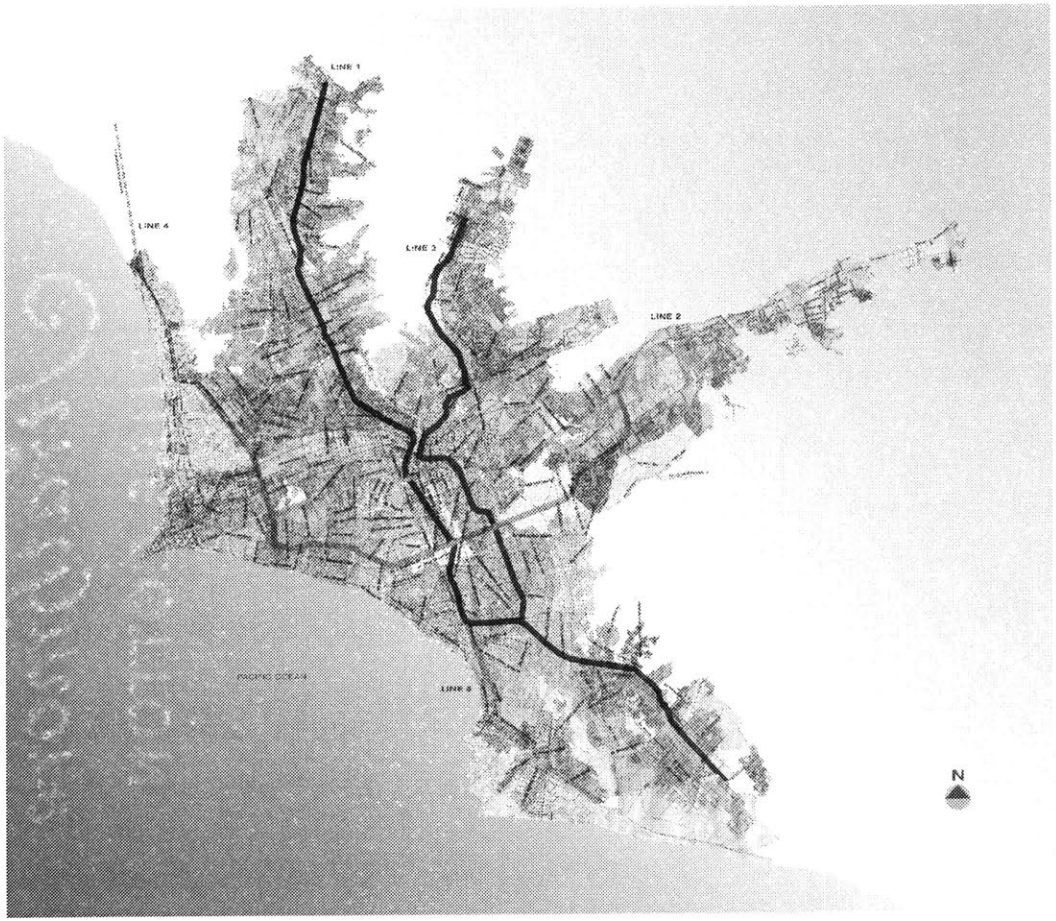


Figure 17: Plan for the Metro Network "MetroLima"

Five Metro Lines have been planned and laid out in such way that they cover the maximum possible area in the city and reach most of the districts in it, especially the poorest ones, where private transportation is almost non-existent and public transit not enough. The 'Green' Line is the one being

Figure 18: Above: Elevated Metro Station – Lima, Peru
Figure 19: Below: At grade Metro Station – Lima Peru
Source: www.metrolima.gob.pe

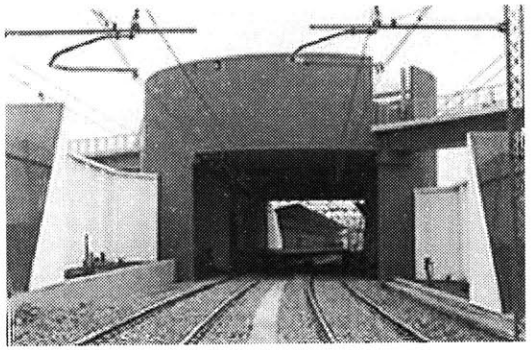
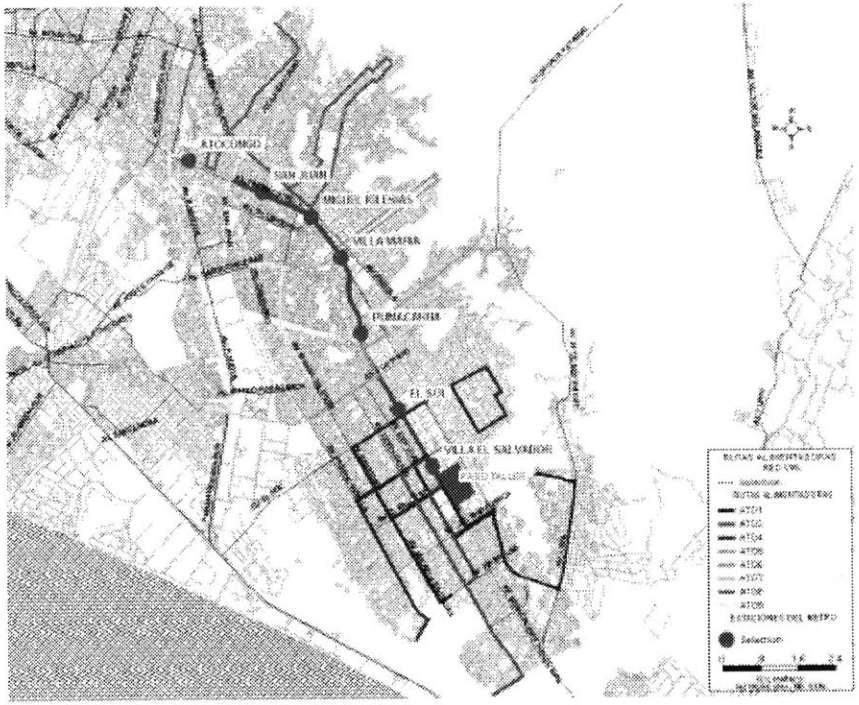


Figure 20: (Right) Map of the initial stages and first seven stations built for the Green Line (January 2003) (Source: www.metrolima.gob.pe)

built today and covers the city South to North along 25km of tracks. It has 18 stations distributed along a 10-mile-long stretch of which only the first six have been fully built and put to work covering 7km, while the seventh has been built but has not been implemented yet.

This line has been planned to run above ground for most of its route, but due to the fact that part of it crosses the Historic Center, it has been designed to run under ground for that specific stretch (not yet built) respecting and preserving the integrity of the historic and architectural monuments in that area. In the northern part of its route around my site, the line runs above ground, parallel to the Panamerican Highway and along another arterial road.[28]



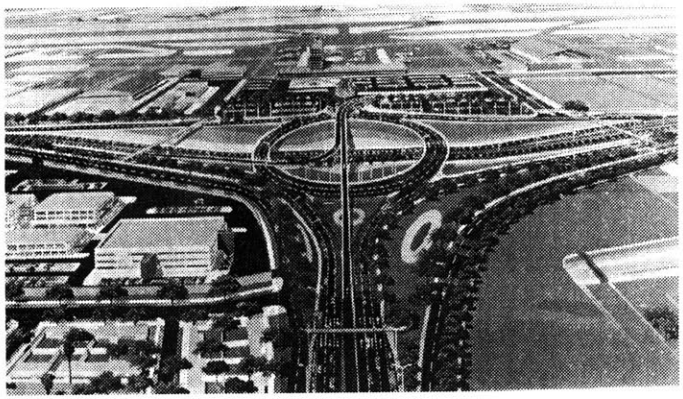


Figure 21: Bird's eye view of the redevelopment plan for the Airport Interchange

There has been a proposal made for the implementation of a transit interchange where the Avenida Tomas Valle meets the Avenida Elmer Fawcett at the Airport's main entrance. This project would enable better traffic flow and would separate private and public transit, thus allowing its better distribution and de-congesting the area.

The design was completed in the early 1990s but has yet to be carried out.

CHAPTER 5: INTERVENTION

DESIGN PROCESS

According to an evaluation made of several transportation facilities and the report that followed it, there are specific conditions in most (if not all) of them that make them appealing and comfortable to the users and interesting and unobtrusive to the context they are set in.[29] In order to establish the relationship the complex is going to have with its surroundings, it is important to recognize all the elements that play an important role in the design of the facilities proposed.

The same report mentions how the identification of such elements provides the basis for internal circulation, location of buildings and key elements as well as establishing visual and physical connections with surrounding areas, all of which will be primary during the design process and the final proposal.[30]

After having identified these elements, they were taken into consideration for the development of a series of concept diagrams, searching for the best fit of the requirements within them. It was important to give the boundaries, major paths and landmarks, as well as the major barriers, special attention, so as to have a coherent final design.

Another set of considerations for the design of the MPT was based on the elements I was interested in emphasizing on the scheme and those which needed to be controlled. Again, the report issued by the US Department of Transportation was used as the main point of reference for the exploration and identification of such factors, which were determined by them, by assessing existing Terminal Facilities in the US and establishing how they operate. They include recommendations such as the

maximization of direct paths within the building, the quality of the waiting areas, safety and security as well as the openness of the interior spaces. They also recognize that there is a need for the minimization of crowded spaces, conflicting paths and levels of transit, distances and the waste of space or volume optimizing the use the necessary areas.[31]

In matters concerning the design of the overall plan (not just that of the functionality of the Terminal), similar factors were considered (such as barriers, major paths, landmarks etc.) but this was done at a larger scale and involved not only the transit networks in the immediate areas but the street patterns and green networks.

PROPOSAL

The intention of this thesis is to establish guidelines, general enough to be applicable in different locations and contexts but specific enough that they can serve the purpose of fully providing a solid base for the creation of projects with similar characteristics and needs. Flexibility in all aspects for the adaptation of the scheme to varying socio-economic patterns is key.

The scheme and final design as well as the implementation of this proposal have to accommodate the possibility that one or several elements might not be completed in the future, whilst the overall result still has to be able to provide users and residents the minimum required infrastructure and facilities with the maximum of comfort and benefits. In short, economic setbacks should not determine the failure or success of the project.

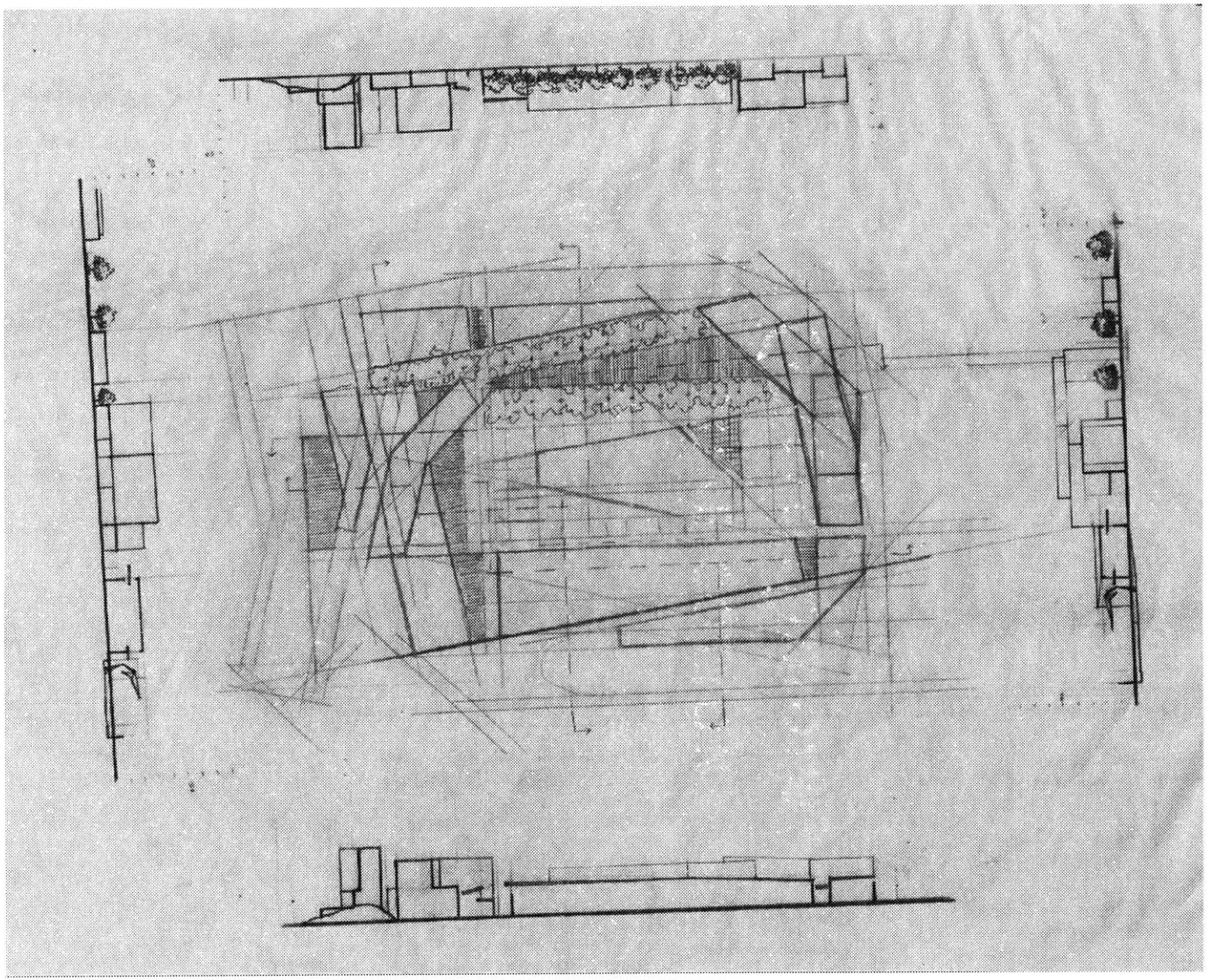


Figure 24: Concept diagram – Sections through site.

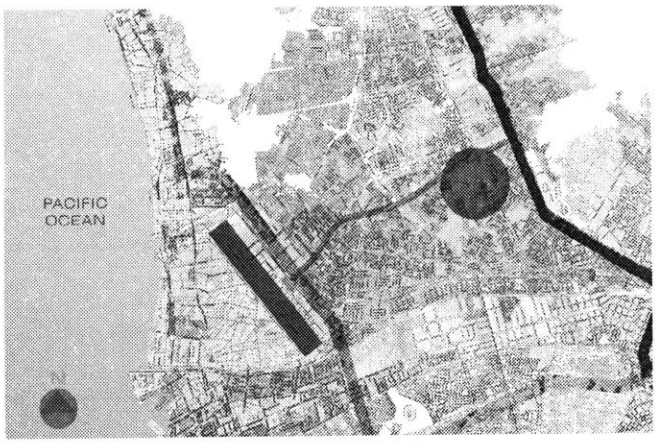


Figure 25: Alternative 1 - Trolley from Airport to Green Line

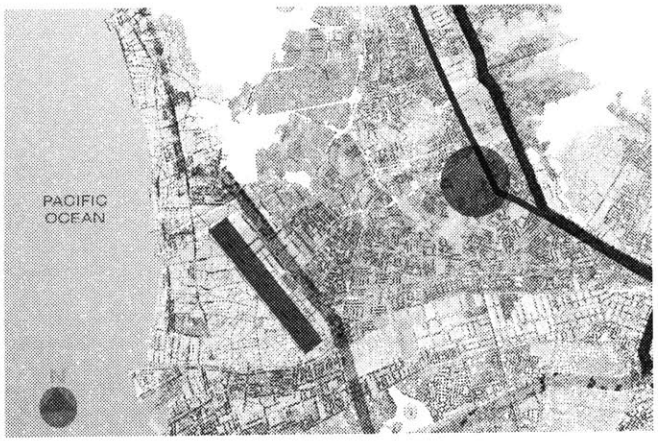


Figure 26: Alternative 2 - Re-routing of Green Line to run on Highway

The users and their activities should, based on how useful, efficient, fulfilling or entertaining they find the complex to be for their needs.

Multimodal Passenger Terminal (MPT): As mentioned previously, the MPT synthesizes different modes, movements and scales in one building and does so focusing on the paths followed by the users as well as on the limitations each of the modes might present for themselves and the others. As a main component of this project, I am proposing the implementation of a Terminal that acts as the booster for the area that as of now does not have an activator or generator of activities. The main metro line in the city (currently under construction) features a stop in its route a couple of blocks away from our site, along the Avenida Tupac Amaru (another arterial road in the area).

My proposal studies the possibility of rerouting and constructing that line so that it stops at the MPT and becomes part of the network I am designing, providing users with an easier transfer from mode to mode.

After analyzing the different available possibilities for the inclusion of the metro in this project, I chose the alternative that presented the most flexibility regarding its components, thus allowing the project to work even if (due to financial or political difficulties) it could not be fully carried out in the long run. Included in this alternative is the implementation of a trolley line running from the airport to the Avenida Tupac Amaru along the Avenida Tomas Valle.

Another possibility for this part of the proposal is implementing rubber-tired vehicles or a shuttle service that runs on dedicated lanes and have exclusive rights of way. As has been proven by the

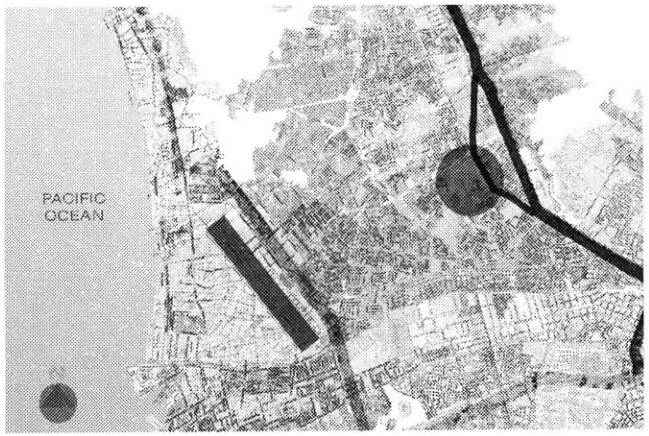


Figure 27: Alternative 3 - Re-routing of Green Line to stop at terminal and then re-connect to original track.

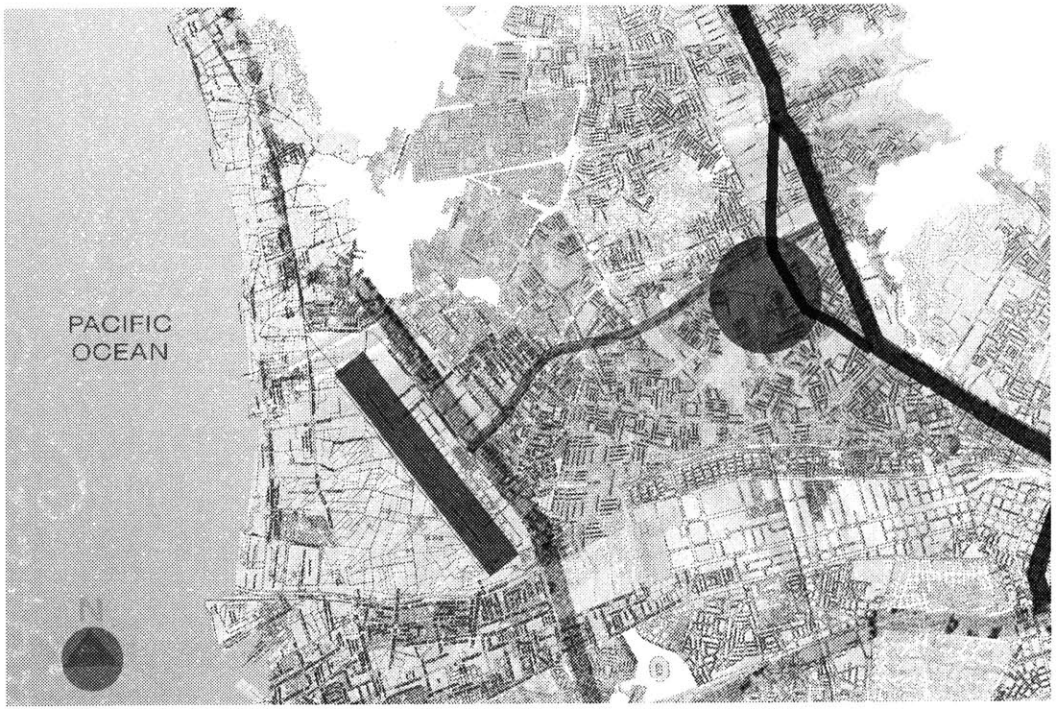


Figure 28: Alternative Plan - Combination of modes chosen as final proposal.

Trans Milenio project in Bogota, Colombia or the new bus system in Curitiba, Brazil, the system does not necessarily have to be light rail in order to be successful. These types of vehicles require less infrastructure and can move similar number of passengers than light rail, making them more affordable in the short run recover their investment in the future.

This intervention would make the connection between the air and land transportation agencies more direct, also providing for an efficient mode of mass transportation in a stretch of the city not served by the metro lines.

In this thesis, I am proposing the implementation of a complex that offers the residents in the area all the amenities they would find in the luxury residential and commercial areas of the city without the high prices and maintenance costs nor the limitations that come with them.

The scale of the different buildings in the complex is pedestrian friendly, yet embracing of the surroundings. It is through the disposition of these buildings that a series of small plazas (courtyards) has been created to allow the visitors to experience the space in their own way.

As part of the connectivity to the green network and the linkage between the site and the neighborhoods around it, the pedestrian paths meander through the site bringing the visitor from one space to the next and from one activity to the next. (Figure 36)

As a means of respecting the cityscape of the area, yet give it more definition the height of the buildings increases as they retreat from the street and as they move towards the hills (Figure 29). As has been mentioned before, the hills have been urbanized and give the impression of one massive building. Contrary to this, the fabric around the site is low built and does not define the edges strongly. The proposal intends to redefine the cityscape whilst accommodating itself to the urban fabric around it, so as not to appear completely intrusive.

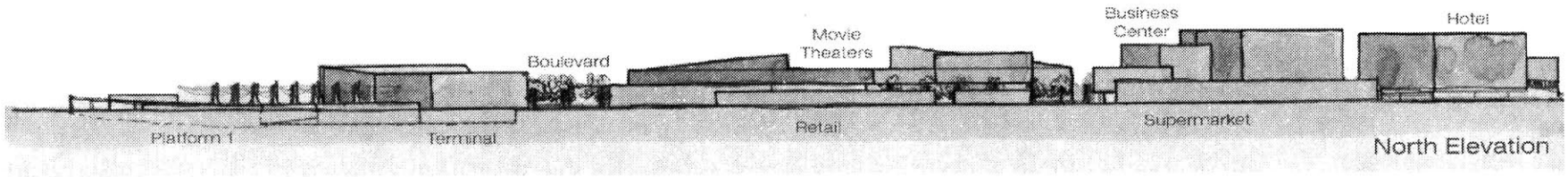


Figure 29: North elevation

An important issue to consider when determining the general layout of the project was how to make a tough environment like that of the bus terminal, more appealing to visitors and less detached from the context it is embedded in. A good way of being more aware of the relations between the different parts of the project is to analyze the flows of people and vehicle, both within the site and immediately around it. (Figure 30)

As part of the final design, I proposed to integrate it into everyday activities that involve people other than the transportation users, by making a direct connection between the terminal building and the retail areas and plazas. The provision of transition spaces between the different uses enables their interaction and promotes the integration of the buses in the commercial center.

I pointed out earlier on, that in Peru travel is never done individually and therefore needs support activities to entertain the different groups of users for variable periods of time. As another means of linking the terminal with the rest of the activities, both the food court and the ticketing areas in the terminal are located and have terraces oriented towards the public plazas and boulevard (Figure 33).

Several functional aspects of the transit agencies were taken into consideration for the design of the building and the immediately adjacent areas. The first issue I looked at was the overall

circulation of the buses. The interaction of buses and people in multiuse spaces is determinant in the success or failure of the project. It is more than just a matter of loading passengers and luggage and moving

them from one place to the other. How buses approach and enter the terminal, how they move within it and how they finally exit it to continue their routes, is primary to the efficiency of the system.

The coordination of paths and movements is the reason why the buses were given an independent access road in the design of the new interchange. This way they have direct access to the loading areas whether they are coming from the North on the highway or along the Avenida Tomas Valle. They have been given the same priorities when exiting the terminal and re-joining traffic on the highway and this has been achieved by establishing dedicated lanes and stoplights, as well as by re-directing local private traffic and giving priority to mass transportation and intercity transit.

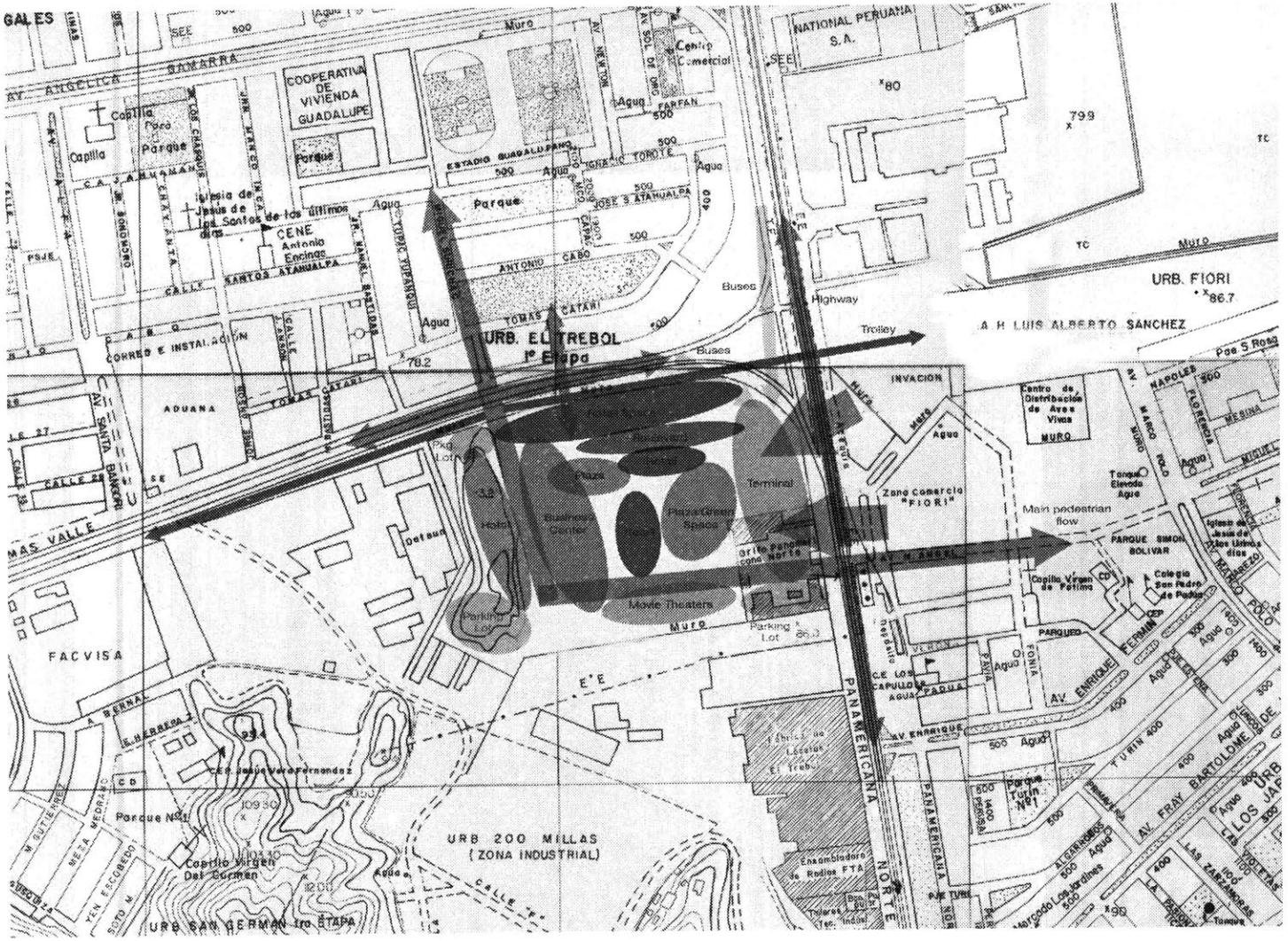


Figure 30: Schematic diagram showing the main flows both pedestrian and vehicular for the site and the immediate surroundings

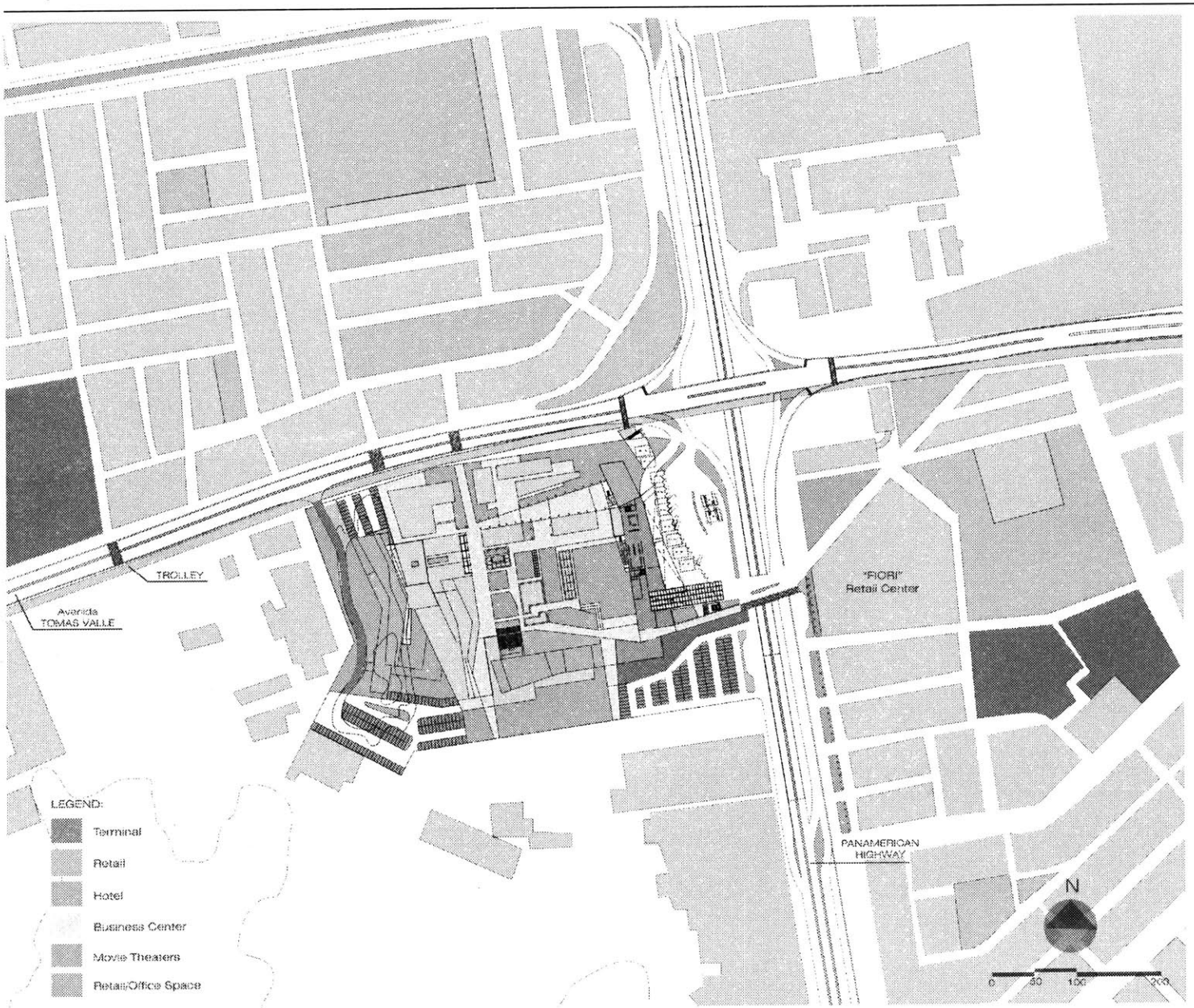


Figure 31: Master Plan

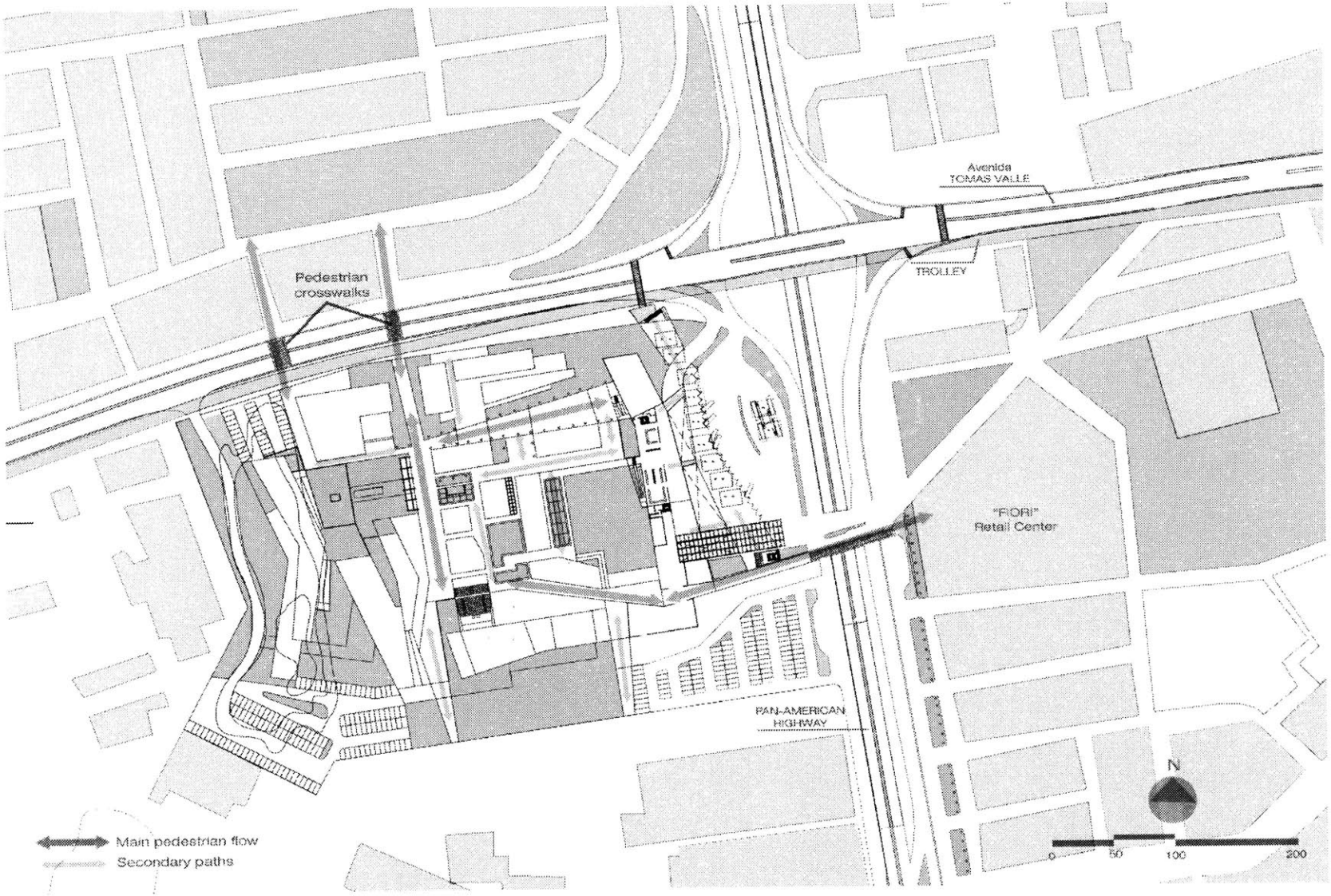
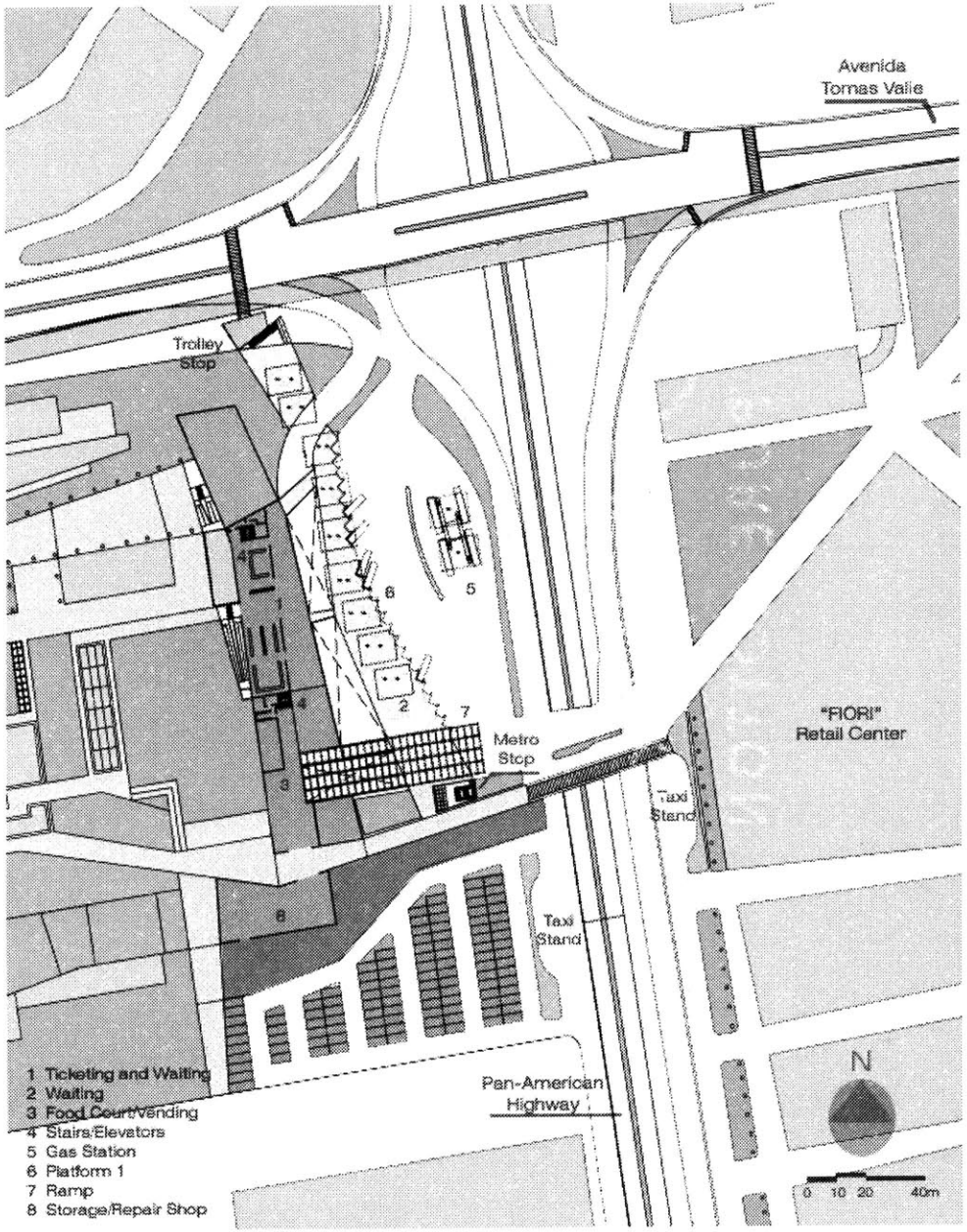


Figure 32: Pedestrian Flow Plan

(Plazas are in grey)



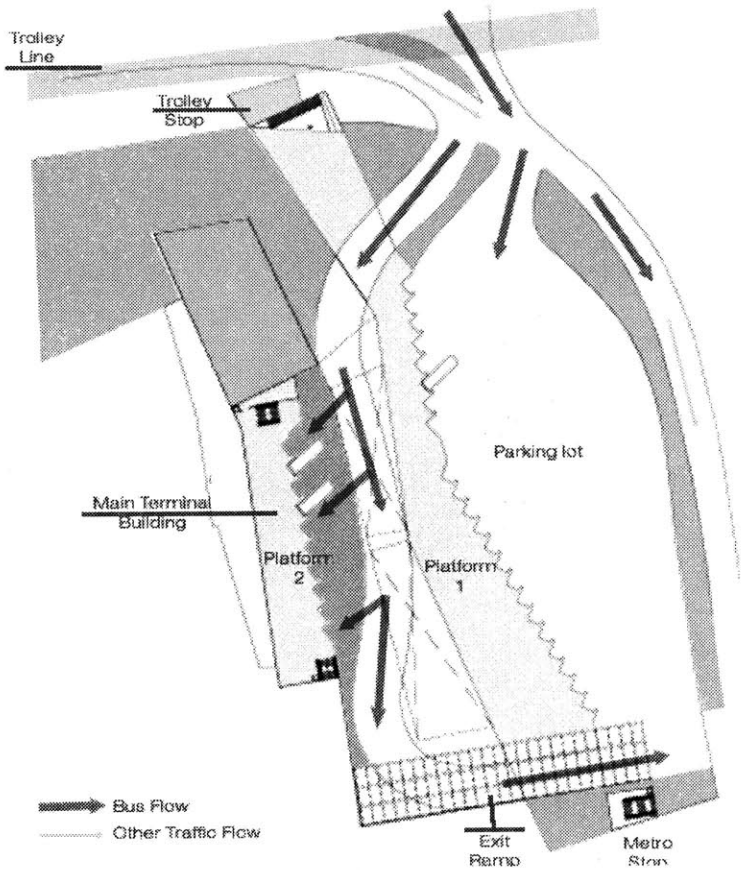


Figure 33(Left): Plan of the Terminal Building
Figure 34(Above): Plan of Platform 2 in Terminal Bdg.

In order to achieve a more orderly flow of the buses and a more coherent distribution of the passengers through the terminal, I have proposed the grouping of the buses according to the distances they serve, and arranged them in two separate platforms. The main platform level is at grade and has direct access from both the terminal and the trolley stop. It houses the long distance buses that for their size and frequency require more ease of accessibility. This platform is directly accessible from the terminal, the trolley and metro stops and the street. (Figure 35)

The second platform level is below grade (underneath the terminal building) and it serves the shorter distance buses. It is also directly accessible from the terminal and the metro stop, although people coming from the street or getting off at the trolley stop will have to enter the terminal building first in order to access the platform. (Figure 34)

The terminal building itself includes the main lobby area, ticketing counter spaces and waiting lounges, small retail spaces, and storage facilities for both long and short-term storage (parcels and luggage being transported and delivered or luggage belonging to passengers who need a place to store their things securely for a determined number of hours).

As a complement to the main terminal facilities and as a response to the demands presented by the bus company owners to the organizers of the competition, I am incorporating both a gas station and a repair shop into the design, which could serve both the bus carriers and the local public from the nearby communities.

New transit infrastructure: As part of the design for the transit system at the intersection of Avenida Tomas Valle and the Pan-American Highway, I am proposing a new road interchange. This proposal would substitute the interchange project developed 15 years ago but never built. It established the construction of a clover-leaf interchange that would take over the little green areas left between the neighborhoods and the highway, now acting as buffer zones.

There is currently no easy way of getting across from one side of the avenue to the other (big loops and turn-a-rounds can take up to 30mins during peak hours), the existent crossings are insufficient to efficiently keep traffic flowing and illegal turns just add to the usual chaos and congestion. The new interchange will consist of a straight by-pass that leaves the avenue on ground level and puts the highway below grade. By doing so, we are enabling the heavier traffic to move faster through the area while making sure that the increase in speed is not a potential hazard for pedestrians.

With this intervention and the by providing appropriate bus stops and cross walks, we are also ensuring that pedestrians do not jaywalk or jump the medians putting themselves at risk. We are as well making it more difficult for drivers (both private and public transport) to make illegal turns or cross lanes spontaneously, and hence making it a more safe and orderly environment overall.

A Diamond Interchange has been chosen as the best solution, for several reasons:

- **Lower investment costs** (upfront and long term) compared to those of a cloverleaf interchange. Given that the budget for big projects like this one is limited, we consider this a priority. I am totally aware that the partial reordering/restructuring of the network is primary if the

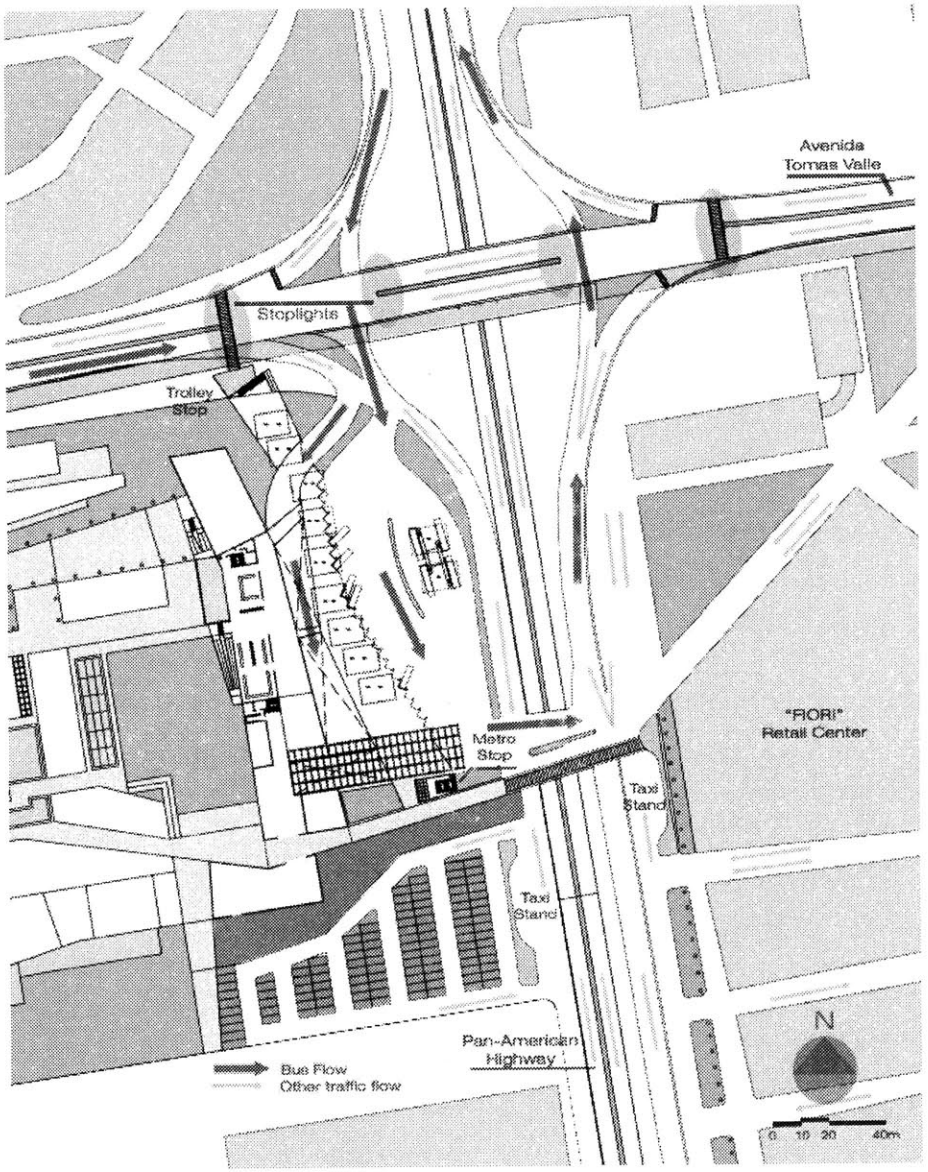


Figure 35: Traffic Flow Plan

• MPT is to work properly and will avoid, by planning the construction of the interchange ahead of time, causing major disruptions to the neighbouring communities. We believe this interchange is complementary to the Terminal itself but as important as it is to the project as a whole it should not represent a financial drawback.

It has been experienced in past occasions, that if parts of projects are not considered primary or too expensive they are cut out even after their construction has begun, which not only reflects poor planning and management, but a waste in resources and a final outcome that is far from satisfactory. Therefore to avoid these situations it is very important to consider all the possible events and have alternative solutions for them, higher costs being one of these possibilities.

• **More pedestrian friendly** than other types of infrastructure. Since the aim is to prioritize pedestrian movement, I thought it was important to minimize the number of crosswalks required to get across the arteries and the distance from origin to destination, as well as to provide the best solution for the sharing of the public realm by both pedestrians and vehicles. It is necessary to minimize the number of situations in which the paths of both pedestrians and vehicles conflict with each other, for this will play an important role in the outcome – successful or not and to what extent – of the project.

• **More flexible** regarding vehicular accessibility (on and off ramps as well as auxiliary roads). Given that both arteries operate in two directions, it is necessary to develop a design of the interchange that easily allows for various coordinated movements. This kind of interchange also

- allows for different levels of traffic to be evenly distributed and diverged in various directions avoiding congestion and increasing the availability of destination choices.

- **Less space consuming** (in the surrounding areas) hence permitting for the "remainder" areas to be used for other purposes – with the possibility of introducing green areas – as well as serving the purpose of creating buffer zones between the interchange and arteries serving it and the residential zones currently so desperately needed.

- **More orderly and sensible to traffic hierarchy:** the implementation of a Diamond Interchange allows us to clearly differentiate and separate traffic according to volume and speed, as well as create a safer and more efficient environment on each of the different levels of transit. Several stop lights are being proposed, all of which will be coordinated with each other to create timed movements and allow for traffic to flow as well as to allow for merging lanes to do so safely.

Pedestrian Crossings are being kept at grade to enhance the visual and physical connectivity we are dealing with and provoking with our proposal for this site, as well as increase the perceived sense of security of the area. In Peru, popular culture is such that above grade or underground crossings do not work as expected (pedestrians prefer jaywalking instead of using them, in many cases risking not only their lives but those of their family members and of the drivers themselves) and over time end up being dangerous places, due to both lack of maintenance of the infrastructure and of police/authority control. Therefore, by putting motor transit underground and giving pedestrians the right of way, we are foreseeing future problems and avoiding the unnecessary expenditure of resources on projects that will not serve any real purpose in the long run.

What will be achieved by the introduction of this Interchange?

Ease of traffic flow, de-congestion of the area, hence faster moving traffic even during peak hours as well as the prioritization of pedestrians in certain areas and of public/mass transit in others. It is part of the proposal to ensure the provision of safe pedestrian crossings and passenger pick up/drop off spots as well as bus stops. We are also pursuing the maximization of linkage between the neighbouring residential areas and the complex, as well as that of the nearby shopping center (Centro Comercial 'Fiori') to the project by means of enhancing existing structures and paths and reinforcing visual and physical connections between all the elements.

Other uses: In order to establish activities that will enable different groups of people to visit and enjoy the complex throughout the day, the proposal includes, besides the Bus Terminal itself, retail space (small retail, restaurants and a supermarket), a business center (targeting local companies and the bus companies that operate in the terminal), a hotel (for general public, transit passengers and bus companies' workers/staff), 3 movie theaters, entertainment space to generate night life and recreational areas for children.

A series of plazas and green areas have been incorporated into the scheme playing with the different scales of the context as well as of the buildings and uses in the complex itself. Although as we have seen the green network is strong and very well knit into the communities, I felt that there was a lack of articulation between the site and its surroundings and a lack of connection between the two communities at either side of the site. Hence the project would act as a the zipper for the area, bringing in the green (visually and physically) from the existent and linking it to each other creating an overall harmonious composition.

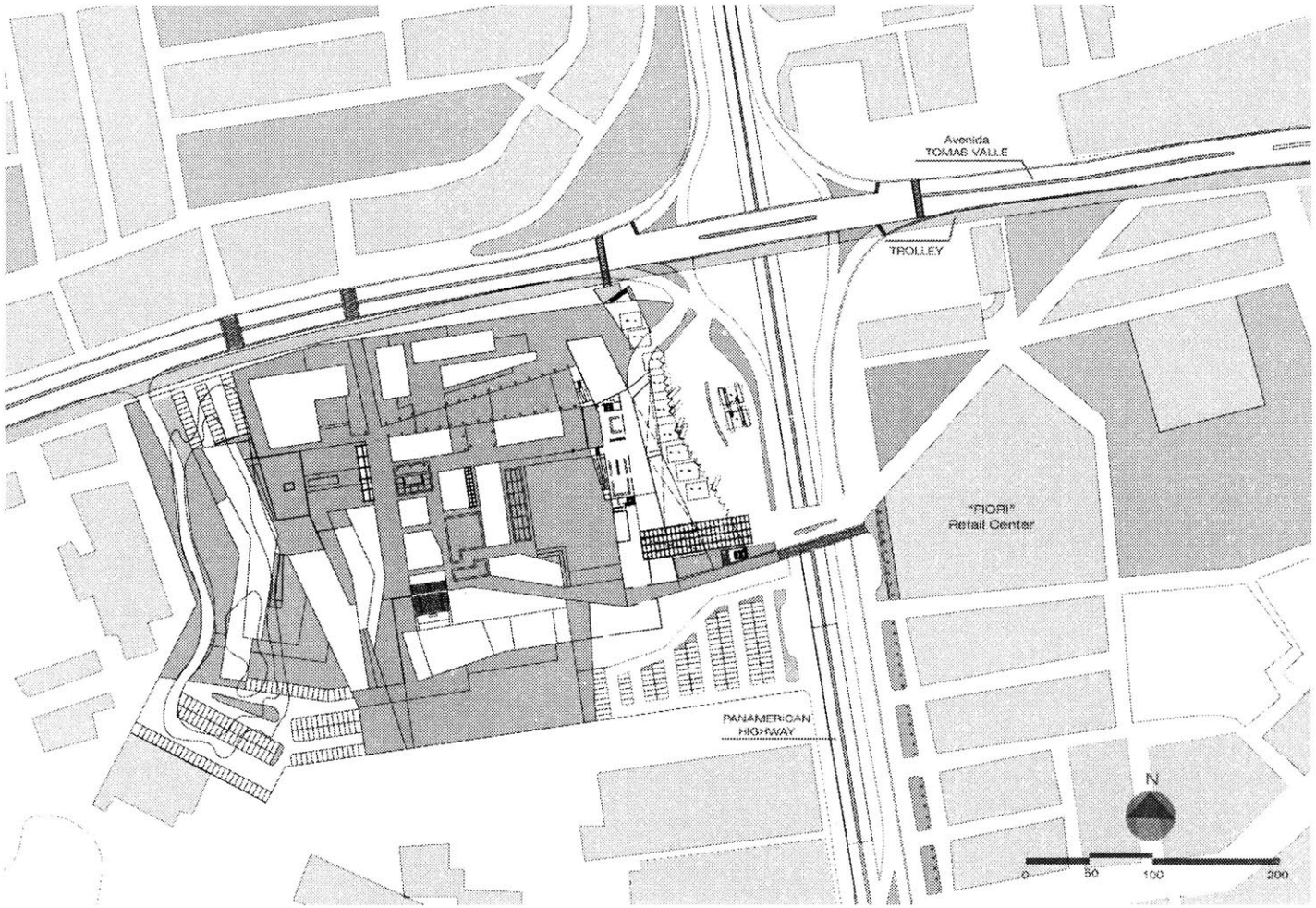


Figure 36: Open Space Plan (Plazas and Green Spaces)

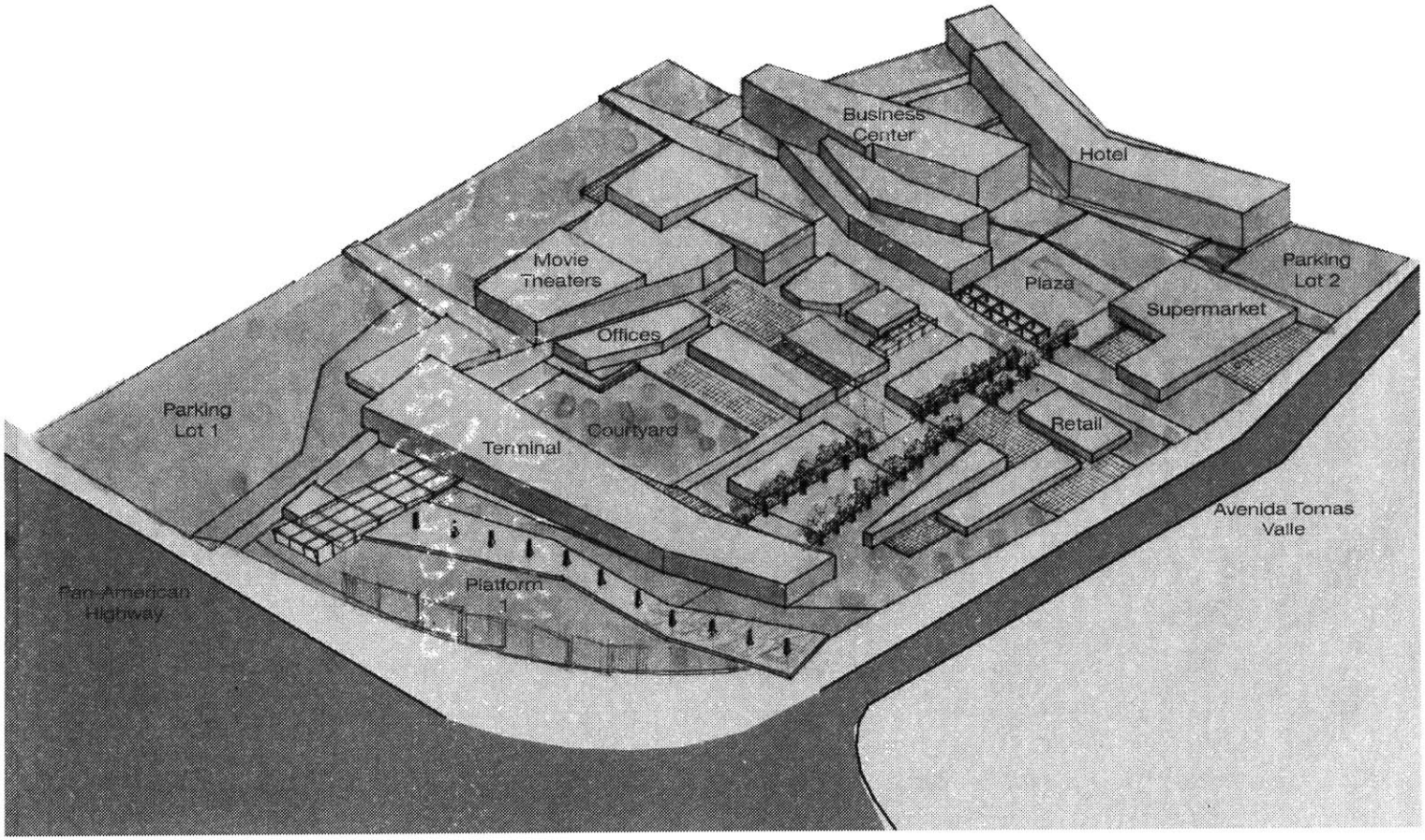


Figure 37: Bird's eye view of the complex from the north-east.

Phasing

This thesis proposes the phasing of the development of the project as a means to ensure that it will not remain incomplete or be abandoned due to lack of resources. This way it provides the alternative, of having a complex that offers fewer amenities but still presents itself complete and fulfills the 'requirements' and pre-established design/functional guidelines.

The phasing will take place over the next ten years, contemplating the possibility of reducing the time span, if funding allows it.

The First Phase will happen within the first two years after having started construction and it will include the Terminal and all of its directly related facilities such as storage space, ticketing areas, loading docks/islands, etc. The interchange and re-arrangement of the arteries is considered part of this phase as well, for it is an important part of the functional and practical considerations for the Terminal and its adequate operation. It may include (if possible) the Plaza and some of the retail as well as the first sections of the Hotel.

The Second Phase will take place within the first five years after construction has been started. It contemplates the completion of the public open spaces and Retail areas, as well as the addition/expansion of the existent Hotel and the construction of the first part of the Business center. Some of the entertainment facilities may be implemented but this will be subject to time and budget constraints.

The Third Phase takes place within ten years after construction has started and implies the completion of all infrastructure entertainment areas included, as well as the maintenance and repairs of previously completed buildings.

Design Guidelines

These guidelines are intended for the provision of a framework with which other terminals could be planned designed and built in the future. One of the main aspects I have taken into consideration when establishing them is the fact that the project has to be flexible enough to allow for its elements to be replicated in other parts of the city or even in other cities, given that the site and the players involved present similar characteristics. Another important aspect is the fact that these guidelines have to be able to provide alternatives for change and improvement, more than just solutions to problems.

The main design elements to be considered are:

Different scales: Because this project deals with various players and realms, both public and private, the need to incorporate different scales is absolute. Interventions are to be made at regional, local and site-specific levels and have to accommodate the specific requirements of each group, being flexible enough to change over time as user approaches vary and activities are affected by those variations. The treatment of the built form at the different scales should be coherent as part of the whole and easily read (individually) from each of the different view points (pedestrians, private and public transit...).

Nodes: Strategic points of the city where user/spectator can enter and be part of
Origin/ Destination points – directly related to paths
Movements of passage/passing from one structure to the next
Areas of concentration of specific uses or physical character[32]

The identification of nodes in the areas surrounding the site is necessary to create an active grid of places people relate to and use as way-finders and enhancers of city image.

I am proposing the introduction of new nodes in the area to allow for better recognition of the site within the context. The nature of this proposal is related to identity and image, to the encouragement of place making and strong community participation, thus requiring the introduction of new elements to tie it down and blend it in with the context.

Paths – Origins and Destinations: Establish order, organize and connect the elements of the city by and around themselves, as users and spectators follow them normally, occasionally or potentially.[33]

People generate movement, movement creates paths and paths determine origins and destinations.

This proposal is all about movement, scales of movement and the pace of those moves. It is about going from one place to another, transporting people and goods and in the end, bringing everything together.

Networks and systems: I am trying to bring up and make more noticeable the existent network of green and public spaces that are scattered throughout the area by making the connectivity between these spaces stronger and allowing them to stand out either by themselves (local impact) or as part of a system (broader impact – neighborhood-wise). By doing so and recognizing the need to incorporate the proposed scheme into it, we are bridging the gap that lies between residential and commercial/industrial areas and between private, semi-private and public areas.

This will also encourage (further) the use of the public space by the people who live and work around it as well as by those who are just temporarily in the area (permanent vs. temporary users: distinctions and similarities – provide for both).

Boundaries and Borders: Linear elements the user does not use as or consider paths

Limits or breaks of path continuity

Borderline elements: important organizational elements[34]

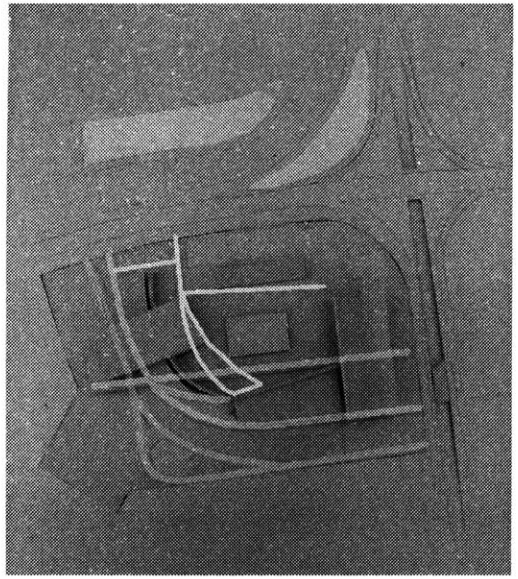
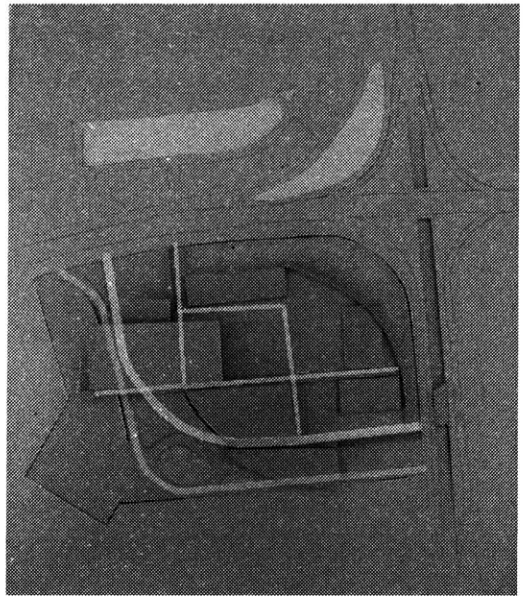


Figure 22: Early Conceptual models – main pedestrian and vehicular flows shown



Intervening urban fabric necessarily deals with borders and boundaries as elements either created by the spontaneous growth of the built environment or by the intentional delimitation of a specific area for its containment, differentiation or emphasis in a given context.

In this proposal the borders are already given and their appearance, both physically and visually strongly defined; thus our intervention needs to be able to deal with them and take advantage of the permeability they present in order to weave the new elements and conditions with the old.

I am proposing the establishment of the project as a zipper, a seam between the neighboring communities, having the borders act as transitional elements and emphasizing the continuity we focus on. In this specific case, the borders are sharply defined and this condition helps bring out the importance of the nodes that are being created.

Transit oriented infrastructure as the framework for new development: This will act as the starting point for the interconnection of open public spaces as a network, both spatially and visually, encouraging the creation of a new town center that includes transit facilities (targeting mainly captive users of long distance bus travel but serving the local transit lines as well) and business, entertainment and recreational spaces (open to the general public and acting as activators of the area at different times throughout the day).

Spine: As the project is being embedded into a green network, it is important to point out that there is a need for directional clarity; a composition element within the project that allows the organization of all the different programmatic parts around it and provides the structure for the whole complex.

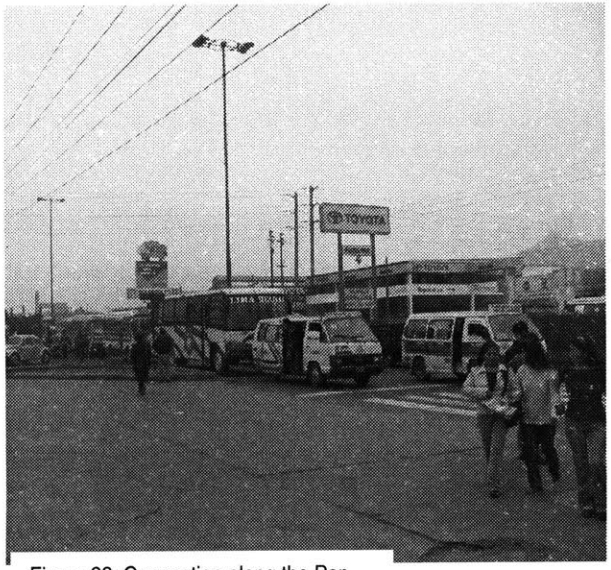


Figure 23: Congestion along the Pan-American Highway

It must as well deal with the specific issues this project presents and optimize the solutions to find the best fitting design for both pedestrians and vehicles. As it is to become the frame for the complex, the presence of other points of identification along it will help facilitate the orientation and recognition of the complex in the area.

Terminal: Currently the area doesn't have a major origin/destination point; therefore, both mass urban transit and regional transit operate in total disorder, creating congestion and not serving the public adequately.

Alternative: Provide a terminal with adequate services and infrastructure[35] that will serve the local communities as well as the public in general. Encourage the development of such terminal as a major transportation hub in the city, supported by the areas immediately adjacent to it. The future development of such areas will be necessary to keep up with the improvements generated by the implementation of the complex and the terminal itself. More importantly, become a city center for entertainment that allows for the better interaction of people and the socio-economic development of the immediate surroundings.

CHAPTER 6: CRITICAL ANALYSIS

Critical Analysis of the Proposal for the Passenger Terminal

As presented in the competition guidelines

As I mentioned before and as shown in Appendix A-1[36], the Ministry of Transport and the Intercity Bus Company owners have organized a competition for the design and development of the Northern Bus Terminal in Lima. This terminal is to serve those passengers travelling to cities North of Lima or arriving from them. Approximately 450 medium and small carriers are already involved in the project and will be required to formalize their legal status (if they are operating illegally) in order to participate.

The guidelines in this proposal establish the creation of a company that is to be responsible for the construction and future management of the facilities and related infrastructure. Bus owners are expected to become shareholders in this company and act as partners, with the right to actively participate in the decision-making processes and fully benefit from the revenues obtained over time.

The set up of the company establishes a minimum number of shares each individual must have to be active and allows them to buy as many extra shares as they can afford. As added benefits, they can make full use of the Terminal's infrastructure for free and obtain discounts on different services provided as well as on the rental or purchase of office and retail space.

The majority of the initial cost for the development of the project will be covered by private investors as well as by private banks. These payments will later be taken over by the shareholders and the initial capital returned in fees. By doing so, the participants become the owners of the terminal facilities and have benefits (long and short term) now non-existent.[37]

The proposal contemplates the possibility of integrating local and intercity transit in one place but does not plan for the incorporation of other means of transportation. As I pointed out previously, the Metro System is currently under construction and probably will not be completed for the next 15-20 years. Despite this, the planning for the future implementation of its services has to be done now, if it they are expected to function effectively and if they are to be inserted in the city in a manner that accommodates changes and growth.

The lack of planning for the incorporation of future projects and the need to improve the efficiency with which transfers take place, as well as the ease of accessibility and connectivity, both within the terminal and the complex as well as with the surrounding areas, are some of the reasons why my proposal contemplates the possibility of incorporating metro and trolley stops within the complex.

These stops will serve the purpose of effectively and efficiently getting people to their destinations, whilst interconnecting the transit modes and providing a broader transportation system. I have proposed two trolley stops along the northern front of the complex and one metro stop adjacent to the southern end of the Terminal, leaving open the possibility of implementing another metro exit. By doing so, I am going beyond the concept of the terminal being the space where the modes meet and actually making a physical connection between them.

As an important part of my design, I have taken into consideration that even though the metro lines are not yet built and may never be fully implemented, the functionality of the project still has to be intact. Despite having mentioned this topic in other instances of the document, I believe it is so important for the future development of the area that it needs to be reinforced and strongly linked to other ideas of the proposal.

Regarding programming, the competition guidelines establish a series of facilities and activities that cater mainly to the transportation agencies and their users. Over time, the diversity of the activities and services would have increased to an extent where the development would be appealing to a broader range of people. My approach to the project establishes from the beginning, that although the Terminal is one of the main components, it is what the complementary elements offer what will draw people to the site and that will activate the area.

Given the current land uses in the area around the site and based on the tentative propositions made in the guidelines, I provide different alternatives to attract diverse groups of people. Small-scale retail and a supermarket to appeal to local shoppers, movie theatres nightclubs and restaurants, hotel and business centre.

CHAPTER 7: CONCLUSIONS

Conclusions

Having analyzed the situation presented, having looked into the projects done by different governmental agencies as well as private developers, and having critically looked at the guidelines submitted for a Design competition in the area I am working, I am able to conclude that :

- In order to fulfill the needs of the transportation agencies involved, fulfill the expectations of the area's residents and create a new urban center that generates enough activities during the day to re-vitalize the area, there is a great need to fully connect the area with the major transportation networks at both regional and local level. There is also a need to eliminate barriers and conflicting paths to make the area more appealing to pedestrians.
- As a means of achieving a successful outcome, it is necessary to integrate and complement the existing urban fabric and services. The implementation of new infrastructure will act as a support element and the services provided as amenities for the residents of the area as well as for the visitors.
- The complementary services provided have to target the resident population and not just the captive users of the system, because this will allow for the activation of the area at different times of day and will raise the profile of the complex, differentiating it from other terminals that may exist in the city. They will help change the negative image transit stations have because of the types of activities that take place in and around them, as well as the effect they have on the neighboring communities.

- The flexibility of the project and its different elements regarding programming, planning and implementation as well as future changes that may involve the removal of one or more modes from the MPT or the consequences of city and population growth, will determine the level of success of the project in the long run.
- The location of complex projects such as this one in the urban environment, is essential to the effects the new development will have in the areas immediately adjacent to it and to how effective it will be in actually providing solution to transit problems.
- The complex and especially the terminal buildings need to be highly visible and easily accessible to ensure that both passengers and transit vehicles can get to their destination in the most effective and efficient way.
- By providing several options for accessing the complex and appealing to different groups of people I am ensuring that their needs are fulfilled and their expectations are met, encouraging further development in the area and as a consequence, generating jobs and revenues that benefit the community.
- The funding of the project is as important as the planning itself, because it is what will enable its construction and implementation. Therefore, it is absolutely necessary to find the most convenient funding plan, whether this is through private or public entities.

Recommendations

As a means of further exploring the extents to which this proposal can have a positive effect on the communities it is related to and as a way of leaving open questions for future interventions I have set up several recommendations:

- The trolley system proposed to run along the shoulder of the Avenida Tomas Valle could be carried out further and the service extended to join the ring road network. This would make the connection between modes stronger and the weaving of the transit networks in the city, tighter. This implementation would also provide better transportation services to a larger population, and would definitely encourage development along its route, generating income for the residents.
- As mentioned in previous sections, the MPT will improve the image of transit stations and stand out as an icon in the area. As a way of making this more obvious, it would be necessary to devise a large signage element that complies with the municipal regulations specific to these items, and locate it on the border between the terminal and the highway so that the visibility of the complex is increased.
- The zoning laws for the area should be adapted and enforced, to ensure that when the area gets developed there are no barriers created between the complex and the surrounding areas. These measures will allow the street life created by the different scales of the buildings and the diverse activities in them, as well as the quality of space provided by the plazas and green spaces, to remain accessible and appealing to the users.

- The coherent and thought-out design of the public spaces in the project is primary to encourage their use. Landscaping will liven them up and provide a rest from the massiveness of the built environment. Street furniture will make them comfortable and safe if it is responsive to the environment and strategically placed.
- As an extension of the Phasing plan I have proposed, it would be interesting to think about the possibility of developing the southern portion of the site and opening it to the residential area that is directly behind it. Currently, the area is not built but the trend observed allows us to predict that in a relatively short period of time (10 years it will be completely urbanized. It would be a loss to the integration of the complex in the area, if it had a backside shutting off one of the neighborhoods.
- The linkage that has been established with the surroundings would be broken if one of the sides is not acting as a zipper. Therefore, there is a need to reinforce the permeability of the project and strengthen its role as a hinge or pivoting point within the urban fabric. There is a need to completely seal the void that now isolates communities from each other.

Notes

[1] According to numbers disclosed by the Ministry of Transportation the percentage of informal companies or carriers only adds up to approximately 30%, although it has been reported that for the past couple of decades the number of companies illegally operating in Lima have greatly surpassed the statistics given. This is mainly due to the fact that it is hard to keep track of these companies and the routes they operate in. A lack of control on the authorities' part and an evident managerial disorder result in numbers that obviously do not reflect the reality seen on the streets.

[2] As a consequence of the lack of control mentioned before and the excessive number of urban transit companies that compete for a reduced market the number of traffic accidents generated by these companies is on the rise. The Ministry of Transport reportedly says that there are three times as many units as necessary and that the demand for trips is approximately 8.5 million per day whilst the offer for the same number of trips is equivalent to 20.5 million per day (www.inei.gob.pe). This shows that the market could be reduced by a third and be more effective not to mention less congested hence reducing pollution and the unnecessary trips through the city that lead to delays and wasted time.

[3] www.inei.gob.pe, INEI – National Institute for Informational Statistics

[4] The Ministry of Transportation (for purposes of clarity and ease of number handling) has divided the country into three different corridors – North, Centre and South - and those into sub groups to allow for a better control of the routes being served and the carriers that serve them. The numbers disclosed in the statistical reports issued by the Ministry refer to those different groups and only to the formal companies.

[5] This information was last updated in 2002, based on the Municipal Survey conducted for population statistical records that same year. (Source: National Institute for Statistical Information - INEI)

[6] www.inei.gob.pe, National Institute for Statistical Information, Distrital Information

[7] During the first stage, the migrants live in shacks made out of woven hay mats, scrap material or whatever they get their hands on at that moment. This stage lasts for a couple months.
The second stage lasts longer than the previously, maybe a couple years, and involves the evolution of the shack into a one-room house usually made out of bricks that are laid out but not fixed with mortar. The roof is still made out of lightweight plastic or scraps of metal sheets. The streets and open spaces are laid out and the main public buildings such as churches or day care centres are built.
Stage three can last several years. It is highlighted by the fact that the government is involved in the formalization of the settlers and some services are installed. The houses are usually halfway built and most of them are prepared to have a future second or even third floor. Although streets are not paved the main roads have sidewalks and trees along them.
The last stage is the longest and could be considered the seam between the informal and the formal, the squatters and the citizens. It is not easy to define the exact changes that take place in this stage and not clear how the passage or full inclusion into the city scene takes place.
However, for most settlements it takes about ten years if not more, to cross over. Many are still developing after being considered districts and no longer seen as shanty towns. New migrants arrive everyday and start (continue?) the process.

[8] Lima was laid out under the Law of the Indies in 1535 and the initial orthogonal grid was based on blocks measuring 100m x 100m (300ft x 300ft). The grid extended over the years following the same direction, but came to a halt when the City Walls were built (1684) in order to defend the city from naval attacks. When the walls were taken down in 1868, the expansion of the city was done in a more 'organic' manner, following the course of the river, adapting the streets to the hills that surrounded the city and to the cliffs that create the edge between the city itself and the ocean. During the first half of the 19th century, as part of urban renewal, the plan for the city included the introduction of diagonals that connected one end of the city to the other and the creation of new plazas, turnarounds, and public spaces.
As a means to give a better sense of the development of the city, and according to Ortiz de Zevallos in "Urbanismo para sobrevivir" (Urbanism for Survival) Lima's urban development can be divided into six stages:
1 – 1535-1684: Spanish Lima
2 – 1684-1880: Walled city3 – 1880-1921: Axial or French layout
4 – 1921-1930: Irradiated city
5 – 1930-1970: Expansive city
6 – 1970-onwards: re-used city

[9] Having worked with the Ministry of Transport, and after evaluating the situation of transit and the available alternatives for its improvement, Ortiz de Zevallos has established that given that 53% of the total trips generated per year nationally, serve the northern part of the cities, and that 32% of these serve the southern parts of the country, therefore considering the need to establish formal transit hubs in these areas, primary (pg. 56).
[10] "Urbanismo para Sobrevivir", pg. 50
[11] Darwin prepared the report on "Multimodal Passenger Terminals" for the Canadian Government and the Department of Strategic Planning of 'Transport Canada' in 1982.
[12] "Design of Cities", pg. 34
[13] "Multimodal Passenger Terminals", Darwin, pg. 6
[14] The construction of one of the five lines of 'MetroLima' has begun in 2001 with the first 10 km of it having been built already. Only 7 stations are currently fully operational.
[15]"Multimodal Passenger Terminals", Darwin, pg. 13
[16] As of now, the bus network is stressed and provides services well over the demands of the public, as a result of the lack of jobs and the ease with which independent people can join the business. According to statistics prepared by the Ministry of Transport, 8.5 million daily trips, out of the 10.5 million total for the city of Lima, are covered by public transportation. The necessary fleet of vehicles to cover these demands successfully is equivalent to a fifth of the existent fleet, demonstrating the disorganization and lack of control that rules the transportation system.
[17]"Multimodal Passenger Terminals", Darwin, pg. 11
[18] According to the Ministry of Transportation and the National Institute for Statistics, land transportation leaves a total of 3 deaths per day and represents a loss of about $500 million per year in man/hours lost due to delays and poor service of the bus system. Of course, the cost of man/hours lost is relative to those who spend those hours in buses or urban transit, and varies according to the value each person assigns to their time. In this specific case the main public that is being targeted belongs to the lower socio-economic classes hence being considered captive users of massive transport. Private transportation is an expensive alternative and the long distances travelled by bus represent a cheaper mode with longer hours spent in the daily commute.
[19] The number of bus carriers varies year to year, depending on economics and demand. The latest statistics show that there were 247 carriers given concessions in Lima and operating in Lima to June 2001 and 238 to December of that same year. See Appendixes for further information on the distribution of carriers by department.
[20] Whether it is that they use public or private transportation the necessary accommodations and facilities have to be provided for easy access and flow of vehicles around and within the complex itself. Drop off/pick up areas as well as temporary and long term parking is being provided to fulfil these requirements.
[21] Disinterest has been one of the main causes of failure in projects similar to this one. In situations where the government has been the major investor for infrastructural upgrading, the initial costs have been covered but the maintenance costs seldom have, leaving the burden on the participants who can hardly ever afford it, hence leading to the early deterioration of the structure. By creating a public/private partnership and allowing the company owners to be shareholders and become directly involved in the new venture, they are fully aware of the operating costs of the building but also first beneficiaries of the assets created and the revenues obtained.
[22]"Multimodal Passenger Terminals", Darwin, pg.14
[23] The Panamerican Highway runs parallel to the shoreline from Venezuela to the tip of Chile connecting most of the South American Countries. It has been built in stages and individually by each country throughout the years. Most of its construction was done during the 50's and 60's.
[24] "Plan Regional de Lima y Callao", Municipal Government for Lima Metropolitan Area, pg. 38.
[25] "Plan Maestro de Desarrollo Urbano del Cercado y del Centro de Lima", Municipal Government for Lima Metropolitan Area, pg. 75
[26] The analysis of the areas and the schematic proposal for the terminals was done almost ten years ago, however neither of them have actually been implemented.
[27] www.geocities.com/cesarjimenez.geo, Plan for the metro network in Lima
[28] $300 millions have already been invested in the construction of the first section of the 'Green Line'. The remaining three sections are estimated to cost an extra $2.03 billion, $1.8 billion of which have already been negotiated and plan to be invested until 2010.
www.strategis.ic.gc.ca/ssg/dd71952e.html
[29] US department of Transportation, "Evaluation of Intermodal Passenger facilities", pg. 101
The Evaluation and later the Report were done as a way of identifying the key elements (positive or negative) that affect existent Terminals, in order to be able to avoid making the same mistakes in further projects. The ultimate

purpose of the report was to have a baseline for the creation of a highly efficient, highly coordinated system that accommodates all the required function and operations of the different modes.

[30] ibid, pg. 105
The elements that need to be identified are: points of access, transfer points, nearby transportation corridors, important areas of the facility, neighbourhood land use, landmarks, environmental setting and joint development. All of these are important in the process of establishing a conceptual relationship between the functional and physical elements of the facility.

[31] ibid, pg. 121
All of these guidelines were obtained by surveying the users of the transportation facilities and compiling the results.

[32] "Image of the City", Lynch Kevin, pg. 48

[33] ibid, pg. 47

[34] ibid, pg. 49

[35] See Appendix A-10 through A-13 for a more explicit description of what adequate facilities and services are.

[36] Competition for the Design of the Northern Bus Terminal – Guidelines. Document provided by the event planners and handed out as the basis for the project. In it they outline the context, main players, project advantages and disadvantages for each group of participants and expected future development.

[37] It is not very feasible in terms of cost effectiveness, for small and medium sized carriers to have their own terminals because their margin of cost and profits makes it virtually impossible to cover investment and maintenance costs whilst making profit off of it.

A-1. Competition for the design of the Northern Bus Terminal – Guidelines

(These Guidelines were given to the parties interested in submitting proposals for the competition. They have been directly translated from Spanish and they reflect the requirements posed by the investors and the carriers forming the new company, not necessarily my own.)

1. Precedents:

1.1 The General Law for Transit and Land Transportation was approved under the article No. 27181, and it regulates, amidst other issues, the creation of Passenger Bus Terminals for regional transportation.

1.2 The mentioned law was regulated by the Ministry of Transportation and Communications, establishing in further detail the requirements and characteristics for Passenger Bus Terminals for regional Transportation, as well as the competitions to be held for the allocation of licenses and permits.

1.3 Under such dispositions, the Metropolitan Municipality for the Province of Lima has dictated specific regulatory guidelines for regional transportation, in which is included the establishment of intangible zones for the exclusive use of the Bus Terminals. As a consequence of the latter, a large part of the transportation agencies have felt that the operation of their actual terminals is threatened and have started to take action.

1.4 The great numbers of people who use the terminals (currently operating in the areas immediately adjacent to the Historic Center of Lima and the districts of La Victoria, San Luis and Brena), the operation of informal/unauthorized bus stops, and the conflicts and chaos this has as consequence on general traffic and vehicle congestion, have generated a negative attitude on the people involved.

1.5 As a response to this, the municipal (provincial and local) authorities are making it more difficult for the informal stops to function freely, to the point where they have established deadlines for their eradication. On the same level, the communities affected by these issues have formed an alliance opposing informality, which, although it provides thousands of families with a regular income, has brought more negative than positive aspects to their lives. The problems with street image, transit/congestion and safety, in the areas adjacent or directly related to those where the majority of the terminals are located have contributed to the negative perception of the public towards this specific economic activity and the participating agents.

1.6 It is necessary to recognize that the infrastructure and facilities in which passengers are picked up or dropped off do not count (usually) with the most basic conditions of safety, security, comfort or even hygiene for both passengers and their families/friends or for the staff members themselves.

1.7 Along the same lines, the chauffeurs and other crewmembers are not provided with any kind of infrastructure for resting in between shifts, or for that matter for adequately and safely fulfilling their duties. Most of the existing terminals and bus stops lack the necessary space for maneuvering (pulling in and out) hence the great numbers of them that actually do so on the streets, endangering by-passers as well as the people on board.

1.8 However the lack of infrastructure is mainly due to the lack of resources to appropriately run the bus companies and provide the commodities necessary for it – it would imply the payment of extra capital, nonexistent, which would definitely affect the viability of the operations.

2. Proposal:

2.1 Having such situation, we are proposing the implementation of a Grand Passenger Bus Terminal for Regional Transportation that will provide its services to all the Regional Land Transportation companies currently registered and appropriately legalized, with the same benefits for them all.

2.2 As projected, the first terminal will be located in the northern part of the City of Lima, having direct access from various main arteries and will serve those buses that are either coming or going to the north of the Country. In a near future the second terminal will be established to fulfill the needs of those traveling to and from the central and southern parts of the country. They will all have the same basic characteristics.

2.3 The Bus Terminal will be operated by a society formed by diverse capitals, amongst which we can point out the individual contribution of those directly related to the transportation services who will (in exchange for the amount invested) benefit from the infrastructure and different services provided in the terminal in a preferential manner. They will as well, receive a relative proportional part of the income generated by the terminal (in a monthly or yearly basis) and this will also be linked to the use their buses and their customers make of the terminal. Another benefit is the right to vote and participate in the general meetings and the right to elect the members of the executive committee.
These are the stock shares we will be calling "A".

2.4 Another group that will be integrated into the operating company with initial capital is that of an important number of PYMEs (Small and Medium Sized Enterprises). Around 2000 representatives of this booming group will participate and activate part of the commercial/retail area of the Bus Terminal, giving it an additional attraction point for visitors. This group of small and medium sized entrepreneurs will contribute with smaller shares of capital and will as well be entitled to participating in the general meetings and the elections of the executive committees. Due to the given structure of the capital this stock shares are being called "B". Any third party interested in the deal can be included in it, as these shares can be purchased freely. They represent the majority of the social capital of the company, therefore guaranteeing to those holders of the type "A" shares the benefits formerly mentioned.

2.5 Additionally, there will be a third class of shares, "C", which are destined to those investors who are interested in the deal and can afford it but lack the interest of participating in the administrative and management related issues of it. These shares do not have the privilege of voting or participating in the general meetings. Instead they benefit from receiving dividends each and every time the company (terminal) presents a surplus and to receive an additional portion for every share owned, besides the right to be informed of the economics and politics of the company regularly. They are entitled to the possibility of increasing their share every time the company's capital is increased.

3. Advantages:

3.1. For the transportation agent:

3.1.1. The implementation of the Bus Terminal and management and handling, through this, of a huge numbers of passengers and buses, will allow the participant transportation agents to access (and benefit from exclusive discounts) basic resources such as gas and petrol, and maintenance equipment such as tires, lubricants, etc. as well as any other parts that might be needed for repairs.

3.1.2. The corporative negotiation of prices for insurance, financing, administrative/economic/legal/technical advisory and training (both for owners as for their personnel), will grant them access to competitive prices (definitively better than those individually obtained) and hence allow for the improvement of the cost structure of each of the companies involved, making it possible for them to develop their companies and increase their benefits faster.

3.1.3. Beside all the benefits already mentioned, the operation of the Bus Terminal will encourage the generation of other sources of income that will ultimately benefit the company owners and their workers, in the form of direct bonus payments and cash, proportional to the volume of passengers that each individual company brings to the terminal and that makes use of the infrastructure, apart from discounts and other bonus benefits for whatever amount of money is spent in the terminal by the passengers.

3.1.4. The establishment of recreational facilities and entertainment areas, will give the transportation agents in association with the owners of such facilities, the opportunity to generate new points of attraction with which they can advertise this destination in other cities, increasing in this way, the potential number of passengers with Lima as final destination – more specifically the Bus Terminal and whatever events are taking place in it.

3.2. For the Micro-Entrepreneur:

3.2.1. The owners of small or medium sized companies, in his condition of share holder will be fully entitled to use and exploit a retail space allocated to them within the retail area in the Bus Terminal.

3.2.2. It is estimated that approximately 150,000 passengers are going to be using this terminal (75,000 leaving the city to other destinations and 75,000 arriving in the city) on a daily basis. It is known though, that passengers do not travel by themselves, for they are seen off or received by family members no matter the length or duration of the trip, hence increasing the numbers of people that can potentially use the terminal and the facilities and services offered in it. This is a socio-cultural characteristic that needs to be exploited and taken advantage of, for they are all (passengers and family/friends) captive users.

3.2.3. Additionally, the implementation of recreational activities such as movie theaters, clubs and bars, a variety of restaurants, a convention center or office towers, will provide an important additional number of clients to support the Terminal without affecting the quality and price of the services and goods offered.

3.3. For the Users:

3.3.1. The passenger/user of the regional buses will benefit from a modern terminal, that will provide them with all the necessary commodities and adequate level of service, such as waiting

lounges, ticketing counters/offices, storage and handling facilities, parking and guarding of vehicles, connection to local (urban) mass transit, as well as a series of other services to benefit from. The Terminal will be equipped with the appropriate security technology to ensure that the users are safe and feel safe when in the premises. This will be complemented by the establishment of the highest standards for hygiene throughout the complex, maintaining a high level of service for the users without any prejudice or discrimination.

3.3.2. The client and the visitor to the recreational and business areas (outside the terminal building) will also be able to enjoy the high standards set for the complex and will be able to access all the services provided safely, comfortably and in total compliance with hygiene regulations.

3.4. For the City:

3.4.1. From the point of view of the general public and the city itself, the Bus Terminal will bring the current informal/illegal terminal situation to an end, solving the problems of congestion, chaos and overcrowding that are persistent and common, making the possibilities for the urban revitalization and recuperation of the area more tangible.

3.4.2. The concentration of services in one place will allow authorities to have a better control of the participating entities and of the compliance of the latter with the established safety regulations for regional passenger vehicles.

3.4.3. It is very important to dwell on the fact that this initiative focuses on the desire of the small and medium sized transportation companies to provide their passengers with better services, increase their companies' benefits and number of vehicles, improve the technical, administrative and commercial levels in which they operate and formalize their companies in order to create more opportunities for themselves, the users and ultimately the city and the country as a whole.

4. Finances and Working Capital:

This is a unique project that brings into play an innovative nature and deals with bringing together into one place the most important national land transportation terminal and one of the largest in South America, with a complex composition including a Conventions Center, Recreational/Entertainment Spaces, office spaces, Hotel, etc. hence becoming the largest business center in the country.

The social value of this project, what makes it unique, is the way in which small and medium sized local enterprises (non dependent of larger retail chains or transnational companies) have been efficiently organized, to make them share holders, owners of the complex by the buying of stock and their active participation in it.

The preliminary studies and analysis of the proposal and current situation in which it would be embedded and work point towards a highly viable and profitable deal, with a surprisingly short period of return on the initial investments and a very high level of projected utilities. The scheme of this kind of business strongly relies on the compromise and cooperation, participation of the shareholders and transportation companies, who in essence are the social basis, but also the economic/financial basis of the deal. Hence it is extremely important that they contribute as much as they can to the initial capital for the project.

The establishment of a trust fund in a major national banking agency has been proposed as a collection means for the capital those interested in the project are to bring up as their share of the deal. This trust fund will derive/distribute the funds necessary to cover the pre-operative expenses, as authorized by the contributors at the time subscription, whilst the remaining funds will be collected and derived to the formation of the initial capital for the formation of the company.

The demonstration of such a compromise with the project and of economic viability will be enough for other banking agencies, either in the form of a society or individually, get involved with the project, providing us with the necessary funds for the development of its different stages, from its implementation to its actual operation, acting (in parallel) as the supervising agents of the distribution of existing capital and future benefits.

The social importance of this project will also allow us to access foreign financing sources, (backed up by the local and regional authorities, the government itself) which should be required and accessed as soon as possible and will require the support and compromise of the companies involved, as well as of all the shareholders.

5. Sources of Income:

5.1. Passenger Bus Terminal:

Undoubtedly, the great strength and the heart of the project as a business proposal resides in the presence of the transportation companies and as a consequence of it, of the Terminal. This economic activity will generate an enormous influx of people towards the Terminal, both passengers and family/friends, activating the area almost 24 hours a day. The Passenger Land Transportation business will generate direct income for the Terminal in the following ways:

5.1.1. Travel Fee: to be charged to each and every passenger whose point of origin is the Terminal. In a preliminary manner this fee has been set at S/. 1.00 per person (approx. $0.30).

5.1.2. Rental Fees: The status of class "A" stock shareholders (with a minimum of 17,000 bonds equivalent to approximately $5,000) will provide the transportation companies the right to have a counter for customer assistance in the main building for a very low monthly fee. Those companies that own more than the initial share will be entitled to have additional counters for every extra group of 17,000 bonds they hold. Those who do not own the bonds but wish to have more than one counter can rent them for low monthly fees. The availability of multiple use counters for the expenditure of tickets and baggage/package reception will be foreseen, being run by the Terminal itself.

5.1.3. Petrol: A gas station (for the exclusive use of the bus companies that use the terminal) will be located within the site and will provide the buses with enormous amounts of Diesel petrol. Due to the fact that the petrol and lubricants will be acquired massively and hence priced by volume, the company owners will have access to better prices than those given in the regular market. Additionally, because this gas station will be located within the perimeter of the Terminal, a portion of the monthly income will be destined to benefit class "A" shareholders, being the selling of the petrol an important source of income for the Terminal. The same criteria are

applicable to the commerce of lubricants and repair parts for the buses.

5.1.4. Office Space: They will form part of the Terminal and will be housed in a modern office building that will be available to the general public giving priority to the bus companies and other companies that are actively involved in the business. This will be a new source of income for the complex.

5.1.5. Hotel: It will be mainly destined to fulfill the needs of those passengers in transit or those with Lima as final destination. It will of course, subject to demand, be open to the general public.

5.1.6. Consulting Services: The company operating the Terminal will make consulting services available to those small and medium sized entrepreneurs and class "A" shareholders interested in some kind of guidance in administrative, legal, financial or technical matters, that could increase their companies' potential.

5.2. Commercial Center:

The second generator of this project is the Retail Center that will be implemented within the complex, designed, built and finished to comply with high international standards of quality and safety in order to provide the users an optimum recreational space, making it the best in its gender in the country. The Retail Center will have spaces with dimensions and characteristics that fulfill the requirements of all of the investors (small and medium sized entrepreneurs) and will generate incomes for the Terminal from the retail space rental fees, office leasing fees and consulting service fees.

5.3. Other Spaces:

Some of the other entertainment/recreational spaces that will be operating in the complex, such as movie theatres, night clubs and bars or banks will also generate income from the rental fees of the space they make use of.

5.4. Other plans:

Other means of income are those coming from businesses such as parking garages, the Conventions Center, provision of security services, storage space rental, rental of safety boxes and consulting and technical/practical training for PYMES, as well as any other kind business that the company might consider appropriate to establish in the future.

6. Criteria for the Business Relationship:

The operation of the two largest business plans of this project, in which all of the shareholders will participate, require absolute clarity and transparency in order to be successful. The basic concepts to be adopted for the management of them are entrepreneurial loyalty, fairness and good faith.

6.1. Good Faith:

As in every business relationship it is assumed that each of the interested parts will comply with their duties and act in good faith. The acting in good faith is absolutely necessary to guarantee the

stability of the project and ensure each of the parts that they are indeed receiving the benefits they are entitled to and expect.

6.2. Entrepreneurial Loyalty:

This concept is oriented to explaining the need for stability in the relationship being established between transportation agents/management and entrepreneurs/management as parts of a bilateral partnership and not necessarily as shareholders/partners. The basis of the deal is centered in the presence of and significance of the bus transportation agencies as main (only?) users of the Terminal and of the retailers as operators of the commercial spaces to be implemented in the Complex and as part of the greater Business Center. The transportation agents will undertake the responsibility of using the Terminal for the purposes of arrivals and departures of passengers with Lima as origin and destination as a matter of exclusivity, guaranteeing the influx of captive users for the buses and potential users of the whole complex. The benefits perceived by the agents as a result of respecting this exclusivity clause have already been explained. It is understood that given the nature of the retailers' business this clause is not applicable to them.

6.3. Fairness:

The shareholders in this project can be separated into two groups and be differentiated by them: those who own most bonds (in 17,000 increases) and those who move more volume of people/users per period of time. However this distinction is made does not imply that one group is superior to the other or has more privileges than the other, they are both entitled to equal treatment in all matters, which will not affect the benefits they receive or the facilities and company-related issues they have access to. The agreements will establish the fairness guidelines.

7. Agreements:

It is foreseen that the company will be taking part in two types of agreements, that with the transportation agents and that with the retailers. Each of them will establish the basis for the operation of their own part of the project, arranging for the provision of safety and stability on the conditions that were formulated as part of the initial deal at the time of signature and acquisition of bonds. The main guidelines that will be picked up by the agreements and upon which the relationships transportation agents/management and retailers/management must rely on are as follows:

7.1. Terminal:

7.1.1. To be authorized full access of the mentioned infrastructure one must be a full class "A" shareholder (17,000 bonds or more).

7.1.2. The condition of user or fully authorized member gives the right to access and make use, free of charge, all of the loading dock/islands for passengers, baggage or packages, the (patio de maniobras) and one counter for customer service.

7.1.3. The transportation agents that require a larger number or counters should purchase a larger number of bonds (according to a table of percentages that will be created) o rent them (subject to rental fees variable to the specific period of time).

7.1.4. The location of counter for customer service will be determined according to the procedures established by the promoting/marketing agent, way in which fairness and transparency will be guaranteed.

7.1.5. The condition of authorized user gives the agent the right to purchase the goods and raw material necessary to run the passenger transportation business in the advantageous manners at the time specified, as well as allows them to benefit from bonuses and commissions resulting of the use of the Terminal and all the infrastructure and services directly related to it.

7.1.6. Future agreements made by the company running the Terminal will provide the agents with additional benefits and advantages. Each agreement will establish the possibility of extending these benefits to the passengers and other clients of the complex.

7.1.7. The company is in the right to establish special fees and prices to benefit the authorized users in matters regarding additional services provided by it, such as rental of office or retail space, consulting, security systems, etc.

7.2. Business Center:

7.2.1. To be considered an authorized user of the Retail Center the agent is required a minimum of 17,000 class "B" bonds.

7.2.2. The condition of authorized user gives them the right to establish a retail space within the complex.

7.2.3. The authorized users that require a larger number of retail spaces hould purchase a lrager number of bonds (according to a table of percentages that will be created) o rent them (subject to rental fees variable to the specific period of time).

7.2.4. The location of the retail spaces will be determined according to the procedures established by the promoting/marketing agent, way in which fairness and transparency will be guaranteed.

7.2.5. The retail spaces will not be sold.

7.2.6. The promoting/marketing company will establish internal guidelines that will norm the appearance and adequate maintenance of the center, including the prohibition of annexing or building beyond the area provided, the use of awnings and canopies outside the spaces, the exhibition of goods on the outside of the spaces and the implementation of display cases that may block the customers' entrance/access, disturb the peacefulness or safety of the center, amongst others.

7.2.7. Future agreements made by the company running the Terminal will provide the agents with additional benefits and advantages. Each agreement will establish the possibility of extending these benefits to the passengers and other clients of the complex.

7.2.8. The company is in the right to establish special fees and prices to benefit the authorized users in matters regarding additional services provided by it, such as rental of office or retail space, consulting, security systems, etc.

A-2. Road Terminals Authorized for the Service of Passenger Transportation: 2000

CARRIER	STREET	DISTRICT	PROVINCE	DEPARTMENT
Expreso Cruz del Sur S.A.	Mz. "C", Lt. 1 Urb. El Palomar	La Victoria	Lima	Lima
Expreso Cruz del Sur S.A	Av. Paseo de la Republica # 815	La Victoria	Lima	Lima
Turismo Olano S.A. Oltursa	Av. Aramburu # 1080 - 1090	Surquillo	Lima	Lima
Peru Bus S.A.	Av. 28 de Julio # 1178 - 1182	La Victoria	Lima	Lima
Terminales y Servicios S.A.	Av. Alfredo Mendiola # 1051, Urb. Fiori	Sn. Martin de Porres	Lima	Lima
A & Z Inversiones S.A.	Av. N. Ayllon # 1301, Urb. Valdiviezo	Ate Vitarte	Lima	Lima
J.A. Internacional S.A.	Calle Los Lirios # 136, Urb. Valdiviezo	Ate Vitarte	Lima	Lima
Pascual Inversiones S.A.	Ctra. Panamericana Nte./Plgn. Salaverry	Huacho	Huaura	Lima
Flores Hermanos S.C.R.L. Ltda.	Av. Paseo de la Republica # 619 - 627	La Victoria	Lima	Lima
Expreso Lobato S.A.	Av. 28 de Julio 2101	La Victoria	Lima	Lima
Miguel S. Ciccia Vasquez E.I.R.L.	Av. Paseo de la Republica y 28 de Julio	La Victoria	Lima	Lima
Soyuz S.A.	Ctra. Panamericana Sur, Km. 143	Sn. Vicente de Canete	Canete	Lima
Inversiones Generales Wanka S.A.C.	Av. Nicolas Arriola # 1329	Ate Vitarte	Lima	Lima
Pio Adriano Delgado Arguedas	Av. Nicolas Ayllon 1030 Urb. Sn. Pablo	San Luis	Lima	Lima

Source: Land Transportation General Bureau - Statistics Branch
Ministry of Transportation and Communications, Lima, Peru

A-3. Number of Trips for Passenger Transportation by Destination: 1996-2001

Department	1996	1997	1998	1999	2000	2001
Amazonas	47852	38029	46590	88381	149465	147334
Ancash	1887566	2382899	2210552	2405109	2502752	2797055
Apurimac	63760	104955	167685	285065	377309	404240
Arequipa	2903435	2673962	2787365	3128215	5091364	5861522
Ayacucho	375908	542384	625912	629742	800727	789402
Cajamarca	478348	638171	627628	1057523	1180780	1082941
Cuzco	637860	595701	601568	712320	919514	933552
Huancavelica	689221	257072	485207	256066	498900	500673
Huanuco	1036796	794435	383912	498627	896355	795077
Ica	3476560	3459525	3677170	4332879	4658808	4705976
Junin	2532692	2025289	2683852	2868316	3062672	2874361
La Libertad	1612274	3421091	3956047	3213973	3314250	3162297
Lambayeque	1172764	1842588	2642230	2704337	2594984	2582311
Lima	15272376	17278782	16942492	17640680	22068944	22818522
Loreto	14507	16026	188311	195568	50374	50589
Madre de Dios	0	0	0	0	112897	0
Moquegua	760701	852337	1447993	607458	1705850	1572347
Pasco	678574	683753	805179	607508	1257145	869373
Piura	1031142	2459817	2005155	2231697	1572026	2304349
Puno	388938	581370	453806	556512	1385591	1409561
San Martin	251013	440537	230867	182818	325667	207837
Tacna	1001164	1526159	1205564	1004822	1413430	1685591
Tumbes	464300	895166	726832	729480	443320	749691
Ucayali	270563	267795	0	0	75099	240918
Total	**37048314**	**43777843**	**44901917**	**45937096**	**56458223**	**58545519**

A-4. Daily Average Passenger Movements for December 1998-1999 (North Corridor)

Sub-Sector	Dec. 1998	Dec. 1999
North-Coast	44900	41998
North-Centre	9128	12665
North-East	644	460
Total: Corridor		
Per day	54672	55123
Per year	19955280	20120000
Total: National		
Per day	123019	125854
Per year	44901917	44937096
# Carriers-National	383	364
# Routes-National	261	268
# Vehicles		
Total authorized: Lima	3259	3283
Total authorized: National	43366	44192

A-5. Intercity Passenger Movements – Estimates By Corridor (North Corridor – December 1999)

Sub-Sector	Carriers	Number of Passengers
North-Coast	224	15329246
North-Centre	155	4622853
North-East	12	168059

A-6. Intercity Passenger Movements – Numbers by Origin/Destiny (North Corridor – December 1999)

Destination: Lima	11328174
Origin: Lima	11070535
Total: Lima/year	22398709
Total: Lima/day	61366

Source: Land Transportation General Bureau - Statistics Branch
Ministry of Transportation and Communications, Lima, Peru

A-7. Passenger Movement for the Department of Lima December 1999

	Passengers December 1998	Passengers December 1999
Lima		
Per Day	18842	23206
Per Year	6877229	8470192
National		
Per Year	10004686	11554364
Lima % of total per year	68%	73%

A-8. Passenger Movement for the Department of Lima December 1999

Corridor	Carriers	Route	Passengers December 1998	Passengers December 1999
North	22	11	6877229	8470192
Centre	2	2	1028477	816088
South	14	6	2098980	2268084
Total	38	19	10004686	11554364

Source: Land Transportation General Bureau - Statistics Branch
Ministry of Transportation and Communications, Lima, Peru

A-9. Passenger Transportation by Concession and Registered Fleet in Lima According to Realm, Modality and type of Service December 2001

Realm, Modality and Type of Service	Number of Carriers To June 2001	Registered Fleet To June 2001	Number of Carriers To December 2001	Registered Fleet To December 2001
Passenger Services	**523**	**4335**	**538**	**4425**
International	**11**	**134**	**13**	**199**
National Carriers	6	67	8	129
Foreign Carriers	5	67	5	70
National	**512**	**4201**	**525**	**4226**
Inter Departmental	429	3694	437	3743
Intra Departmental	29	283	27	277
Touristic	40	122	47	128
Communal	1	1	1	0
Exceptional	8	31	8	5
Workers	4	55	4	55
Vehicular Comittee	1	15	1	18

Source: Land Transportation General Bureau - Statistics Branch
Ministry of Transportation and Communications, Lima,

A-10. Ideal Integrated Transit System Characteristics

- **Efficiency:** Avoid congestion and delays (between trips – loading/unloading – as well as traffic), speed, only necessary number of stops on routes, coordinated scheduling between modes, avoid long walks or transfers, adequate repair and maintenance facilities and minimum personnel requirements.
- **Reliability:** Maintain promptness of schedules, update information on potential delays and minimize breakdowns, as well as guarantee the availability of transfer services.
- **Comfort:** Adequate ventilation and air quality, as well as temperature and control, adequate lighting and control of noise, sufficient seating for a determinate percentage of passengers, enough accommodation for packages, ease of accessibility and fare control, weather shelters and well maintained vehicles and attractive stations and facilities/amenities.
- **Safety:** Minimize and avoid vehicle accidents, adequate signage for loading and parking areas, stairs and doors, absence of vandalism, theft and physical violence in station, shelters or vehicles.
- **Cost:** Reasonable fares, different passenger privileges (i.e. free transfers), fare reductions for special groups of people and graduated fares to accommodate budgets and needs.
- **Accessibility:** Adequate information and signage, adequate information of trips (fares, schedules, routes, etc.), adequate service (level of service and frequency of it) and distribution of routes, affordability and availability of seating (both in waiting areas and transportation vehicles).

Source: Interplan, 1973 – US Department of Transportation, Evaluation of Intermodal Passenger Facilities, pg. 194-195

A-11. Principles of Transit Station Design

- Transit generates Business; Business generates Transit.
- Transit should be an integrated part of activity centers.
- Access to activity centers should be provided for a variety of modes.
- Activity centers should be places where people change modes.
- Transit facilities should be of the highest quality to compete with the automobile.
- Transit facilities need to be actively managed and designed for change
- Transit should be clean, safe, accessible, secure, informative and comfortable.

Source: Rabinowitz, Beimborn, Lindquist and Opper, 1989 - US Department of Transportation, Evaluation of Intermodal Passenger Facilities, pg. 195

A-12. General Access Design Principles

- Facilitate Intermodal Transfers and the growth of intermodalism by providing sufficient access capacity to serve existing and anticipated demand.
- Define "sufficient access capacity" by:
    - Evaluating current capacity for each access mode;
    - Assessing current and projected future demand for each mode;
    - Identifying trade-offs among competing modes; and
    - Setting overall performance objectives and standards to be met by the provision of access.
- After setting performances standards, develop design plans to meet the established criteria.
- Avoid or minimize negative impacts on other modal systems.
- Avoid or minimize environmental impacts, particularly in residential neighbourhoods adjoining intermodal facilities.
- Where feasible, utilize existing investments in facilities and right of way.
- Allow for improvements that might be needed to accommodate unanticipated access demands.
- Incorporate new technologies and allow for the potential use of emerging technologies.
- Carefully consider the relationships between modes.

Source: Vickerman Zachary Miller, 1994 - US Department of Transportation, Evaluation of Intermodal Passenger Facilities, pg. 196

A-13. Brief History of Urban Transit in Lima, Peru.

1850	First Vapor Powered Train in South America
1877	First Animal Powered Trolley
1906	First Electric trolley
1921	First Bus – limited operation and served only a small community.
1927	Appearance of "colectivos" (minibuses 'collective' – informal transportation) – Mainly due to high fares (not massively affordable) and the inability of formal system to cover demands for mass transportation. The city grows horizontally but the transit network does not grow with it at the same rate.
1936	First Laws and Regulations for Bus operation issued – only referring to allocation of routes and maintenance of pre-established order.
1960's	Crisis in the System: Massive migrations create hundreds of squatter settlements on the outskirts of the city that are not served by the transportation agencies or the informal carriers (at the beginning). Municipal agencies collapse.
1965	Last trolleys put out of service.
1970's	Microenterprises take over the transportation industry and implement committees to regulate the system and serve the city. Interest in implementation of a metro system – not carried out.
1976	Creation of ENATRU – National Urban Transport Company.
1980's	Central Government interested in the reorganization of the system.
1986	World Bank: Loans granted for the construction of arterial corridors (underpasses) that are only partially built. Creation of AATE (Autonomous Authority for the Electric Train) – Rail system infrastructure starts getting built, trains are bought, but no portions of the network are fully implemented.
1989	Substantial lack of transportation units – Metropolitan Lima Government provides credit for the purchase of 500 new buses.
1991	Central Government implements total deregulation of urban and suburban transport.

Source: www.geocities.com/cesarjimenez.geo/transpor.htm

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General Information on Transit System, as well as some statistics on carriers, passenger ridership and number of trips.
Lima, Peru

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