



The *Plan Regulador Metropolitano de Santiago*: an integrated approach to urban transport planning?

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Abstract

This paper reviews the urban transport component of the *Plan Regulador Metropolitano de Santiago* (Chile), a master plan for growth in the area. This planning document has important implications for transport planning in Santiago: it provides the groundwork for establishing linkages between land use zoning and transport investment decisions; it sets spatial limits to urban expansion; and it establishes a set of residential densities.

One of the most difficult challenges for the Greater Santiago area is to develop a comprehensive master plan that will accommodate the transport needs of its 37 municipalities (comunas) and make the city a more desirable place to live. Some of the principal factors contributing to environmental degradation in Santiago, such as air pollution and traffic congestion, are caused by the inefficient provision of transport services. Therefore, it is important that this plan clearly define the role of urban transport in the economic development of the metropolis.

This paper concludes that while the *Plan* plays a key role in the reduction of travel times, energy consumption and agricultural deterioration, it mistakenly proposes to satisfy increased travel demand through an expansion in road capacity and identifies roadway improvements that fall under the jurisdiction of individual comunas. However, many of these comunas lack resources and are unable to generate the revenues necessary to finance these improvements.

In the future, the *Plan* should clearly define the role of each mode within the transport network and promote greater interagency coordination. In an effort to encourage greater efficiency in transport investment and reduce negative externalities, the *Plan* should actively promote the use of alternative modes to the private automobile. This policy course will require the establishment of a strong metropolitan transport authority capable of coordinating the efforts of the comunas and regional ministries.



1 Introduction

The *Plan Regulador Metropolitano de Santiago* addresses future growth in the Greater Santiago area. This master plan has important implications for urban transport planning in Santiago, given that it provides the groundwork for establishing linkages between land use zoning and transport investment decisions. It sets spatial limits to urban expansion, creates residential densities and establishes metropolitan subcentres. Furthermore, it proposes that an urban road network be developed to accommodate the increased traffic demand generated by densification.

Indeed, the provision of transport services is a vital component of urban society. One of the most difficult challenges for any metropolitan area is to develop a comprehensive master plan that accommodates the transport needs of its population while maintaining and enhancing the city and region as a desirable place to live. Some of the principal factors contributing to the deterioration of the environment, such as air pollution and traffic congestion, are caused by the inefficient provision of transport services, and thus, it is important that master plans clearly define the role of urban transport within the context of the metropolitan economy.

We conclude that while the *Plan* recognizes the role that urban density can play in the reduction of travel times, energy consumption and agricultural deterioration, it assumes that the most efficient way to satisfy increased travel demand in Santiago is to expand the road network. Many of these physical improvements are the responsibility of individual municipalities, many of which cannot afford such an expense or cannot legally require that developers finance facilities that are not connected to their projects. Prior to road construction, feasibility studies need to be undertaken on all segments of the roadway network and a financial plan should precede their approval.

Clearly, the *Plan* needs a more comprehensive approach to urban transport planning and greater coordination between comunas and government agencies. The role of each travel mode within the context of the metropolitan transport network must be carefully defined by a forum of planning professionals, user groups and community leaders. In an effort to encourage greater efficiency in transport investment, the *Plan* should actively promote public transport and nonmotorised modes as viable alternatives to the private automobile. In order for this to happen, a strong metropolitan transport authority must be empowered with the ability to work with the municipalities and appropriate levels of government. This authority should be comprised of professionals with the technical and legal knowhow necessary to promote integrated transport planning at the metropolitan level.

2 Santiago: Urban Characteristics

Santiago is located at the northern end of Chile's Central Valley, 105 kilometres southeast of the port city of Valparaiso. Currently, this metropolis of almost five million inhabitants accounts for one-third of the nation's population and continues to be its major financial, political and cultural centre. Greater Santiago is made up of 34 "comunas" (or municipalities), encompassing an urban area of approximately 500 square kilometres.

The average population density of Greater Santiago is approximately 100 persons per hectare, however, densities of over 160 per hectare are found in a few of its comunas. This settlement pattern has resulted in high average trip lengths and often, long journeys on public transport. Disparities in urban density have been compounded by the impact of decentralisation and a significant rise in auto ownership throughout the metropolis. Despite the predominance of public transport, there has been a marked increase in auto usage, particularly in the high-income communities of Las Condes, Vitacura and La Reina.

Presently, public transport accounts for over 70% of all motorised trips in Santiago, while the private auto represents approximately 25%. The public transport network consists of numerous bus services, a 27-kilometre rapid rail (metro) system, numerous shared taxi services and a suburban segment of the state railway system. Public transport carries over three million passengers a day, approximately 80% by bus and 14% by Metro. As in most cities, services are primarily centre-based, extending out from the downtown area of Santiago to serve outlying areas of the metropolis. Figure 1 depicts the existing network of roads and rail in Santiago.

3 Transport Planning in Santiago

Chile has long been a laboratory for the formulation of urban planning policies. This interest for exploring solutions to urban problems reaches back to the turn of the century, when Santiago and other major cities experienced enormous economic, cultural and demographic changes as the result of the success of the export economy of the late 1800s. A period of industrialisation and economic prosperity fueled the first attempts to transform Santiago into a "modern" metropolis, in the tradition of Continental Europe [1]. In the early 1900s, the state began to implement important urban projects aimed at improving the physical and social order of an expanding city.

The Constitution of 1925 further strengthened the government's commitment to place restrictions on the economic individualism that had characterised Chilean politics in the 1800s, and to strive for the social and economic integration of all sectors. These changes in political ideology inspired urban planners to seek technological solutions for improving the urban quality of life, such as the improvement of public sanitation, as well as the provision of open space and public transport. In the 1920s, transport planning took on greater

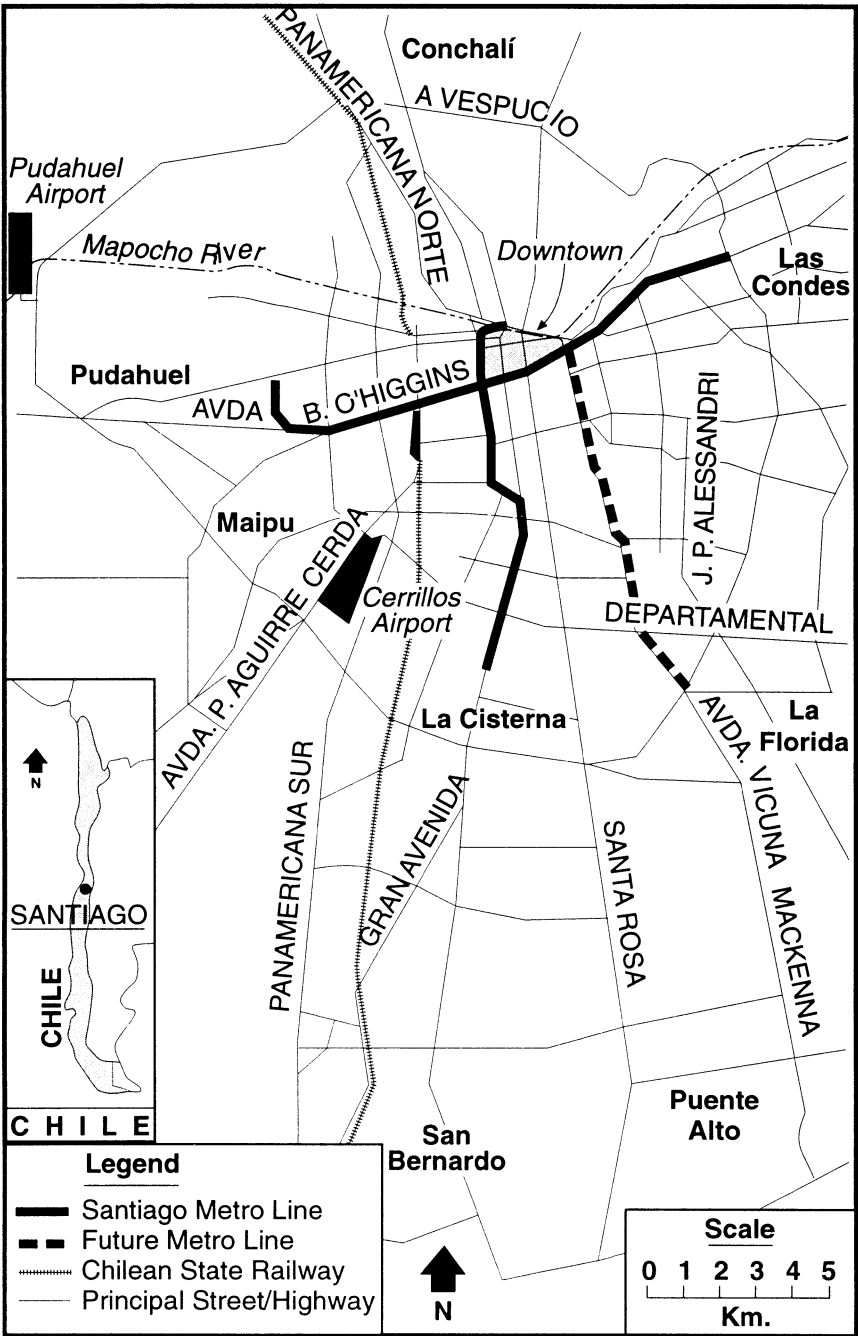


Figure 1: Map of Greater Santiago

significance, in response to increased motorisation and increased congestion on the downtown streets of Santiago [2].

It was the devastating Talca earthquake of 1928, however, that prompted the state to introduce the first formal set of urban plan requirements. Under Law 4563, all cities of 20,000 or more inhabitants were required to develop a "General Plan of Transformation" for regulating future development [3]. Theoretically, this law sought to change the course of urban expansion from sporadic, unregulated growth to planned, well-coordinated development. While it played an important role in the formal establishment of urban plans in Chile, Law 4563 primarily focused on physical improvements and did not adequately address the social and economic issues central to urban planning.

In an attempt to guide future development in Santiago, the government hired Austrian planner Karl Brunner, in 1929. One of his first tasks was to conduct a critical analysis of urban development in Santiago and to formulate an ordinance for construction and urbanization in Santiago. This legislation placed emphasis on the health and appearance of the city, the cleanliness and aesthetics of its buildings, the ease of circulation along its streets, and the physical accommodation of its residents [3].

As part of a 1939 development scheme for Santiago, Karl Brunner developed plans for controlling urban expansion (e.g., building height limits, and residential and industrial zoning), providing open space and improving the local circulation system. Furthermore, he sought to accommodate the auto through the widening of city streets, the construction of radial arterials and the establishment of parking lots [3]. Unfortunately, Brunner did not attempt to prevent the decline of public transport, an industry that struggled in the 1930s and that was later taken over by the public sector.

In the 1950's, demographic growth and further proliferation of the private auto led to increased traffic congestion in many world cities, including Santiago. The demise of the city's troubled street car system, in favour of the private bus, also contributed to urban gridlock. While the bus offered operators a higher degree of route flexibility, it also led to a rise in the number of on-the-road vehicles and congestion.

In response to these changes, the government called for the further study of urban issues and the creation of metropolitan plans. This effort culminated in the adoption of the *Plan Intercomunal de Santiago* (or Interdistrict Master Plan) of 1960, a document designed to regulate the development of Santiago, an area that encompassed 38,600 hectares. The transport element of this plan called for the establishment of a transport network in each comuna and the integration of these networks into a metropolitan network.

Following his election victory in 1964, President Eduardo Frei Montalva appointed a rapid transit commission to identify mobility issues and to formulate a transport plan for Santiago. After an exhaustive search, this commission hired a private consortium to draft portions of the plan. The 1968 *Plan Regulador de Transporte*, a metropolitan transport plan, proposed a set of measures for



improving urban mobility in Santiago, including the construction of a five-line metro and the implementation of complementary measures. These measures included the construction of a metropolitan road network and better metro-bus integration [4]. Unfortunately, the economic and political turmoil of the 1970s prevented most of this plan from being implemented.

In 1979, the military dictatorship severely altered the original scope of the *Plan Intercomunal* when it added an additional 60,000 hectares to the total area of developable land. This action encouraged development of low-income subdivisions on prime agricultural lands surrounding Santiago and pushed the urban fringe ever further away from the metropolitan core. At the same time, the government's decision to deregulate public transport led to an oversupply of service and downtown congestion.

As a result of these urban policies, there was increased spatial segregation of lower-income residents in peripheral areas of the metropolis as congestion and average travel times increased and more residents began to travel on foot. In the 1980s, the decentralisation of responsibilities to individual comunas further exacerbated this problem.

4 The *Plan Regulador Metropolitano de Santiago* of 1994

According to Chilean law, the *Plan Regulador Metropolitano* is the planning instrument assigned to regulate and orient future urban development in Chilean metropolises of over 500,000 inhabitants. As the primate city of Chile, Greater Santiago has attempted to coordinate the regulatory plans of several comunas into one coherent, metropolitan plan. Eventually, the metropolitan areas of Greater Valparaiso and Greater Concepcion will be expected to develop their own regulatory plans.

In 1990, the restoration of democratic rule brought a renewed interest in growth management, and as a result, an effort was initiated to revise the thirty-year old *Plan Intercomunal*. Subsequent conferences and seminars on the subject generated a diverse set of recommendations from various sectors of society. After a preliminary round of project scoping and public involvement, a regional council was created in 1993 to draft a metropolitan plan that could be developed in conjunction with individual comuna plans. A draft regional plan was later approved and in November 1994, the new *Plan Regulador Metropolitano de Santiago* went into effect. Figure 2 depicts the spatial distribution of land use and densities proposed under the *Plan*.

The *Plan* attempts to reverse the expansive, laissez faire policies of the Pinochet regime. Its principal goal is to establish urban growth limits that will reduce daily commute distances and relative travel costs, the principal causes of congestion and socioeconomic segregation. In general, it seeks to achieve the following objectives:

- improve the overall quality of life through more efficient land use and a better employment of existing infrastructure;

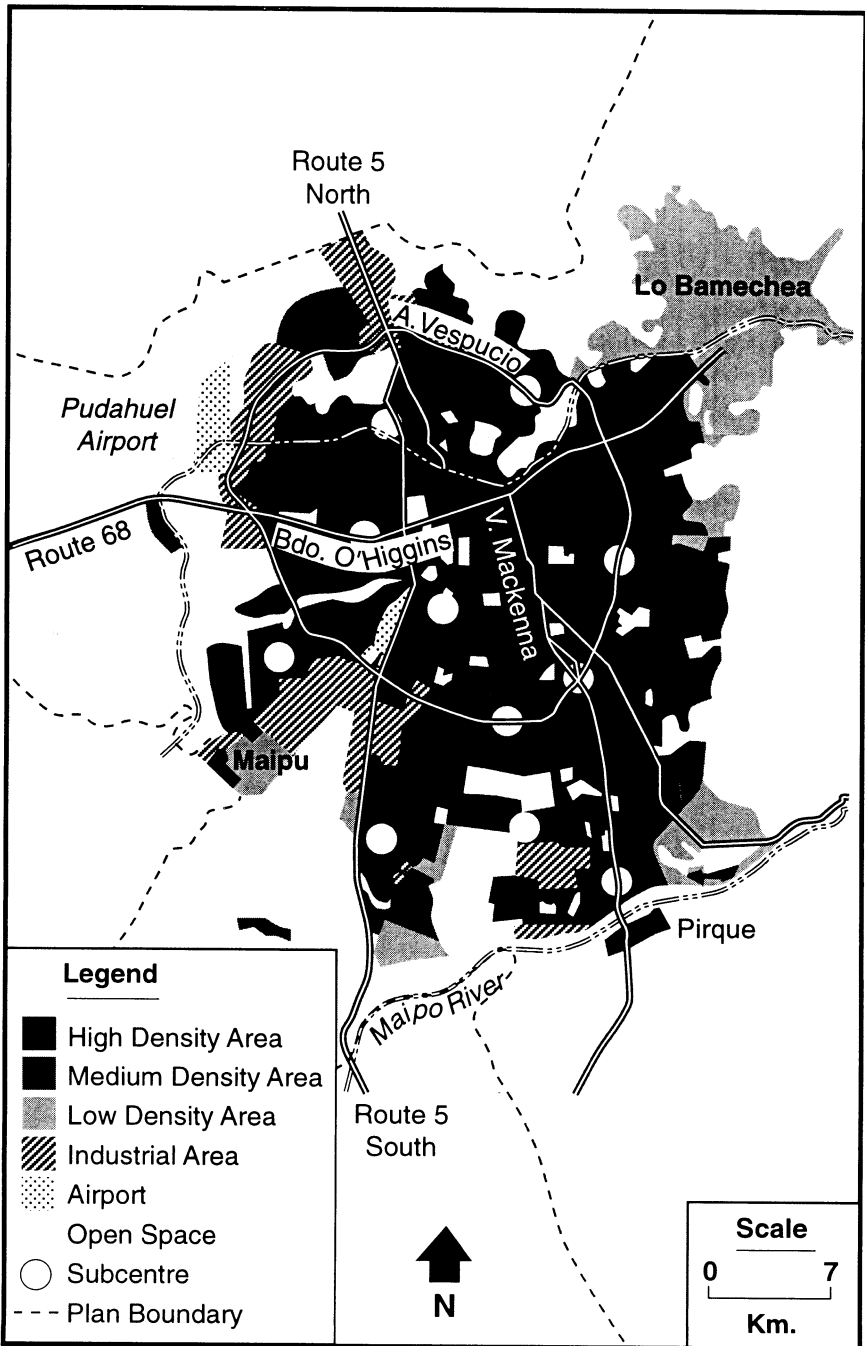


Figure 2: Plan Regulator Metropolitano de Santiago



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- improve the relationship between Santiago and its surrounding environment through the protection of natural resources and the utilisation of existing infrastructure; and
- improve the overall management of Santiago through the implementation of a zoning scheme that supports a desired set of economic activities and the establishment of a network of transport guide ways that improve urban mobility.

The *Plan* proposes to coordinate the implementation of a set of land use strategies and infrastructure improvements, so that Santiago can accommodate up to nine million residents in the year 2020, without having to expand. It proposes to accommodate this growth through a reduction in the total area of developable land from 100,000 to 60,000 hectares and an increase in average density from 100 to 150 residents per hectare. It designates specific land uses within its area of jurisdiction and establishes urban zones of maximum density, depending on desired land use. The *Plan* also establishes a set of metropolitan subcentres, designed to decentralise economic activities away from the downtown [5].

5 Transport as an Element of the *Plan Regulador Metropolitano*

Since the early 1990s, transport policy has sought to improve system performance while preserving the integrity and participation of the private sector in the provision of services. The state has attempted to introduce measures that reduce the negative impacts of increased travel demand. For example, a few years ago, the Ministry of Transport and Telecommunications introduced a bus route licencing plan aimed at reducing the number of buses entering the downtown area and improving both the efficiency and service of individual operators. More recently, there has been a proposal to introduce a road pricing scheme to reduce congestion.

The *Plan* has important policy implications for urban transport planning in Santiago. In its attempt to lay the groundwork for establishing linkages between land use zoning and transport investment decisions, it proposes that a hierarchical road network be developed to accommodate the increased traffic demand generated by high density development. Unfortunately, the *Plan* places too much emphasis on expanding road capacity and not enough on improving access to public transport and nonmotorised modes.

As part of a larger scheme to improve the urban infrastructure of Santiago, the transport element of the *Plan* proposes a number of physical changes to the transport system that do not satisfactorily address the diverse set of travel needs of its residents. In essence, this element proposes to establish linkages between transport flows and municipal land use plans through implementation of the following components:

- creation of an urban road network, consisting of principal highways, intermunicipal roads and intersections of regional importance;
- codification of a metropolitan road network;

- regulation of parking space;
- regulation of petrol stations;
- localisation of urban transport terminals; and
- system capacity to accommodate new travel demand.

While most of these components are integral to the planning of transport, the *Plan* does not provide a set of policies and objectives with which to orient development. It recognizes the need to develop a separate transport plan for Santiago, however it does not indicate the manner in which this plan should be coordinated with specific development strategies proposed under each of the municipal plans.

Under the existing regulations, each comuna comprises an autonomous territorial entity, somewhat independent of central government and responsible for local planning and fiscal accountability [6]. Each comuna is required to exert authority over transport and land use, and to provide guidance in municipal planning, according to the laws and technical standards imposed by the relevant governmental ministries. Insofar as urban transport regulations are concerned, each individual comuna is principally responsible for such activities as the issuance of driver's licences, the establishment of traffic rules and intersection control.

In light of the fact that Greater Santiago represents an urban agglomeration of several comunas, there are numerous transport issues that have both multi-jurisdictional and regional implications. Due to the relative autonomy of each of the comunas, however, many of these transport and land use issues are only addressed at the comuna level and not at the metropolitan level. Clearly, this arrangement inhibits the integration of transport policy into regional planning and places a great deal of urgency on the need to introduce regional transport planning policy in the *Plan*.

Furthermore, this *Plan* and the comuna plans subscribe to the widely-held assumption that the most efficient way of relieving traffic congestion is through the construction and expansion of an integrated network of urban roads and highways [7]. According to this scheme, the road network is expanded in response to a perceived need to increase auto capacity in proportion to increases in urban density. Similarly, the *Plan* identifies a need to augment the local supply of parking space.

While the construction of new roadways and parking facilities may provide some short-term benefits to a limited sector of the population, past experience has shown that this approach requires significant capital investment, and that increased road supply eventually results in increased travel demand and a return to congested conditions. In addition, transport planners from around the world have come to realise that auto-oriented investment programs often produce negative environmental impacts, such as air pollution, spatial segregation, and urban gridlock [8]. In order to achieve an acceptable level of sustainability, Santiago must carefully strive to control growth in motorisation and maintain its rich mix of urban transport options.



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A coordinated, multi-modal transport system, consisting of public transport, private autos, bicycles and pedestrians, is necessary to achieve a high quality of life and to improve the social and economic well-being of the metropolis. Without this balance, traffic congestion, air pollution and other negative externalities will eventually take their toll on the viability of Santiago's commercial and residential sectors [9].

The interrelationships between different components must be carefully considered when developing a metropolitan plan, given that investments in urban transport must support the surrounding land use and the travel demand that it generates [10]. The travel needs of the metropolis and its comunas must be measured in terms of the performance of each of its principal travel modes. If Santiago's future transport system is to improve, it must be managed and developed with vision; responsiveness to current and future trends; sensitivity to land use and the environment it serves; and cooperation on both a local and regional scale.

6 Conclusions and Recommendations

The *Plan Regulador Metropolitano de Santiago* recognizes the role that urban density can play in the reduction of energy consumption and environmental deterioration, however it assumes that the physical improvement of the urban road network will provide an efficient way in which to accommodate future increases in travel demand in Santiago. The *Plan* systematically identifies improvements necessary to accommodate new auto trips, however, it does not offer strategies for encouraging the use of other, alternative modes, nor does it suggest strategies for financing certain system improvements.

Experience has shown that major investments made in accommodating the private auto trigger further demand for more space; however, the single-occupant vehicle uses land and natural resources less efficiently than any other transport mode. Environmental costs become more prohibitive as the volume of auto traffic increases. With congestion comes slower travel times, less productivity, air quality deterioration and more wasteful consumption of resources. One goal of a balanced transport system is to minimize congestion while providing attractive alternatives for those who, in consideration of cost, ability, convenience or personal preference, do not drive autos.

Metropolitan master plans should be designed to account for the fact that a desirable living environment and a prosperous business environment cannot be maintained if traffic levels continue to increase. A balance must be restored to Santiago's transport system, and various techniques should be used to control and reshape the impact of private autos on the metropolis. These include improving and promoting public transport, ridesharing, bicycling and walking as alternatives; limiting the area's parking capacity (e.g., long-term parking in commercial areas); directing major traffic movements to certain routes; and limiting the vehicular capacity of Santiago's streets and highways.



In Santiago, most improvements to the transport system are the responsibility of the individual comunas, many of which cannot afford such an expense and cannot legally require that developers finance facilities that are not tied to a project. Each comuna only has control over transport in its own area and often, there is a lack of coordination between comunas. They should be encouraged to participate in metropolitan forums and to establish bilateral relationships with neighbouring comunas. One option would be to require that area-wide impact reports be completed as part of transport feasibility studies and that a financial plan be drafted prior to project approval.

Finally, it is recommended that a metropolitan authority coordinate land use and transport planning, revising the *Plan* to include a more comprehensive treatment of modes and intermunicipal coordination. This entity will need to receive the unconditional support of all of the comunas of Greater Santiago and to work closely with all of the appropriate government agencies (e.g., ministries, metropolitan agencies) to ensure that metropolitan and multi-comuna issues are addressed in a comprehensive manner. It will also need to define the role of each travel mode within the metropolitan transport network and to encourage greater efficiency in transport investment through coordinated land use decisions and economic integration.

Key Words: master plan
 transport planning
 metropolitan authority
 alternative modes

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