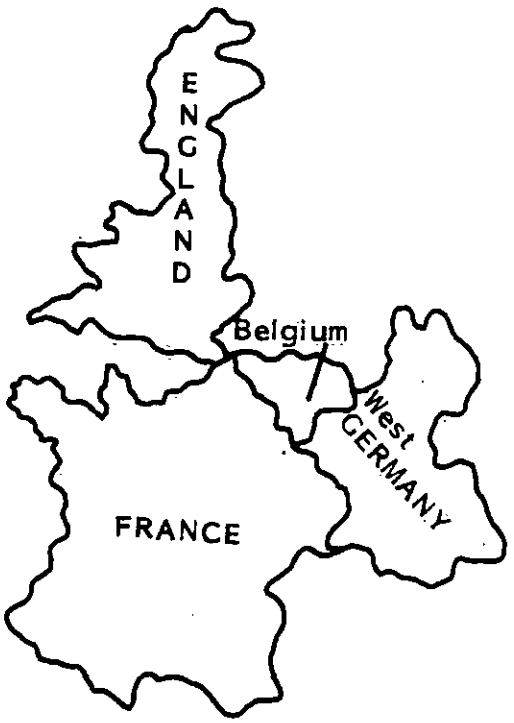
SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
and the LINCOLN INSTITUTE of LAND POLICY




Summary Report

# EUROPEAN TRANSIT and JOINT DEVELOPMENT TOUR

**France • Belgium • England • Germany**

SEPTEMBER, 1983

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Prepared and edited by
SCRTD Community Relations Department

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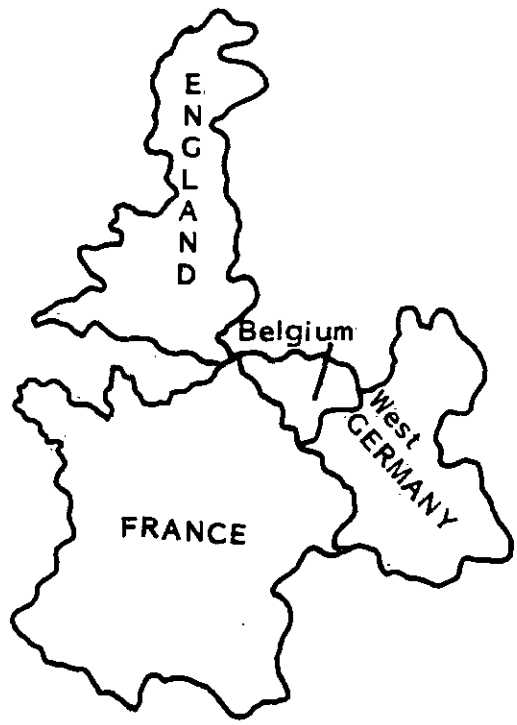
Photography courtesy of European transit properties and RTD.

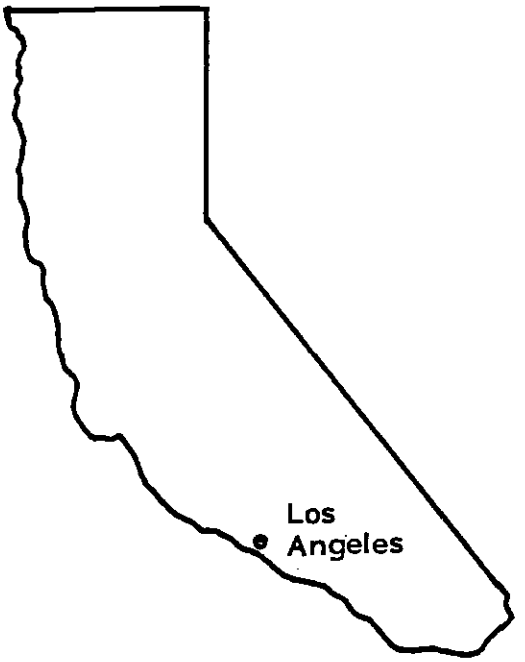



# Introduction

Being among the last big cities to develop rail rapid transit from scratch has its advantages. Planners of tomorrow's systems have the opportunity to draw from the wealth of resources and experiences of yesterday's pioneers and today's innovators. The Los Angeles Metro Rail Project is one of tomorrow's systems that has and continues to benefit from the experience of its transit predecessors. Throughout the recently completed preliminary engineering phase of the project, the Southern California Rapid Transit District (SCRTD) has tapped these resources--both domestic and foreign--in order to emulate the good decisions and avoid the mistakes relative to design, engineering, planning and technology.

Early in the engineering phase, the SCRTD established "peer review boards" which brought together experts from other transit properties across the nation to evaluate Metro Rail plans for such concerns as system safety and security, and fare collection methodology. At other times, SCRTD has visited these properties to observe first-hand the implementation of various design innovations and technologies. Importantly, these observations are not solely confined to technical issues, but they also encompass concepts relative to land use, development and environmental impact mitigation.

Transit systems in both Canada and Europe have established precedents in the areas of joint development and land use, and modal integration. Because these critical issues require addressing at this point of Metro Rail's development, SCRTD went on a fact-finding visit of Canada's two major systems (Summer, 1982) and most recently completed an inspection tour of several European capitals (May, 1983) noted for their extensive transit networks. This summary report only focuses on the highlights of the European excursion. The Los Angeles delegation of 14 public and private individuals observed—among other things—how the Europeans successfully implemented multi-modal integration and how land use and development were considered in system and station planning. The lessons learned will assist the Los Angeles private and public sectors as they work cooperatively to plan a well-balanced transit system that will be compatible with and guide the growth and development of the greater Los Angeles region.




# Participants and Acknowledgements

The European itinerary for the Los Angeles delegation was well planned and quite intense. The delegation visited seven cities in just two weeks: Paris, France; Lyon, France; Lille, France; Brussels, Belgium; Ostend, Belgium; Charleroi, Belgium; and London, England. The delegation's programs was developed by Professor George Lefcoe of the University of Southern California Law Center, acting on behalf of the Lincoln Institute of Land Policy, in conjunction with Belgium Professor Pierre Laconte, Director of the Universite Catholique de Louvain, and Audrey Lees, Director of Planning for the Greater London Council. Members of the delegation were:

MRS. JACKI BACHARACH, Councilwoman for the City of Rancho Palos Verdes, and former Chairperson of the Southern California Association of Governments.

MR. REGINALD BALLARD, licensed Real Estate Broker and a state licensed B-1 General Contractor.

MR. LOU COLLIER, Community Relations Manager for the Southern California Rapid Transit District.

MR. ED EDELMAN, Supervisor, Third District, County of Los Angeles, and former Chairman of the Los Angeles County Transportation Commission.

MR. MARVIN HOLEN, Attorney and Supervisor Edelman's appointee to the Board of Directors of the Southern California Rapid Transit District.

MR. TOM HOLMES, Engineer and First Vice President of the National Association of Real Estate Brokers.

MR. MELVIN HOOKS, a 20-year Real Estate Developer and Founding President of the Association of Minority Real Estate Developers.

MS. BRIDGED HYNES-CHERIN, Regional Administrator for the Urban Mass Transportation Administration of the U.S. Department of Transportation.

MR. GEORGE LEFCOE, the Henry W. Bruce Professor of Equity at the University of Southern California Law Center, and member of the Los Angeles County Regional Planning Commission since 1977.

MR. STEVEN MERTZ, Graduate of Stanford University and associate of the University of Southern California Law Center. A researcher of legal implications of land use controls and redevelopment, Mr. Mertz served as interpretor, administrator director and research assistant for the European transit tour.

MR. ALBERT PERDON, Assistant to the General Manager, Southern California Rapid Transit District.

MR. MANUEL SANCHEZ, Attorney and representative for numerous minority business/contractor associations. He has also been involved in land development issues.

MR. RICHARD STANGER, Transit Development Manager for the Los Angeles County Transportation Commission. A registered Professional Engineer, Mr. Stanger is Chairman of the Rail Transit Committee of the Transportation and Research Board.

MR. GEORGE TAKEI, prominent Actor and Mayor Tom Bradley' s appointee to the Board of Directors of the Southern California Rapid Transit District. Mr. Takei has a special interest in providing public art in the Los Angeles Metro Rail stations.

Los Angeles delegation members in London, with Big Ben and Thames River in background.

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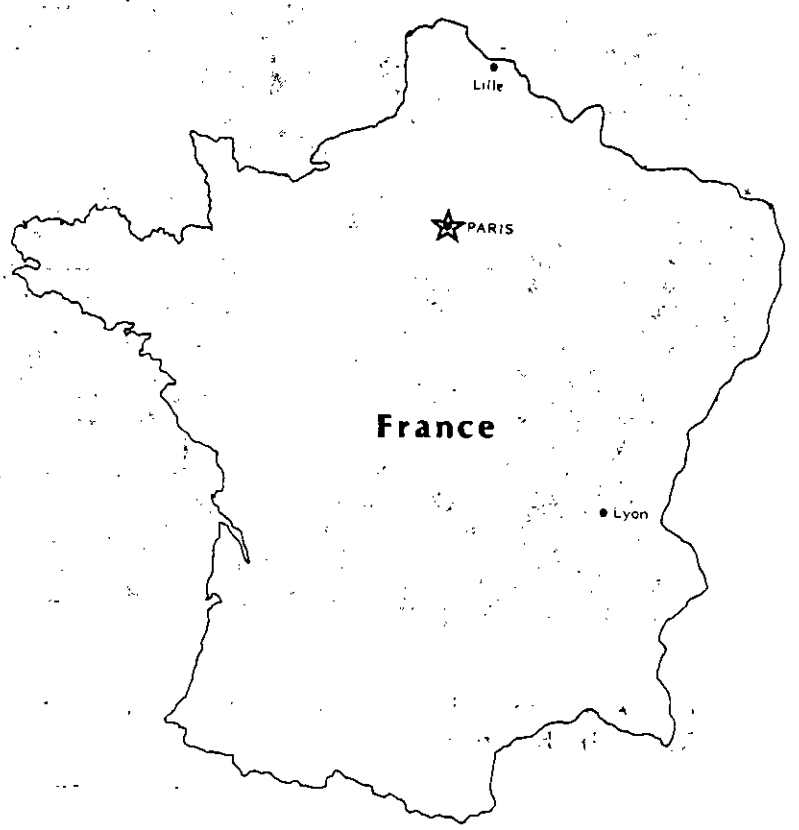
Special sentiments of appreciation must go to the hosts in each city the delegation visited for satisfactory accommodations and the wealth of invaluable information shared.




# 1 - FRANCE

PARIS -- May 16, 1983

Transportation Overview

The delegation was officially greeted at the Ministry of Industry and Research by M. Braibant, the Special Assistant to the Minister of Transportation. Mr. Braibant highlighted the activities of the four major groups responsible for public transportation in France. These key groups are: national transport planners, local transport planners, public enterprises and private enterprises. Two of the public companies about which the delegation learned a great deal while in Paris were the Societe Nationale de Chemins de Fer Francais (SNCF; translation: French National Railway Company) and the Regie Autonome de Transport Parisien (RATP; translation: the Independent Public Corporation for Parisian Transportation).

SNCF administrates the national network as well as the rail network that serves the environs of Paris. RATP serves central Paris and its immediate suburbs by Metro and bus systems. The outermost, low-density suburbs are served by a group of private bus companies, collectively known as the Association Proffessionnelle des Transporteurs Rutiers.

TABLE 1

VITAL STATISTICS OF RATP AND SNCF AS OF DECEMBER, 1981

| RATP | | SNCF |
|---|---|---|
| 103 | Length of lines in km | 927 |
| 63 | Number of stations | 325 |
| 8.9 million | Km traveled annually by trains | 43.8 million |
| 205 million | Annual Ridership | 434 million |

In order to ensure compatibility and to avoid wasteful duplication, the Syndicat des Transports Parisiens (STP; translation: the Paris Transportation) oversees all public transportation systems serving the Ile-de-France region, which comprises the greater Paris area. STP is composed of national officials as well as local elected officials. Its 1982 budget was approximately 16 million francs. Besides fare box revenues totaling about 5 million francs, STP has two principal revenue sources at its disposal. First is the "versement de transport" (transportation payment), which was instituted by French law in 1971 and requires local employers to contribute to the costs of public transportation. This employer tax, which is collected through the Social Security system, applies only to companies with nine or more employees. It generated about 4 million francs in 1982. The second revenue source comes from an unspecified percentage of parking ticket fines collected in the Paris region. STP is also responsible for distributing national subsidy monies.

## New Towns and New Business Districts

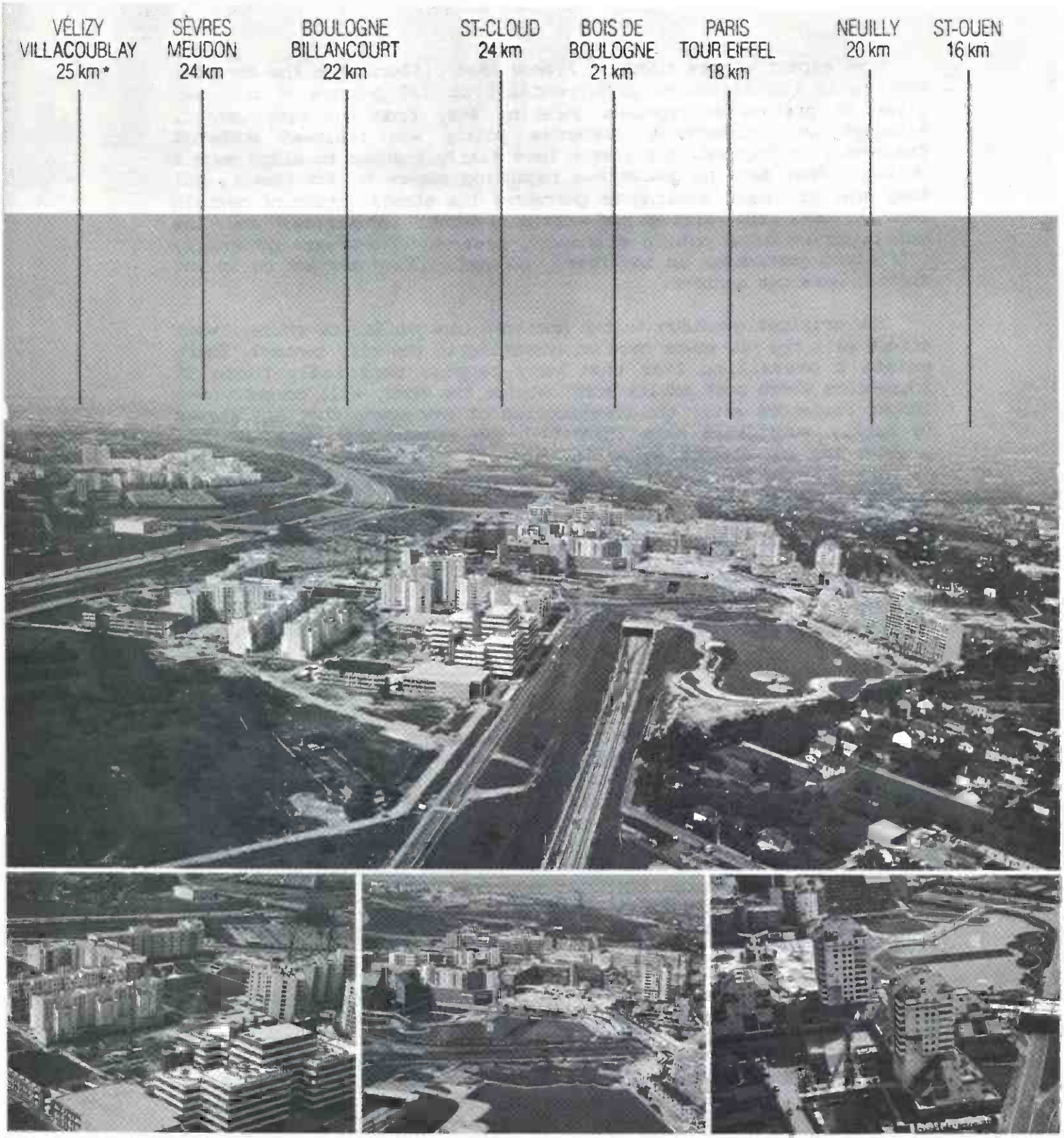
The following gentlemen spoke to the delegation on matters concerning the coordination between land use and transit planning: M. Hirsh, Director of the Ecole Nationale des Pont et Chaussees (National School for Bridges and Roadways); M. Servant, Project Manager for the Transportation Division of the Instutut d'Amenagement et d'Urbanisme de la Region Ile-de-France (a public foundation responsible for town planning and development studies in the Ile-de-France region).

Marne-La-Vallee

Two topics were of special interest to the delegation. The first concerned the creation of five "new towns" in the Paris area. In the early 1960s, Paris land planners saw the need to stop the ill-effects of haphazard growth in the capital region. To this end, they sought to channel all new major development along two linear east-west axes that would parallel the already existing principal growth axis that followed the natural flow of the Seine River. Furthermore, they hoped to create new urban centers along these axes which would assure planned and orderly residential, business, and industrial growth at densities high enough to make public transportation feasible.

Marne-la-Vallee is the new town closest to the center of Paris; it is a mere 13 km from the major highway system encircling the capital. The whole town is literally constructed around an axis composed of the east-west RER line. (RER stands for Reseau Express Regional.) This heavy rail express system of track crosses all of Paris in an intricate, double-X pattern, and ties together geographically opposed suburbs (e.g., Marne-la-Vallee has five of its own RER stations. Each station is architecturally unique and each one is located in one of the principal sections of the new town. Several stations have park and ride facilities with about 1,000 parking spaces each.

Marne-la-Vallee today has a population of 100,000 people. This number has doubled since 1970 and is expected to double again by 1990. Although this new town is extremely well connected to Paris via highways, conventional trains, and the RER, it is by no means a bedroom community. Several nationalized companies have major offices here as well as several private companies. The well-planned business parks are also homes for such companies as Honda France, Philips Data Systems, Kodak-Pathe, Singer and General Foods. Many other foreign companies wishing to locate their European or French headquarters in the center of Paris were denied building and occupation permits by the government. The French government took a calculated risk to promote the new towns by saying to the foreign conglomerates, "either locate in a new town or new business center such as La Defense, or don't come to France at all." Thus, the growth of the new towns has been assured by commercial and industrial development as well as by residential development. Yet one criticism of the new towns is that they are still having difficulty attracting institutions of higher learning. Hence, some observers feel that without intellectual growth, the new town development can never be complete. This problem appears surmountable, however, because in France, the national government has significant control over education, and it is empowered to mandate the placement of new universities and expand existing ones.




Marne-La-Vallee is one of five successful "new towns" developed around Paris. It is one of the closest to the center of Paris. The "new town" has been fostered by new commercial and industrial development being specifically located here.

One aspect of new towns in France that differs from the American context is the extent of governmental financial guarantees that are given to private enterprises locating away from the city center. Although this government guarantee policy was followed somewhat frequently in England, the French have flatly refused to allow such a policy. They make no guarantees regarding return on investment, but they are, at times, willing to guarantee the stabilization of certain land prices, the arrival of certain other industries, and the construction of a public transport system. These are generally sufficient guarantees in the French context. They may not be in the current American context.

The critical question in the American context is, of course, what effect will the new towns have on commuting to the city center? There exists a prevailing fear that many people, especially those in households where both adults work outside the home, will commute even longer distances after the construction of new towns that are served by highly subsidized mass transit. The French are aware of this problem and are attempting to deal with it by theoretically creating as many jobs as there will be housing units. Also, where housing is in short supply, those who work and reside in the same area receive occupancy priority. From the limited studies made thus far, it appears that the people living in the new towns are relatively more successful in reducing commuting trips than are those living in traditional suburbs. That is, an average of 55% of the new town population live and work within the same area as compared with 30% for traditional, bedroom suburbs, which are commercially less active.

## La Défense

The second topic of great interest to the delegation was the creation of a new business district just west of Paris. The district owes its name, La Défense, to the memory of the struggle for the defense of Paris in the War of 1870. The first plans for the redevelopment of the decaying area date from 1932. But it was not until 1958 that a public decree was issued expressing the political desire to provide Paris with a modern business district to meet the demands of a burgeoning economic society. Due to aesthetic and historical reasons, the French refused to permit the construction of tall buildings within the old city. Thus, an eclectic, London-type skyline was avoided.

Historically, the 2000 acres now comprising La Défense contained approximately 9,200 delapidated dwellings and about 480 workshops for small craft tradesmen. After the land was acquired through free bargaining, and sometimes through eminent domain proceedings, it was cleared and families and businesses were temporarily relocated to nearby sites. Once new housing was built within La Défense at Parc Malraux, many families returned to the area. As of January, 1982, more than 30,000 persons were living in the Parc Malraux neighborhood. The current 12,000 dwelling units represent approximately three-quarters of the planned total.

La Dèfense skyline forms a dramatic backdrop for picturesque Paris. It is the most successful business district development, and it is located just west of Paris.

At first glance, this may look like Wilshire Center in Los Angeles. But it is a section of La Dèfense --a community of residential and commercial buildings, and the home of Europe's largest shopping center. Skyscrapers of varying heights distinguish this unique development.


The key to the successful development of La Dèfense was the careful planning for use of multi-modal transportation access. All public transit modes interface at La Dèfense.


In several rail stations in Paris, commercial and retail businesses thrive.

Commercial buildings occupy only 20% of the total surface area, since most of the offices are located in skyscrapers of various sizes. As of January, 1982, almost 50,000 persons were working in office space totalling 1,025,000 square meters. The total projected office space is set at 1,550,000 square meters or approximately 15 million square feet. This projection should be reached in 1988, which is the anticipated construction completion date. La Défense also boasts the largest shopping center in Europe with 1,200,000 square feet of retail space.

What is especially interesting about La Défense, and what may serve as a lesson for Los Angeles, is that redevelopment of the area was made possible because of the opportunities afforded by public transportation. La Défense is served by all modes of public transportation and has the largest number of multimodal transit interconnections after Place du Chatelet/Les Halls. Anyone visiting La Défense may choose between four excellent means of public transport: SNCF (railways), RER (regional express metro system), Metro (subway), and bus. All SNCF railway trains on the lines Versailles-Paris-Saint-Lazare and Saint-Nom-la-Breteche-Paris stop at La Défense station. Other lines connect less directly. Line A of the RER puts the famed Etoile-Arc de Triomphe region a mere five minutes away. In 1985, the railway lines to the west of Paris (Poissy and Cergy-Pontoise) will be connected to line A of the RER to give a new direct link to La Défense. Although line 1 (Chateau de Vincennes-Pont de Neuilly) of the regular Metro does not yet extend as far as La Défense, a future extension is planned. For bus connections, La Défense is a bus rider's dream. It is the most important bus terminal in the Paris region; it is served by 18 routes, has 25 stops within the redevelopment area, and sees a daily bus rider traffic flow of 60,000 people.

Even though La Défense is well served by public transportation, the French planners realistically took account of the private automobile as well. There is an elaborate underground road system consisting of multi-level cross routes and interchanges. The various subterranean levels consist of a national highway (#A-14); a ring boulevard connecting all buildings in the business center; a system of service roads reserved for taxis, buses, ambulances, trucks and other utility vehicles; and tunnels for the RER and Metro extensions. Still lower, beneath the service level, are located four different parking lots which can accommodate a total of 18,000 cars and which are centrally controlled to ensure easy access during peak hours. One also finds at this lowest level a series of "technical galleries" or utility tunnels, which house water, electricity, telephone and gas lines. Above this underground labyrinth, pedestrians circulate freely between the buildings by way of spacious malls and numerous foot bridges.

Although La Défense is generally a success, there is a certain starkness about it. Much of it was built in the faceless architectural period of the 1960s and there still appears to be insufficient landscaping within the large concrete plaza areas. A business park of this magnitude and style is a modern business necessity, but it definitely lacks the charm of the center city. One might also argue that the French were wise not to mix the two.

## Financing Aspects of Public Transportation within the Paris Region

The inter-relationship between mass transit and surrounding land uses is a critical issue that has only recently been fully appreciated. In addition to providing easier urban access, mass transit creates more pedestrian environment, increases population density along their routes, and concomitantly intensifies surrounding land use. Economic growth and increased tax revenues naturally follow these changes; the problem is, how to capture this appreciation.

France uses a variety of tax systems that indirectly help recapture some of the increased value flowing to businesses due to the availability of public transportation. First, there is a fee for the insuance of office and industrial building permits in the Paris region. The fee amount is based on the floor surface area occupied by the new or rehabilitated structure. The total annual revenue produced by these fees was approximately 50 million francs in 1978. An unspecified percentage of this amount went towards expanding the public transport system.

Second, there is a local "equipment tax" used to finance the provision of communal structures connected with civil construction programs. The rate is usually 1%-5% of the value of the land on which the building is erected. In 1978, the Paris region received about 200 million French francs from this equipment tax. Again, an unspecified percentage went to maintaining and improving the mass transit system for the city.

Additionally, the French impose property taxes, company taxes, value added taxes, and trade taxes. However, one of the most interesting taxes relating directly to transportation is the employers' tax, referred to in the Transportation Overview section of this report. The rate of this tax is currently 2% of certain nationally set ceiling salaries. This tax is paid directly to the STP and is used to cover the loss of revenue resulting from reduced fares granted to all salaried persons using the Carte Orange. Thus, since 1982, employers have met 40% of their employees' commuting costs.

The Carte Orange is a semi-unrelated but important topic that should be discussed at this point. The Carte Orange is a multi-modal pass that permits its holder to travel as often as he or she pleases on the SNCF urban trains, Metro, RER, RATP buses, and certain private suburban buses. The pass is valid for either a month or one year, depending on the option selected. Its price depends on how many zones are customarily travelled. A Zone 1 pass which gives access to all of central Paris costs only 110 French francs per month (less that $20).

An aerial view of Les Halles, which is a billion-dollar development project in the center of Paris. It has brought together the public and private sectors to develop a commercial, residential and retail center, tied together by all rail transit systems interfacing beneath this development.

PARIS - May 17, 1983

Commercial Development Based on
Access to Public Transportation

The delegation spent the morning at the office of the Société d' Economie Mixte pour l'Amenagement des Halles (SEMAH), which is the corporation set up by the City of Paris to redevelop the old Les Halles market area. SEMAH was created in 1969 and is funded through the following capital sources: 51% by the City of Paris, 25% by the French national sacrament, and the remaining 24% by various national banking and insurance institutions.

Les Halles is an historic open-air market district located in the center of Paris. After World War II, the area became increasingly blighted and it was General DeGaulle who first decided to renovate Les Halles. The project was begun in the mid 1970s and final completion is set for 1986. It is interesting from both a transportation and commercial point of view. Directly below Les Halles is Chatelet Station, which is the largest multi-modal public transport station in all of Paris. It is the main transfer station for the RER lines, and it has Metro stations, SNCF railway connections, and several bus stops. About 62.7% of the people visiting Les Halles come by Metro-RER, 15.7% by private automobile, 7.4% by bus, and 14.2% by foot. In one survey, 90.8% of the persons responding said that gaining direct access to Les Halles by any of various methods was very important to them. However, as was the case at La Défense, the planners have not altogether abandoned the private automobile in spite of the availability of public transport. There is a complete underground road network located on various levels just above the Metro-RER tunnels. The road systems are constantly monitored by electric cameras, and measuring devices trigger ventilation systems when the carbon dioxide and smoke levels rise too high. Vehicle counting appliances alter traffic signals by remote control in cases of accidents and traffic jams. Parking availability in this congested area is now better than ever before. Upon completion, there will be a total of 4,180 spaces, of which 3,250 spaces will be for public use. Since late 1979, more than 2,500 spaces have been constructed. Since this is the busiest transit center in Paris, it made sense to take commercial advantage of the traffic flow.

The commercial sector of Les Halles is a veritable forum. Pedestrian walkways, public gardens, and numerous subway exits all lead to the center, which has a concave design. There are four terraced subterranean levels of shops, all opening onto a public square which has a tremendous view of the old city.

One plaza level of the five-level rail station/commercial center in Les Halles.

Construction of housing and office space continues while business goes on as usual in Les Halles.

The project's distinctive appearance and special amenities are reflected in its cost--approximately $1 billion not including certain heavy rail improvements. Although Les Halles required very little national subsidy, it is substantially funded by the City of Paris. Nevertheless, Les Halles has become of national significance, because France is a very centralized nation. Of key interest to the delegation was whether Paris has made any attempt to recover some of the increased value of the surrounding buildings. Indeed the answer is much more difficult than is the question. Although the French are generally unacquainted with tax increment financing, they have made some attempt to recapture the increased value through a renter's tax and a right-of-first-refusal on buildings sold within the area. Also, there is a sort of value added property tax that channels increased revenues into the city's general fund. In summary, however, it seems that the French were more interested in creating an aesthetically pleasing and functional joint development project of lasting long term public benefit than in building a less gracious structure that would earn a larger short-term profit.

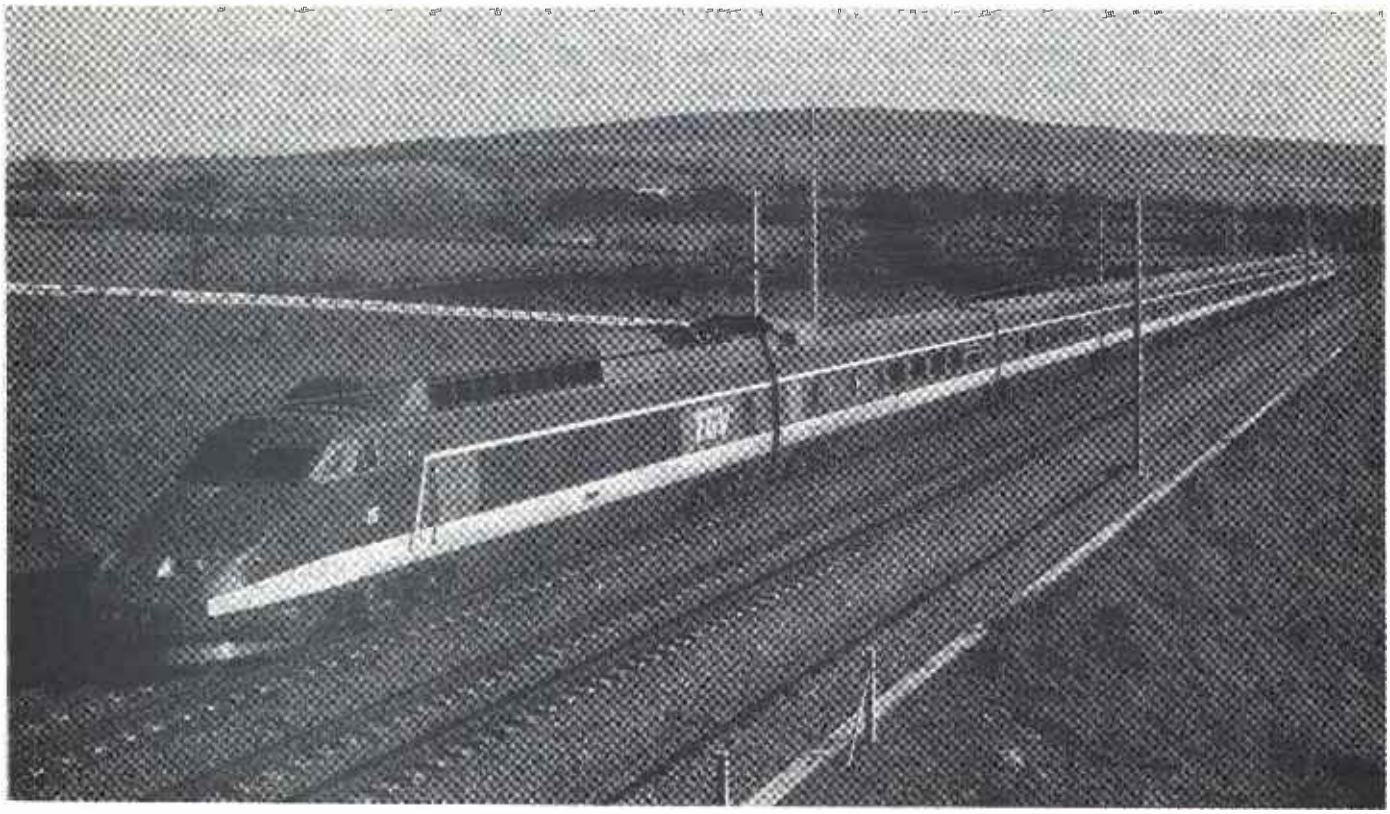
SOFRETU

The delegation started the afternoon by attending a luncheon hosted by officials of the SOFRETU. SOFRETU is a French acronym for Société Francaise d'Etudes et de Réalisations de Transports Urbains. This group is sanctioned by the French government to coordinate for export purposes the various rail transport companies throughout France. After lunch, representatives from the various groups comprising the SOFRETU network gave presentations on their particular area of rail expertise. Groups represented in the afternoon information program were: Alsthom Atlantique, Francorail/MET, FIEE (Fédération des Industries Electriques et Electroniques), FTP (Fédération des Travaux Publics), CSEE (Compagnie de Signaux et d'Entreprises Electriques, Compagnie Générale Automatisme, and Thomson).

LYON - May 18, 1983

The TGV Bullet Train

The delegation was greeted at the Gare de Lyon train station by M. Jean-Philippe Bernard, Deputy Manager of the International Affairs Department of SNCF. Mr. Bernard accompanied the delegation to Lyon and explained the operation of Train a Grande Vitesse (TGV; translation: the bullet train or high-speed train) while we were en route. The maximum speed in commerial service has been set at an economic optimum of 162.5 mph.



The TGV, the fastest passenger train in the world, connects Paris to Lyon in southeastern France. This new line is devoted exclusively to high-speed passenger service. It is the first of several extensions to be made over the next three to 10 years.

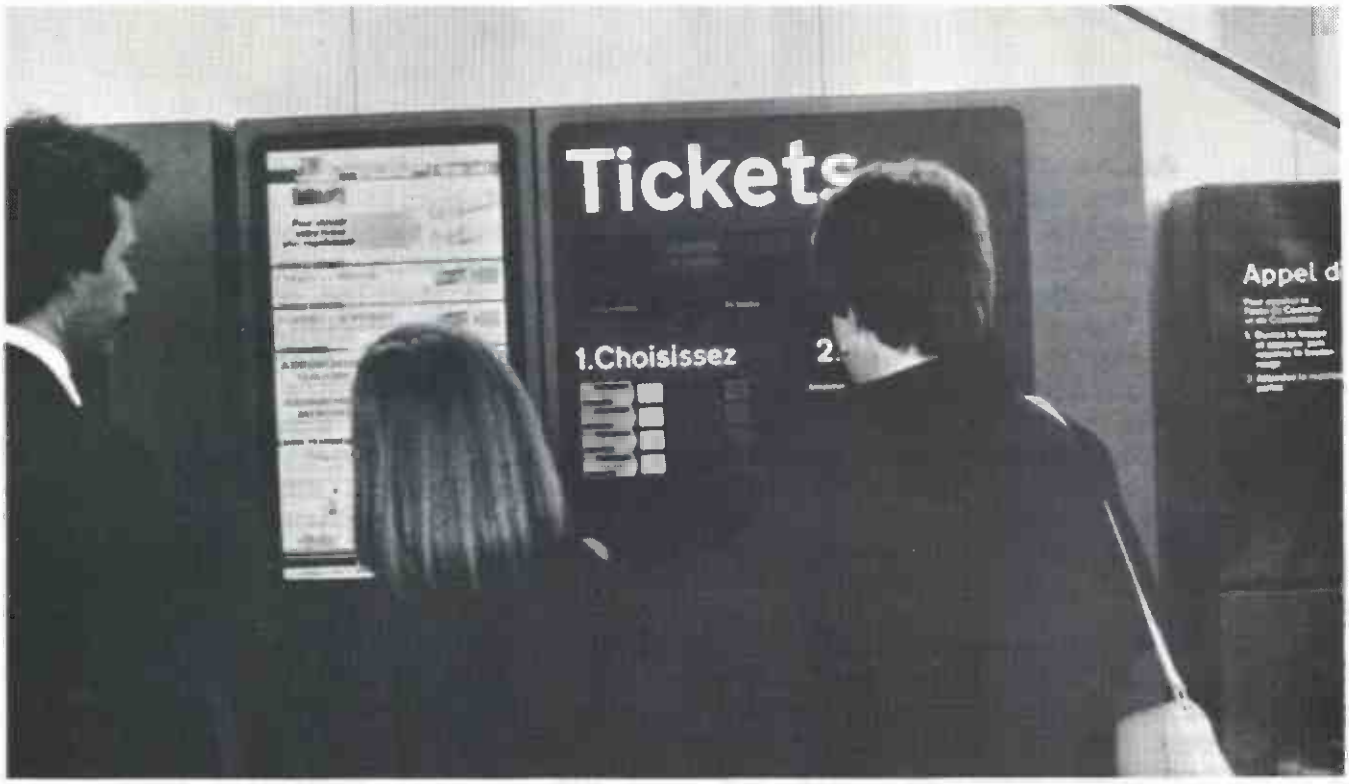
The Paris-Lyon-Marseille axis is one of the main arteries of the French railway network. Traffic on this line previously exceeded 250 trains a day because the route is regularly traveled by 40% of the French population. Since simultaneous movement of passenger and freight trains led to frequent bottlenecks, the TGV was conceived to provide a new high-speed line, reserved exclusively for passenger use. To ensure optimim project profitability, the new line is completely integrated within the existing standard gauge track network. The infrastructure cost was further reduced by approximately 30% because the TGV's tremendous power allows it to negotiate long gradients (up to 3.5%) at full speed; thus, tunneling construction costs were negligible. A concerted effort was made to protect the French countryside during and upon completion of the TGV line.

In the Yonne region, the original path of the line was redrawn so as to avoid the Chablis vineyards and the Serein Valley, which are of great touristic value. For obvious safety reasons, there are no level crossings, and special passages were built for livestock crossings in rural areas. Finally, for aesthetic reasons, noted architects were employed to design the 300 railway and 176 highway bridges along the new line.

Lyon's Metro System

The delegation was met at the Lyon train station by members from the SEMALY (Société d'Economie Mixte du Métropoltain de l'Agglomeration Lyonnaise, which is the official agency responsible for the Lyon Metro). Lyon had a population of 1.12 million people as of the 1975 Census and a total of 1.75 million people is projected for the year 2000. Population density is very high at the city center where 10% of the total area accommodates over 40% of the total population and where 50% of the total area correspondingly accommodates 90% of the total population. Centers of employment in Lyon are even more concentrated than are centers of residential population. In 1975, 30% of the total available jobs were concentrated in the "hyper-center" which represents only 2% of the city limits.

From 1965 to 1976, the percentage of Lyonais households owning a car increased from 45% to 55%. The number of cars entering the city each day increased by 40%, and the average annual number of journeys made by private car increased by 8.5%. Given these statistics, the opening of the Lyon Metro in May, 1978 came just in time. The Metro project was in the planning stages for 10 years and the major part of construction was completed within five years. Before the line opened in 1977, 40% of the population perceived Metro as a prestige project. But after the first year of service, only 20% still held that belief, thus indicating that its functional attributes and needs were more broadly recognized.




Automatic ticket machines are widely used throughout France. This includes even ticketing reservations for riding the Paris-Southeast high-speed line, TGV.

In Lyon, fare collection for the Metro is accomplished by a barrier-free system. It is felt that this self-service ticketing system is more cost-effective.

Public transport in Lyon is very successful. Over the past two years, the number of people using some form of public transportation has increased by 30%, with one-third of all the daily passengers using Metro on a regular basis. Metro service is constantly being expanded and this expansion attracts new riders. Fare collection on Metro is accomplished by a barrier-free system. Monthly passes costing 152 FF (just over $25) are used by approximately 45% of all Metro riders. Students and elderly patrons receive special discounts. SEMALY believes that the self-service ticketing system is cost effective and estimates its fraud rate among the 240,000 daily patrons at 4%-5%. A staff of about 60 undercover controllers can verify about 20,000 passengers each day. The fine for travelling without a ticket or pass is 125 FF, and anyone caught cheating more than three times a year may face legal action.

The interconnection of bus and Metro is excellent since all the bus lines were reorganized after the construction of Metro. Bus and trolley routes currently number 78, and of this total, 59 are in direct contact with Metro stations. At Perrache, one of the central interchange stations, there are more than 100 bus departures each hour. Buses or trolleys leave the station every 40 seconds during peak hours. Arrivals and departures are via special limited access roads and are supervised from a central control center. This interchange center also boasts a large shopping center with separate parking facilities.

The Lyon area public transport system may be briefly described by the following statistics:

- o Aggregate system route length: 868 km (incl. 14.4 km Metro)

- o Number of routes:

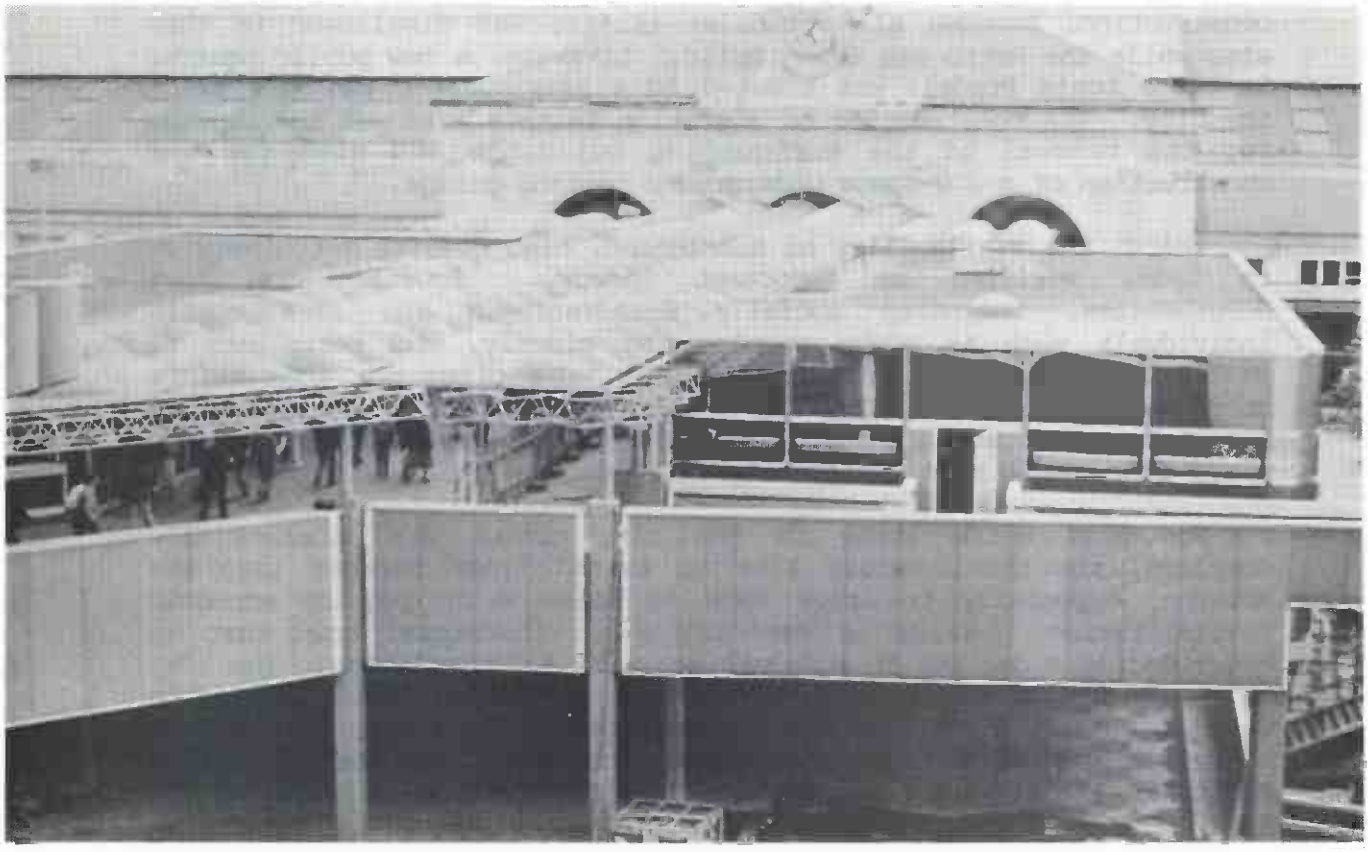
| | |
|---|---|
| Metro | 3 |
| Bus | 68 |
| Trolley-bus | 7 |
| Funicular railway | 2 |

- o Number of vehicles:

| | |
|---|---|
| Buses (+57 in reserve) | 809 |
| Trolley-buses | 156 |
| Funicular rail cars | 4 |
| Rack and pinion Metro cars | 3 |
| Metro cars | 97 |
| TOTAL | 1,069 |

- o Aggregate distance covered per year: 43 million km
- o Total population served: 1.2 million.
- o Annual passenger ridership (bus and Metro): 204 million.
- o Average weekday traffic: 750,000 journeys (incl. Metro 240,000)

The 2.2-km pedestrian mall between the Boulevard Victor Hugo and Rue de la Republique.



The Lyon Metro interfaces with the TGV and other transcontinental trains via covered walkways lined with retail outlets.

Public transport currently accounts for some 21% of all journeys within the city environs.

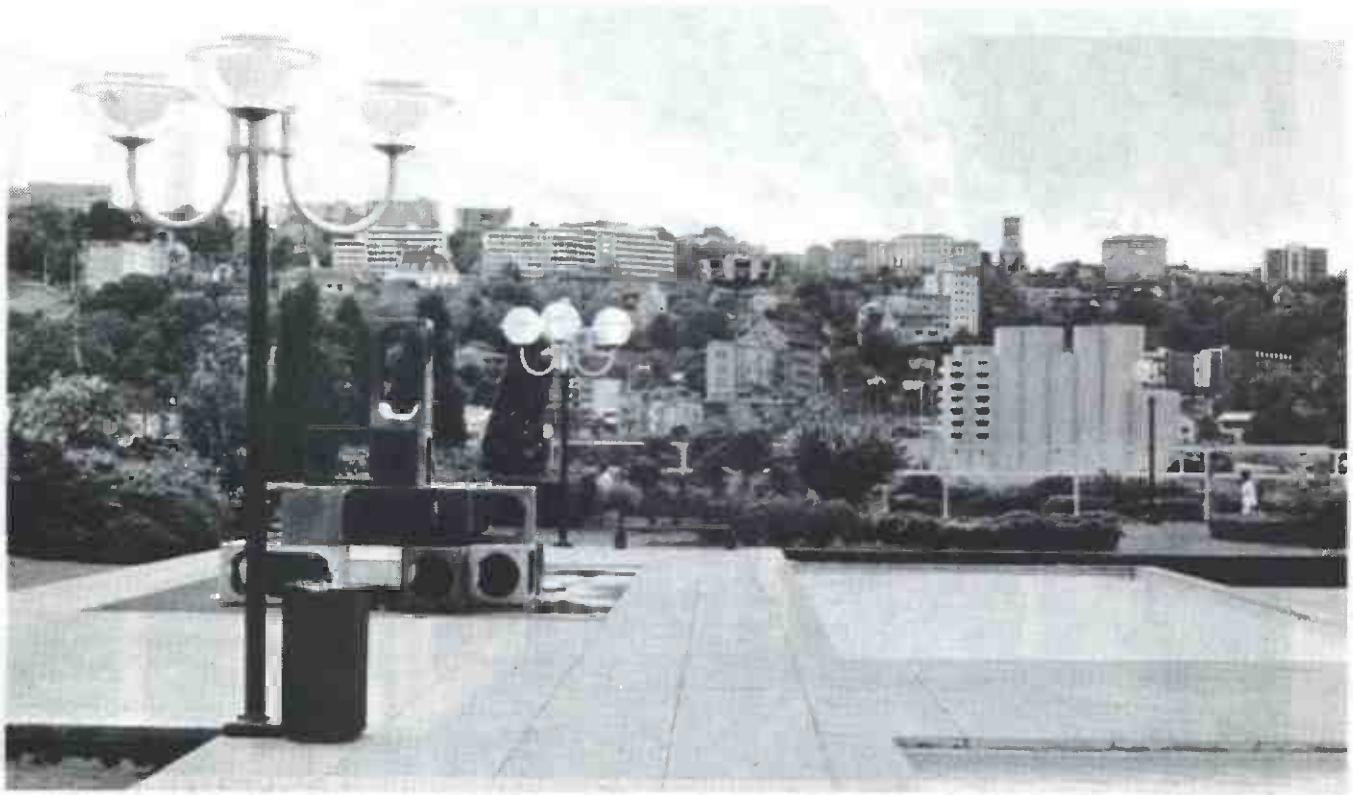
## Metro's Impacts on Surrounding Land Use

The Lyon Metro has definitely had a quantifiable impact on the city center and outlying areas. Even though a subway's effect on the evolution and function of a city can only be meaningfully evaluated over the long term, there are some short-term observations about the Lyon system that may prove helpful to city and transit planning in Los Angeles. First, Metro had a substantial impact on retail centers located near the stations. Additional people were attracted to these centers and housing and employment increased. A portion of this increase along Metro routes came from outlying commercial areas. While daily traffic into the areas served by Metro increased (by about 20% over three years), this increase would have been even greater with the increase in population and employment without Metro.

Second, certain urban development projects were closely tied to the construction of the Metro line. One of the most striking examples of this dual planning was the creation of a 2.2 km pedestrian mall between the Boulevard Victor Hugo and Rue de la Rèpublique. This successful pedestrian mall was a natural by-product of Metro construction, because all vehicular traffic was disallowed in this area while the Metro was being built. Likewise, a new public square, La Place Louis Pradel, was created in a previously blighted area of the city. The construction of a station in this area was the impetus for the renewal of the surrounding buildings and also for the construction of a 300-space underground parking garage.

Third, the availability of subsidized, high quality Metro service in Lyon, verified an important theory. Studies show that Suburbanites, including socially disadvantaged and less mobile individuals such as young people, the elderly, and recipients of public assistance are entering the city more often now than before Metro was constructed. This has proportionately localized the demand for public services in the city center and other areas served by Metro where they can be more efficiently delivered.

Now that Metro lines in the city center are substantially complete, the SEMALY would like to extend lines further into the suburbs, especially to areas such as Vaise which require economic revitalization. Vaise is essentially an industrial town that is experiencing a decline in economic activity and population. The city currently has about 20,000 inhabitants and recently 7,000 local jobs were lost when a textile plant closed down. Moreover, this suburb serves as one of the major entrances into West Lyon and increasing vehicular traffic is further degrading the quality of life in the area.



Atop the Lyon Metro station that interfaces with a TGV station, a park has been created for patrons and visitors to enjoy. This is similar to the aerial park at Security Plaza in downtown Los Angeles and other local high-rise developments.


Lille is the site of the new VAL metro system, a fully automated operation.

Automatic glass doors open and close to allow patrons to ride the VAL system when trains enter and exit stations. The doors serve as a protective barrier for patrons, too.

VAL was designed to minimize capital and operational costs. But the planners did take advantage of incorporating the system in commercial/residential areas as seen in this station plaza level. A hotel is located in the background. Apartments at left and retail business can be seen.

It is for these reasons that the extension of the Lyon Metro into this section is deemed vital. Planners believe that Metro will not only contribute to the development of West Lyon, but that it will also revitalize Vaise by attracting a new commercial and industrial base as the attraction for housing and commercial activity around the line increases. The revitalization of Vaise via Metro service is perhaps analogous to the desirability of redevelopment along some points of the Los Angeles Metro Rail line.

PARIS - May 19, 1983

Marketing Policies for the Paris Metro

A representative from SOFRETU accompanied the delegation to Chatelet station, where they met the RATP marketing director. RATP uses four main policies to attract new riders and to keep regular patrons. Its policies are apparently successful since the Paris transport system carries 7.5 million passengers each weekday over a network of 300 km. The city bus network alone consists of 200 lines and 4,000 buses.

First, there is a policy which is now about 10 years old, whereby extra and/or underused station space is rented out to commercial boutiques. That is, stations were not expressly designed with commercial shops in mind but ample space is available for commercial enterprise. The shops not only make the stations safer and more animated, but they also provide additional monies to RATP (about 50 million FF annually). The types of establishments represented run the gamut from real estate offices to perfume outlets.

Second, the fare policy is periodically restructured by two national ministries to meet the changing needs of the riders, but fares cannot increase more than 8% a per year. There is a segmentation of fares depending on one's age, social class, and frequency of Metro use. The Carte Orange pass was a huge success when it was introduced in 1975. Not only did it increase Metro ridership, but it also increased bus ridership by 40%.

Third, RATP is pursuing a Madison Avenue-type advertising program. The current budget for advertising is about 10 million FF a year and the goal of each advertising campaign is to convince the public that it should use public transport instead of or in addition to their private cars. The current campaign has been especially well received and its two slogans are widely known -- "Le metro, c'est votre deuxieme voiture." ("The subway, it's your second car") and "ticket-chic, ticket-choc" (a catchy play on words which cannot be done justice in an English translation).

Fourth, RATP officials pursue an active policy of sponsoring cultural events in the larger stations, such as Auber/Opera and Chatelet/Les Halles. Past examples include: mini-concerts by popular folk singers, mini-plays by the world famous Comédie Francaise, arts and crafts displays, circus displays with live animals, and an exposition on the history of French comic strips. However, a few of these events have been so successful that they have occasionally interfered with the pedestrian traffic flow. Since the crowds at these events sometimes grow as large as 5,000 persons. The performances are usually scheduled during off-peak hours such as on evenings and weekends.

In the afternoon, the delegation toured the grounds at La Défense and also the central command center for the Paris Metro. Both tours were especially interesting because they related directly to earlier lectures given on each facility.

LILLE - May 20, 1983

Lille's Automated Metro System

The delegation left Paris at 6:30 AM en route to Lille, where the day was spent examining the new VAL Metro system. The MATRA Industrial Group, which hosted an official dinner meeting at Le Doyen in Paris, was the delegation's host in Lille. MATRA manufactures sophisticated military and civil high-tech equipment and is an important supplier of armaments and aerospace equipment in the military and civil sectors respectively. In the civil sector, MATRA has expertise in urban transportation, telecommunications, and data processing. Thus, MATRA was well prepared to function as the prime contractor on the new Lille Metro Project.

VAL was especially designed in order to reduce capital investment and operating costs. Such economies were essential on this system because of relatively low passenger demand (maximum of 15,000 passengers per hour as compared with an average 30,000 passengers per hour for conventional heavy rail transit systems). Certain technical features added to the efficiency and economy of the system. First, the rolling stock is compact (perhaps too compact in that certain delegation members expressed feelings of claustrophobia while riding the system). The width of the cars is only 2.06 meters. Loading platforms are also much narrower than normal.

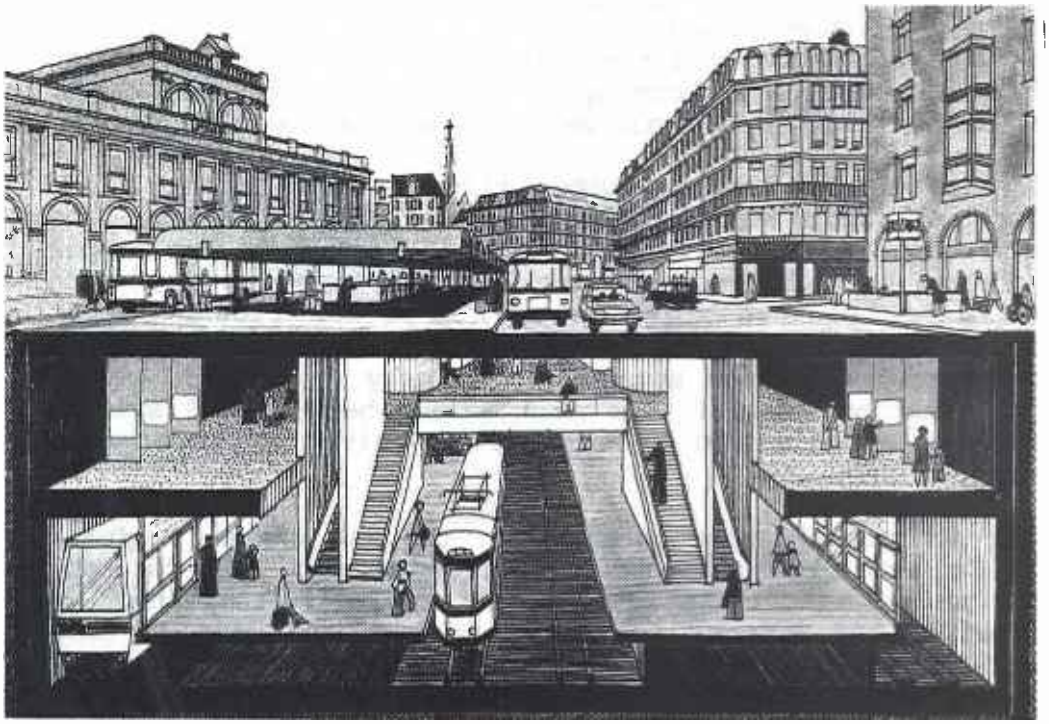
Second, the cars are supported by a single axle and not by bogies. The axles are equipped with rubber tires, which have another light alloy wheel located inside so as to allow continued system operation in case of a flat tire. Axle guidance is assured in two ways: by a normal concrete and steel track with two lateral tire rails, and by special rollers mechanically linked with the axle in the switching zones. This type of axle guidance system provides several advantages: lightness, compatibility with small vehicles, and easy switching.

Third, all vehicles run on rubber tires. This is not a new concept and, in fact, Paris, Montreal, Mexico City, Santiago, and Sapporo have long had rubber-tired systems. The biggest advantages that are claimed for rubber-wheeled vehicles over those equipped with steel wheels are reduced noise levels, smoother rides, better performance in terms of accelerations and braking, and the ability to climb steeper grades. These advantages, if they do in fact exist, were not all that noticeable. The newer steel-wheel-on-rail systems as in Brussels appeared to have equally desirable performance characteristics.

Fourth, and probably most interesting, the VAL system is fully automated. Drivers are not needed to control the cars from the cab. A reduction in operating costs seemed to be the motivating force in fully automating the system. Since traffic on the line is only moderate and the train capacity is correspondingly low, employment of a driving staff would greatly add to the annual operating costs. It is estimated that driverless operation enables a reduction in operating personnel of approximately 60%.

MATRA officials claim that passenger safety on the VAL is as good as, if not better than, on traditional driver-operated systems. Not only is the VAL track highly electronically sensitized to detect speed and directional changes, but a system of double doors has also been installed on the platforms to prevent people from falling onto the tracks. If some sort of failure should occur, the problem is handled by remote control from the central monitoring station. Meanwhile, monitoring attendants can maintain constant voice communication with the passengers. If a serious failure occurs, an emergency team can gain access to any part of the line in less than eight minutes and can manually drive the car to the next station.

After being thoroughly briefed on the system and visiting the maintenance yards, the delegation spent several hours riding the system to check noise levels in residential areas and to look at station construction. Although some of the stations and tracks leading into the stations were located in the middle of newly constructed housing developments, the delegation was told that there had been no complaints regarding noise. This is not as incredulous as it may sound. Members of the delegation conducted an evaluation of the sound impact and found that the cars did indeed travel very quietly along their tracks.



Artist's rendering shows how some stations in the Lille Metro system provide adequate pedestrian access and provisions for multi-modal interface.

Metro Logo

Central Control Center

Architectural design and artwork are most prevalent in the Lille system. Shown above is the courtyard entrance to a station.

There are currently 13 stations along the original line which had just opened on May 16, 1983. (By Spring of 1984, the line will have been extended to a total distance of 13.3 km and five new stations will have been opened.) All the stations are architecturally distinct, although each is equipped with 12 sliding platform doors, elevators for wheelchair access, escalators that start and stop upon tactile recognition, and normal stairways. The stations are monitored by television from the central headquarters and a two-way voice communication system has been installed along the platforms.

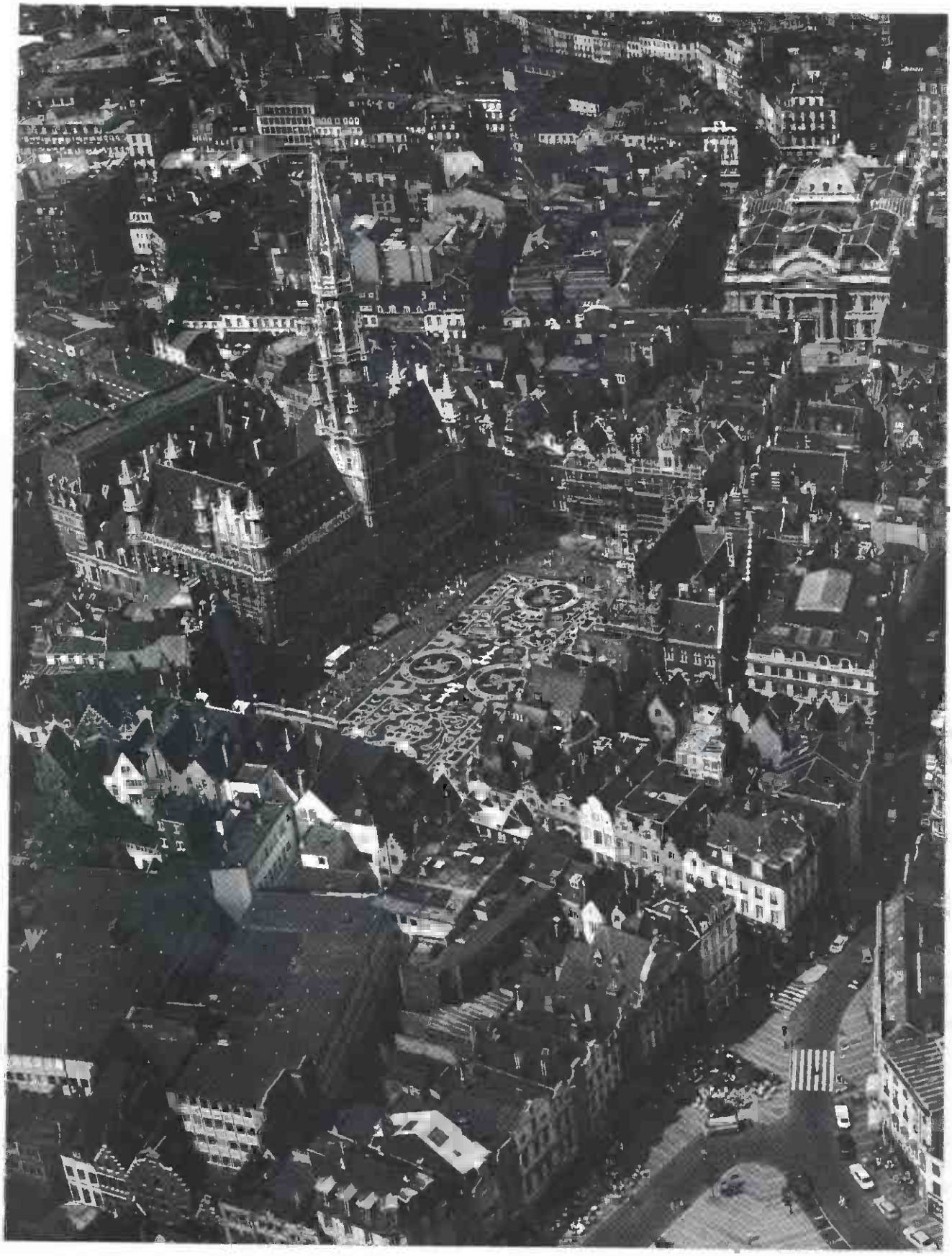
Public art is a prominent feature in the Lille Metro stations, and vandalism has not been a problem and is not a serious concern. The works range from modern, polychromatic plastic pipe sculptures to one classical station, which is done all in fitted stone work and smoked glass mirrors. An effort has been made to keep the multi-level stations bright and airy through the use of vast skylights. Ticketing areas are spacious to give easy access to ticket vending and self-service ticket canceling machines. After canceling one's ticket, he can travel an unlimited number of times for a one-hour period on the Metro, buses, or trolleys. Weekly and monthly passes are also available.


# 2 - BELGIUM

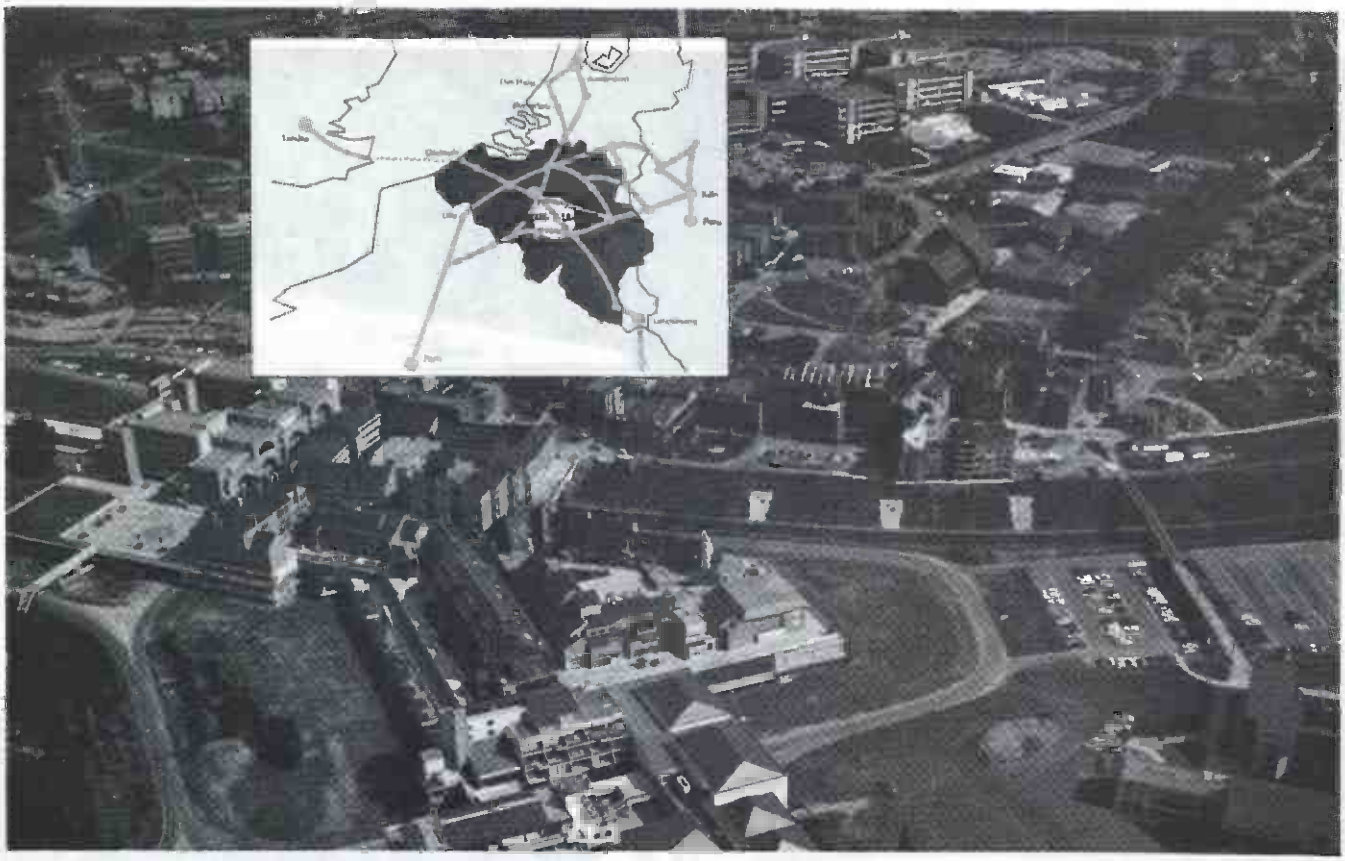
BRUSSELS - May 21, 1983

TRANSURB CONSULT and the Belgian Mass Transit System

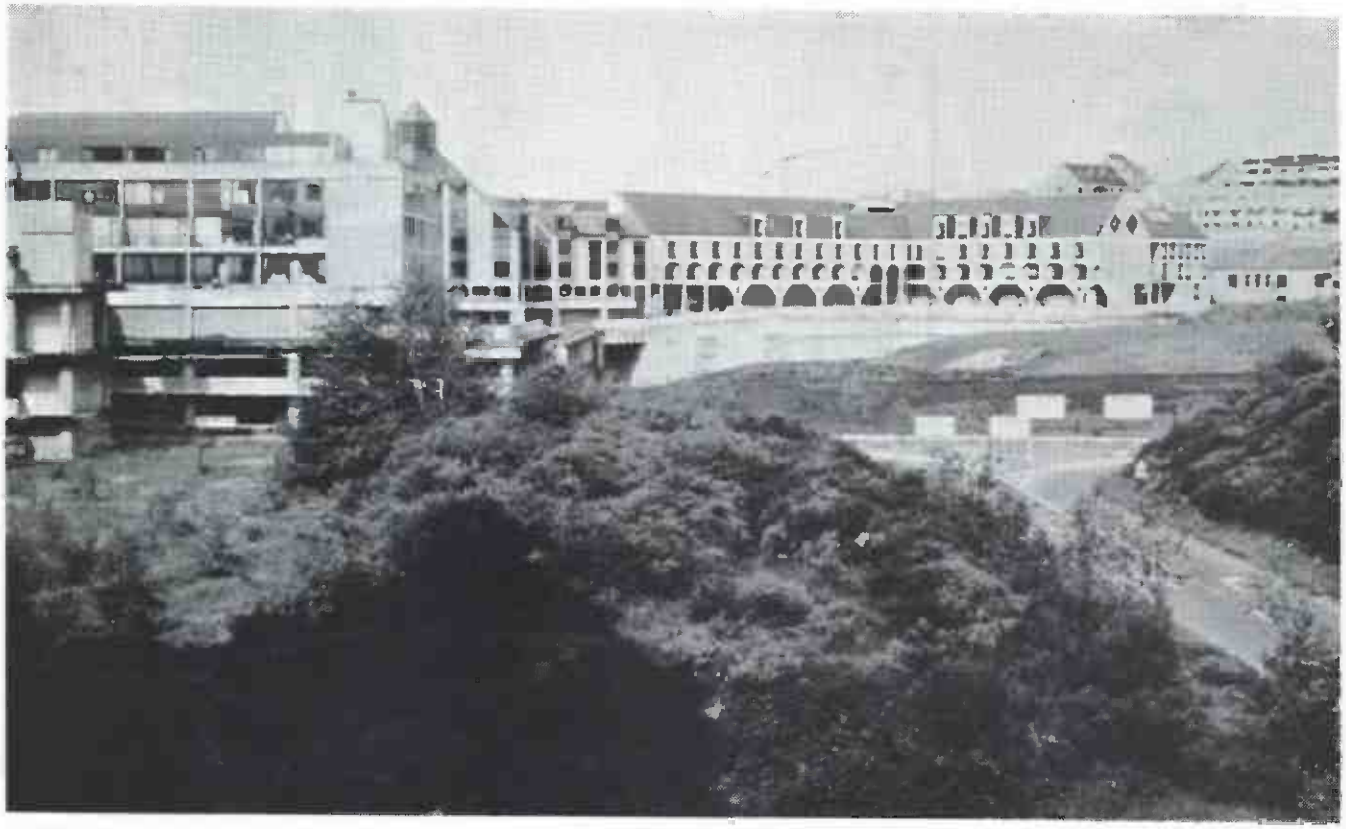
Assisting the delegation in Belgium was the state-operated professional consulting/engineering firm of TRANSURB CONSULT. TRANSURB CONSULT, which is the sole spokesman for the export of Belgian transit systems, is an integrated corporation composed of the Société Nationale de Chemins de Fer Belges (SNCB; translation: the state-owned National Railway company), the Société des Transports Intercommunanes de Beuxelles (STIB; translation: the Brussels Public Transport Authority), the National Railways Company of Luxembourg (CFL); the major Belgian consulting firms, and the Office de Promotion Industrielle (OPI), which is a public organization responsible for research, development, and investment.



Belgium has 10 million inhabitants in a limited geographical area. In order to continue developing its capacity for adaptation to changing times and growing demands, Belgium has advanced a great deal in mastering all aspects of mass transport and town planning.



Louvain-la-Neuve lies to the southeast of Brussels, about 18 miles from the center of the capital.



This is a ground-level view of the housing, college campus, commercial buildings and a main highway in Louvain-la-Neuve. Running beneath these buildings is a Metro rail line.

"Pre-metro" is one system that operates in subway as a heavy rail-type operation (above) and on the surface in a light rail mode (below). It has proven to be a successful concept in transforming public transit in Brussels.

SNCB and CFL operate a rail network with a total length of 4,300 km and rolling stock consisting of 500 electric locomotives, 950 diesel line and shunting locomotives, and 600 electric multiple unit railcars. The STIB operates an urban transport network that consists of 15 km of subway lines, 62 km of light rail transit lines, 90 km of trolley lines which are in the process of being converted to light and heavy rail, and 261 km of bus lines. The rolling stock consists of 79 subway cars, 189 light rail transit vehicles, 172 trolleys, and 595 buses.

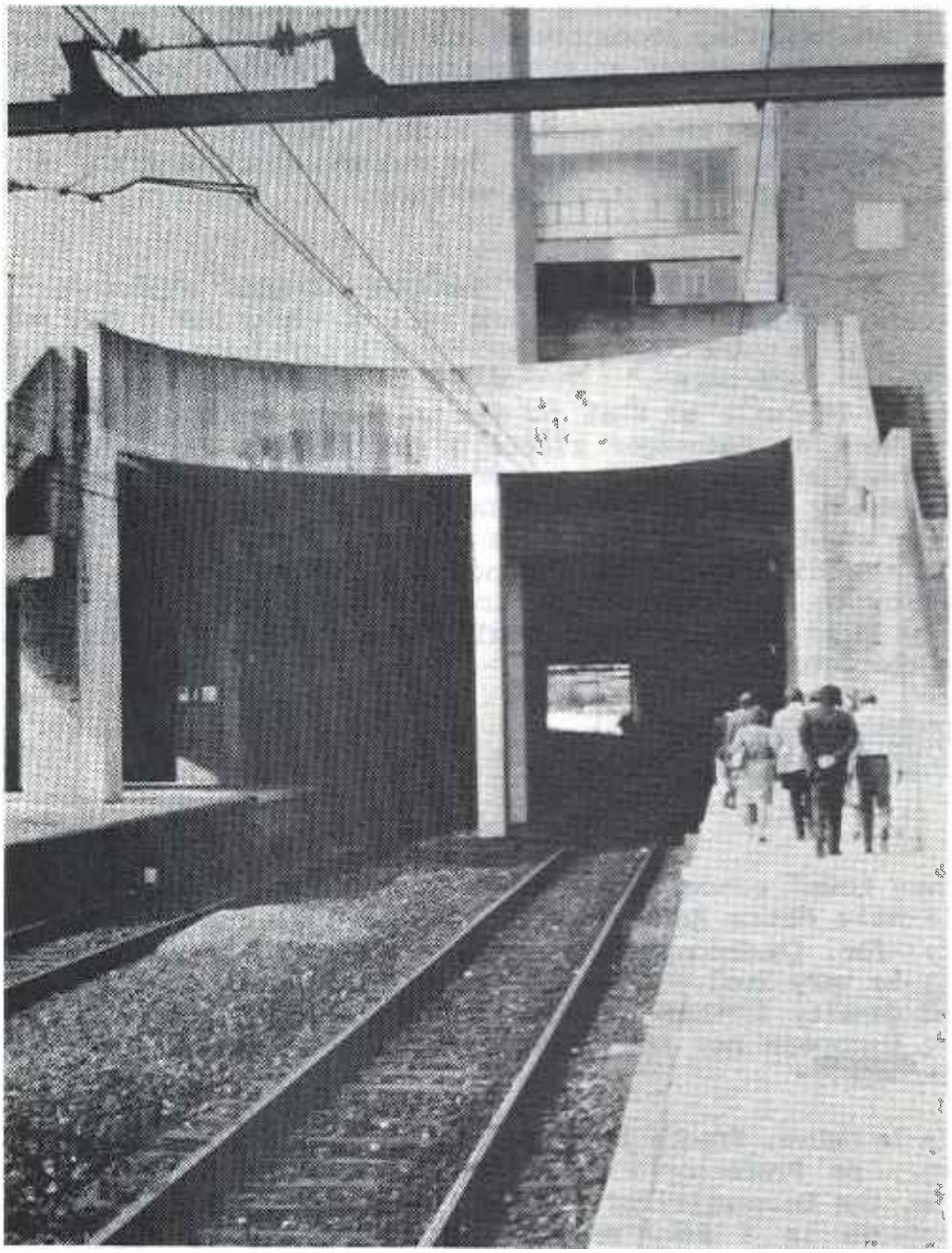
Messrs. De Smet and Flecijn of TRANSURB CONSULT explained the organization's management structure and area of expertise. They were followed by Mr. Antoine Lombart, who briefly explained a uniquely Belguim idea of "prè-métro." Pre-metro is a concept whereby rail infrastructure is built so that it can initially support light rail vehicles. Then as passenger ridership increases and/or increased funding becomes available, the prè-métro line can be converted to heavy rail use by changing platform heights and converting to heavy rail transit vehicles. This includes changing power collection from pantograph to third rail. This concept appeared to have direct applicability to Los Angeles for transit corridors to be served initially by light rail but which would warrant full Metro Rail-type service in the future.

The Transportation-Land Use
Planning Interface at Louvain-la-Neuve

The "new town" concept may not be crucially relevant for the initial 18-mile Metro Rail starter line in Los Angeles, but the opportunity for interconnecting public transit and real estate development is very real. Also, as future Metro Rail extensions are planned and density further increases along the subway lines, lessons learned by European new town planners will be invaluable to Los Angeles planners.

Louvain-la-Neuve, French for "the new Louvain," is more than just a new town. As Professor Pierre Laconte, Director for University Expansion at the University of Louvain, explained to the delegation, Louvain-la-Neuve is a $400 million social experiment, sparked by Belgium's ever simmering language war. Belgium's southern half, the land of the Waloons, speaks French and is French in culture; the northern population speaks Flemish, a Dutch dialect, and has cultural ties with historic Flanders.

Louvain-la-Neuve is a new university town designed and developed by the Université Catholique de Louvain (UCL). The University of Louvain, the oldest Roman Catholic University in the world, was founded in 1425 in the City of Louvain ("Leuven" in Flemish), located about 25 km east of Brussels. It consisted of two universities: one Flemish-speaking, Katholieke Universiteit Leuven (KUL) and one French speaking, UCL. In 1968, as part of a language-based regionalization process, the UCL moved to a rural site 30 km southeast of Brussels.



The terminal station beneath Louvain-la-Neuve.

University authorities decided to develop a university that was integrated into a town rather than as an isolated campus. Public transportation was vital to the new town's success, but no concerted effort has been made to recoup for transit purposes the increased value of development within proximity of mass transit facilities. There is no through traffic in the center of Louvain-la-Neuve, except for a railway line that penetrates to the town's very center. Access to the railroad station is easy and there are ample parking facilities. Such convenience encourages trips to Brussels (30 minutes away) by train instead of by car. The road design is based on a circumferential route which opens onto a series of cul-de-sacs. Three main arteries give access to the city center and its underground parking lots.

The ultimate goal is to house approximately 50,000 persons on 2,300 acres of land. The population mix will be balanced so that there is a maximum of about 15,000 students. In order to avoid the phenomenon of urban sprawl now referred to worldwide as "Los Angelesization," the town was designed first and foremost for the pedestrian. One pedestrian street forms the linear backbone along which all other development takes place. Most of the community facilities and shops are located along this corridor, and it is linked by other pedestrian routes to the four mainly residential districts that surround it. The layout of the housing is such that no one has to walk more than about 300 meters to gain access to shops, community facilities, or public transport.

Ostend and Knokke - May 22, 1983

Ostend-Knokke Light Rail Transit

The delegation traveled two hours by train to Ostend, where it was met by Mr. Van Sooye, the Operations Chief for the SNCV (Flanders division). At Ostend, the delegation boarded a Light Rail Transit System train and rode the length of the Ostend-Knokke line. The afternoon was spent in Bruges.

LRT train at station in small town of Knokke. LRT system connects Ostend, a multi-modal transit town, to Knokke.

Aerial view of the industrial city of Charleroi. Part of the light rail system can be seen paralleling the highway.

The Light Rail Transit (LRT) System is an urban or suburban mass transit system whose trains run on rails and are electrically powered by overhead pantographs. LRT is applicable along corridors of light-to-medium travel density. Along such corridors, the benefits of LRT are numerous. First, passengers benefit through easier and extended access. While travel speeds on an LRT system are generally slower compared with a subway, the average distance between stops is shorter and the walking distance between connections is generally reduced. Second, the community at large benefits. Construction of lines at ground level is generally accomplished easily and with minimal disturbance to neighboring residents. Also, since the LRT is electrically powered, there are no polluting exhaust fumes. Third, the community's overall transportation expenditures are minimized because LRT, when appropriately applied, minimizes infrastructure investment costs and operating and maintenance costs as compared to autos or other modes. At Ostend, the delegation saw what appeared to be an excellent application of an LRT system in a small coastal community, where travel densities were relatively low and sufficient street capacity existed to easily accommodate LRT tracks and train movements.

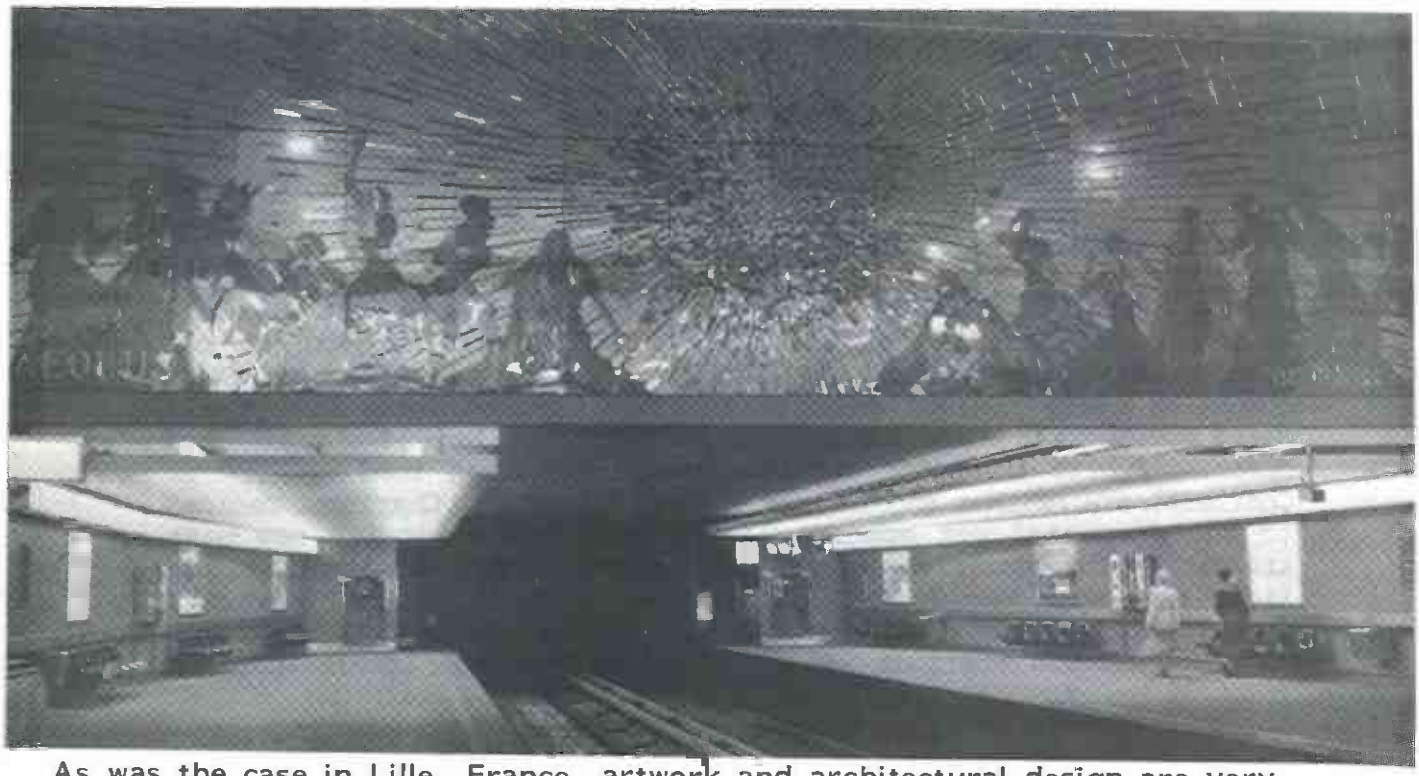
CHARLEROI - May 23, 1983

Light Rail in Charleroi

On the Pentecost holiday, the delegation was able to visit the new Charleroi light rail line even though most everything else in Catholic Europe was closed. The City of Charleroi and its environs have a population of approximately 400,000 persons. Population density is quite variable with 60 persons per hectare in the city center and as few was 5-8 persons per hectare in the peripheral surburbs. The main industry in the area is iron works and this whole region south of Brussels suffered economically in recent years.

Two transit companies serving the Charleroi are: the (Société Nationale des Chemins de Fer Vicinaux (SNCV) and the Société des Transports Intercommunaux de Charleroi (STIC). Although these companies carry 100,000 passengers a day (approximately 25% of all daily movements), there are no separate tracks or lanes for trains and buses. Public transport services using the urban road network in Charleroi are neither regular nor rapid. Therefore, Charleroi decided to build special yet economical infrastructure for its new mass transit system consisting of articulated tram cars. Construction for light rail was concentrated on protected surface tracks, viaducts, some tunnel sections, and stations with central platforms. The mean distance between stations is 700 m and the average travel speed is about 30 km/hour.

The central control center for rail lines in Brussels is also the emergency transportation center. All emergency services are tied into this center with adopted plans of action to meet most every conceivable emergency.



As was the case in Lille, France, artwork and architectural design are very important to the people of Brussels. All new rail stations have been given particular attention to enhancing the environment with clean designs and tasteful artwork. Above is Station Thieffry.

Upon completion in 1994, the Charleroi 52-km light metro network will consist of a small-ring line, circling the town center and eight radial lines. This design makes connections easy at the city center and assures a high traffic density at the town's main attraction centers. The eight radial routes were planned according to traffic surveys and provide easy access to the main suburban areas. Charleroi is an industrial coal mining town and the Metro's engineers took advantage of old coal mine cuttings when laying the track. The tracks are separated from the flow of general automobile traffic.

The radial lines will have a total of 61 stations upon completion. Most of them have small park-and-ride facilities (30-50 cars), but larger facilities (100-150 cars) are provided at major highway crossings. Bus and train interchange points are usually located at the entrance to the light rail stations.

The delegation was particularly impressed with the commitment to station enhancements on the Charleroi LRT system. The terminal station at the outer end of the line is located in the iron works area of the city. This area is characterized by many industrial buildings that all have a grey appearance resulting from the smoke and particulates from iron processing mills. Charleroi made a point of having their new LRT system standout from this somewhat drab enviroment by introducing bright colors and exciting architectural treatment in the station areas. The terminal station was the most prominent example of this, however, all stations that were visited demonstrated the commitment to this design philosophy.

BRUSSELS - May 24, 1983

The delegation spent the morning in Brussels at STIB headquarters (the public transport company of Brussels). One of the lectures concerned development occurring around station stops. One case study cited was the Alma (St. Luc/UCL) site. After the Catholic University of Louvain was bifricated, a new medical school and university hospital were built outside Brussels in the province of Brabant. The hospital complex was built on 40 hectares of rich agricultural land. The east-west Metro line was modified to serve this new complex and special care was made to design the station to ensure compatibility with its surroundings. With the hospital so close by, the station was constructed with "floating concrete floors" and specifically designed "noise preventer tunnels."

The afternoon was spent riding the system and looking at the maintenance facilities. While visiting the different stations, one is immediately impressed by the grand displays of public artwork in many of the stations. Metro stations in Brussels are both functional and attractive. By commissioning different artworks for many of the stations, the Belgian government has not only recognized the talent of its native artists, but has essentially transformed the stations into permanent art galleries. Art in Brussles, like Metro, is for everyone. Art and artists are also very important to Los Angeles, and both will have a vital role in the station aesthetics of Metro Rail.

Beyond the artworks in the stations, there are high quality surfaces on station walls and floors such as marble, stone and wood. Mr. Antoine Lombart of the Brussels Public Passenger Transport System who hosted much of the tour and discussion session, expressed the basic guiding philosophy that led to what clearly was the most outstanding example of modern subway station architecture and urban design. By committing to the added cost and effort in the station design and construction, the City anticipates greater community pride and support for its subway system. It anticipates lower maintenance costs, because there will be fewer problems of vandalism, graffiti, litter and damage to station property. These expectations have been realized. The delegation saw virtually no graffiti or damage to any of the facilities. Mr. Lombart pointed out that the Metro system will be there for 100 years. The savings in reduced operating costs over that time period as a result of greater public pride in their Metro system will more than compensate for the slightly greater up-front capital cost in station enhancements. Few could argue this point.

Terminal station in Charleroi illustrates use of clean design, some artwork and vivid colors that enhance the platform area of the station.


# 3 - ENGLAND

LONDON - May 25, 1983

The delegation spent the morning at County Hall, where the Greater London Council (GLC) does all of its work. The GLC is a government authority consisting of locally elected officials who handle regional affairs for London's population of 7 million people. The GLC deals with issues too broad for any of London's local borough councils to tackle alone, including education and transport. Dave Wetzel, Chairman of the Transportation Committee, presented an overview of the Labor Party's position on the importance of public transportation in London. Audrey Lees, Land Use and Transportation Coordinator, and David Bayless, Chief Transportation Planner, also addressed the delegation. The following are some of the more salient points made during the presentations.

## Overview of the London Transport System

Various components comprise the public transport system in London. Briefly, these elements are:

- Underground (subway) — London Transport extends over 390 km (242 miles) and has 266 stations to serve central and inner London alone. Under the 1969 Transport Act, the London Transport Executive operates the system, and the Greater London Council is responsible for all policy decisions, including those for fares and financing.

- Railway -- British Rail provides long distance inter-city services to London and also provides opportunity for substantial commuting. The system is composed of 770 kms (477 miles) of track and 297 stations in Greater London.

- Buses -- The bus system is completely integrated with the operation of the underground. The GLC is responsible for all policy and funding decisions for the intra-city bus lines. For those lines that extend beyond the GLC area, the counties determine the levels of affordable service.

- Taxis -- London has an excellent taxi system, which has approximately 11,000 cabs and 14,000 licensed cab drivers.

## The GLC's Transportation Objectives

GLC's objectives for the current year centered primarily around cost efficiency and fare structure issues. The five key objectives are:

1. Provide convenient public transportation at a price that will encourage use or at least not discourage use.

2. Provide reliable and reasonably priced bus service that moves people from the City center to outlying suburban and industrial areas. Even though serving outlying areas is rarely profitable, such service is necessary to attract new high technology growth industries to London.

3. Establish and implement transport policies that help reverse the decline of the inner city. (These policies were not detailed for the delegation.)

4. Establish and implement transport policies that effect social changes by reducing mobility inequities, especially where a dependency on public transport is combined with social, housing, and/or economic deprivation.

5. Establish simplified fare structures that improve operating efficiency and increase passenger convenience. Likewise, the London Transport and British Rail fare systems should be further integrated.

London's public transport fares rose rapidly in real terms after 1975 because of increased operational costs and declining ridership. The fare structures had remained graduated in relation to distance traveled with the exception of outer London bus fares, which were changed to a flat zonal basis in 1980. In October, 1981, the new GLC administration reduced London Transport's fares by 32% and introduced a zonal structure for all bus fares and for Underground fares in the central area. This returned fares to about the 1970 levels in real terms.

This policy was declared illegal by the Law Lords in 1981, and on legal advice as to the significance of the decision, the Council reluctantly doubled fares in March, 1982. This not only created exceptionally high fares but reversed and widened the gap between London Transport and British Rail fares-- the antithesis of integration. Since then, the Council has taken steps to improve the situation and with legal advice decided to further simplify Underground fares to provide season tickets, which are valid for both Underground and bus. As part of the process, fares were reduced overall by 25%. This new system went into effect on May 22, 1983.

This is a major step towards integration, and the way in which BR and LT fares could be integrated is now being actively pursued by BR, LT, and GLC; however, though introduction of any proposal would require government consent for BR's involvement.

Though high transit subsidies are accepted widely in Europe and elsewhere, and to some extent reflected in the 40% subsidy level for BR's South-East services, a comparable level for London Transport clashed with Central Government wishes to contain local government expenditures.

The main effects of the October, 1981 and March, 1982 fare changes were:

1. With "Fares Fair" - October 1981 (Reduced Fare)

   There was a 6% reduction in the number of commuters traveling by car into the Central Area in the morning rush hour. There was an increased use of public transport (13% in bus journeys and 7% increase in Underground journeys). This increase was generally evenly spread among different age groups, although 16-24 and 35-44-year-olds showed an above-average increase. The fares simplification led to increased travel by holders of bus passes and reduced boarding times.


In London, double-decker buses and the black cabs are widely used for public transport on the surface.


The London Underground provides rapid and comprehensive transportation to all major parts of London.

2. With Fare Increase - March 1982

There was a 16% drop in bus journeys, 13% drop in Underground journeys, and an increase of 6% in journeys by car, 20% by motorcycle and 50% by pedal-cycles. The number traveling by car to the Central Area in the morning peak rose by 14%. An additional 3,700 road casualties were expected to occur annually. The immediate effects of the further fare changes and the longer-term effects will continue to be monitored through a special panel of 200 Londoners at approximately six-month intervals.

FRAUD

Fraud is a major burden on the traveling public, leading to higher fares, lower services, and higher subsidies than would otherwise be necessary. The effect is realized both in the lost revenue and in the money spent in seeking to limit fraud. The present level of fraud on London Transport translates to about 40 million pounds a year. The simplification of the fares system, facilitating automatic ticket sales and the increased use of travelcard season tickets are factors likely to reduce fare evasion and the growing need for ticket inspection. Additional fraud-prevention measures for Undergound and buses include:

Underground

- Increased staff at ticketing windows so as to reduce by 50% the number of occasions that ticketing windows are closed.

- Modified ticket machines that take 1-pound coins, and give change. New machines were offer a wide range of tickets.

Increased facilities for collecting excess fares at special windows and experiments with ticket collectors issuing receipts.

Buses

Increased ticket inspection.

Transportation Specifics

The Subway. London's Underground, commonly referred to as "the Tube," carries approximately 1.8 million passengers each week day, and the distance of the average trip is 7.5 km. The system brings 300,00 commuters into Central London each day and is used by more than 100,000 British Rail commuters to reach their final destinations. In general, work related trips make up approximately 60% of all trips taken on the Tube. It is for this reason that almost 200,000 persons use monthly or seasonal passes. Despite these impressive figures, use has fallen by 30% since 1970 primarily because of declining population and employment in the city center, coupled with increasing fares.

Many parts of the Underground are in need of modernization. There is a continuous renewal program for signaling, tracks, and escalators. The rolling-stock is, of course, replaced less frequently and usually only when life-expired. Between 1986 and 1990, rolling stock renewal will be at a low, and 60 million pounds will be spent on renovating 140 stations and replacing 21 large passenger elevators.

While older parts of the system are being renovated, many new lines are planned for construction. An extension on the eastern side of London is planned for the late 1980s, and the Piccadilly Line to Heathrow Airport is being extended to a new terminal and should open in 1985. A light rail system for the Docklands which would run from Tower Hill and possibly Stratford to the Isle of the Dogs is also planned for completion in 1985. This latter project is being spearheaded by the Greater London Council and the private London Docklands Development Corporation.

The Docklands region is economically stagnant and it is hoped that the extension of public transport into the area will help revitalize it. Although it was hoped that the Docklands would be the site of a great joint development building project, private investors have up until very recently been reluctant to invest in this highly blighted area. The proposed light rail system to serve the Docklands is that of short (one-to-three-cars) trains operating on steel rails. The trains could run on the roadway, like trams, or on completely segregated tracks, where speeds of 50 mph would be possible. Areas of high population density would have stations or stops at quarter to half-mile intervals. Light rail has been proposed, because the short, lightweight trains reduce the cost of structures and the size of stations. These trains can also cope with steeper gradients and tighter curves than can normal railways or subways.

Buses. The red double-decker bus is by far the most widely available form of public transportation in London. Although 85% of all Londoners are within a quarter mile and 99.5% are within half a mile of a bus stop, the bus system is considered somewhat unreliable due to traffic conditions. The bus network extends over 2,790 km and carries approximately 1 billion passengers a year. The average trip of 3.4 km is shorter than the average trip on the Underground (7.5), and usage is especially high in the suburbs. Less than 25% of the total 350 routes serve Central London.

Use has declined by 33% since 1970 in terms of journeys and 28% in terms of passenger miles. This reduction reflects declining population, increased car use, increased fares, and a declining level of service. Usage is especially elastic for shorter trips for which walking is an alternative.

LONDON - May 26, 1983

Dr. Tony Ridley, Managing Director for Railways and chief member of the London Transport Executive, gave an overview of the London Transport System. Some details of his lecture were incorporated into the previous section of this report. Other details are embodied in the following account.

London Transport, with its closely integrated systems of buses and Underground trains, provides public passenger transport in Greater London. This covers an area 1,600 square kilometres in the capital. London Transport's trains run over 380 route kms, its buses over 2,800 kms (1,736 miles) of roads. It manages 249 railway stations.

The chart on the next page illustrates the extent of Transport's current services, its staff and its rolling stock.

Marketing

London Transport carries almost 40% of all passengers traveling entirely within greater London and almost 50% of those traveling to and from work. More than 80% of peak-hour travel to Central London is by public transport. As for London's visitors, 45% of their journeys are made by Underground, whose speed and simplicity make up for the more picturesque travel by bus. Tourists already provide 12% of London Transport's revenue from fares and there is hope for an even higher figure.

London Transport's policy of promoting the greatest possible use of its services by the public--within the financial limits set by the Greater London Council--has met with considerable success. Separate marketing campaigns have been directed at increasing both peak and off-peak travel. New levels of fares and new types of tickets have been designed to meet its financial obligations and at the same time to encourage as many people as possible to make use of a transport system that ultimately exists for their benefit.

LONDON TRANSPORT

| | Bus Services | Underground Services | Total |
|---|---|---|---|
| per annum | | | |
| Passenger Kilometres | 4.3 billion | 4.5 billion | 8.8 billion |
| Passenger journeys | 1.23 billion | .59 billion | 1.82 billion |
| Bus/Railway Car Kilometres | 265 million | 330 million | 590 million |
| Staff employed | 34,000 | 26,000 | 60,000 |
| Rolling Stock owned | 6,500 | 4,230 | 10,730 |
| Rolling Stock depots & workshops | 69 | 13 | 82 |

Both the marketing strategy and its performance are based on and monitored by market research. In 1978, a new method of evaluating the bus services was introduced by adoption of a policy requiring the entire system to be self-financing, and it was. Approximately 28% of the project costs were met with cash payments by developers building retail, office, hotel and housing projects at major station stops. Mr. Ridley pointed to the new Hong Kong Metro as a modern example of effective project management. Hong Kong Metro was built on schedule and within budget, which Mr. Ridley attributed to many factors, not the least of which are: (1) the determination and skill of Hong Kong's labor force, (2) the careful work of 300 experts hired specifically to design and supervise the building of the project, (3) and exacting management, and (4) re-routing of street traffic during Metro's construction.

London Transport International was a member of a consortium of British firms set up to advise on all aspects of the proposed system, including design, construction, operation, control, maintenance, and rules/regulations.

## Financing the London Transport System

Mr. Maurice Stonefrost, GLC Comptroller of Finance, addressed the monetary issues concerning the Underground's operation. In 1982, there was a deficit in traffic operations of 74 million pounds before any grant was made from the GLC. Some major factors in the loss of income were: (1) effects of strikes (-9 million pounds); (2) lower receipts than anticipated for British rail passengers using Underground services (-5 million pounds); and (3) a lower than forecast yield from the March 1982 fares increase (-7 million pounds), offset by the increased payment for the fare reductions given to the elderly.

With regard to subsidies, it should be noted that while the Underground registers only a relatively small loss, most of all government subsidies go toward operating the bus lines. The reason for the disparity is that the Underground generally serves the densest parts of London (north of the River Thames) and the buses serve mostly less densely populated outlying areas. Before allocation of grants from the GLC, the deficit for the bus lines alone ran 155 million pounds in 1982. Mr. Stonefrost believes a transit system, including a bus component, could be operated without deep subsidies, but only by reducing hours of bus operation and eliminating some routes entirely. He also feels sure that the fare reduction experience conclusively discredited the view that if fares were low enough, increased ridership would make up for lost revenues. It did not come close.


# 4 - WEST GERMANY

Observations on Munich Transit - May 27, 1983

This section of the report summarizes the visit to Munich, made by Professor George Lefcoe and Steve Mertz of the Los Angeles delegation. It specifically addresses their analysis of the barrier-free fare collection system (often referred to as self-service, automatic, or honor system) as it is used in Munich.

Professor Lefcoe and Mr. Mertz discussed the concept and its pros and cons with Munich transit director Dieter Buhmann, representatives from the private consulting firm of Socialdata, and Professor Richard Michael of Munich Technical University.

Some of the reasons given for initiating a barrier-free system are financial savings, reduced employee workloads, and overcoming staff shortages. The principal characteristic of a no-barrier fare collection system is the absence of turnstiles or fare gates at entry and exit points. Control of fare payment is shifted to teams of roving inspectors who verify passenger ticketing on a somewhat random basis. Only a small percentage of the total number of passengers is checked, and a penalty is levied against those people who have evaded lawful payment.

The barrier-free system is used in many parts of western and eastern Europe; it is used uniquely within all of Germany. When the system was introduced in Munich in 1971, the state-of-the-art fare collection equipment could not handle the collection of multi-modal and multi-distance base fares. The Munich mass transit system consists of the U-Bahn for center city subway travel, the S-Bahn for subway and above-ground metro travel serving the center city as well as outlying areas, streetcars, and buses. Daily ridership in the 80-square-km region served by the system totals approximately 1.7 million passengers.

Tickets for any of these transportation modes can be bought at large blue vending machines in U- and S-Bahn stations, at streetcar stops, or in the streetcars themselves. The passenger has a choice between single tickets or multiple strip tickets, which are cancelled one at a time. If the trip is rather short, the passenger may be entitled to use an inexpensive, "short journey" ticket ("Langstrecke"). The 24-hour ticket (6 DM) is of particular interest to tourists who will be making many trips a day but who will be staying in Munich only briefly. The 24-hour ticket is slightly discounted and is available at the City Tourist Office, in over 300 private shops, and at any of the large blue vending machines. Vandalism against these machines is minimal and maintence costs are negligible with 1 breakdown for every 30,000 uses. All tickets are good for S-Bahn, U-Bahn, streetcar, and bus. The passenger cancels the ticket himself at the canceling machines located at the entrances to the U-and S-Bahn stations, and in streetcars and buses.

## Control System

For reasons of economic efficiency, most of the policing effort is concentrated on the maximum load point of the line being checked. It is not cost effective to control on relatively less crowded suburban lines; there are fewer passengers even though there is more incentive to cheat as one crosses more tariff zones. All passengers in a selected vehicle are controlled or sometimes an entire station is targeted with team controllers stationed at all points of entry and exit. In Munich, about 3% of the average daily ridership may be controlled on any given day. A staff of 130 uniformed and plainsclothed controllers verify passengers' ticket on the Munich Municipal System consisting of the U-Bahn, streetcars, and buses. The Deutsch Bundesbahn (German National Railway Company) has an equal number of controllers checking passengers riding the S-Bahn.

A passenger who is found without a valid receipt of fare payment has two options--he may accept his guilt and pay an immediate fine (sometimes called a "superfare") to the inspector, or he may challenge the finding. When the fine was previously fixed at 20 Deutsch Marks (DM), about 40% of the alleged cheaters paid the fine on the spot. Now that the fine has risen to 40 DM, only about 20% pay the fine on the spot and the rest mail the money to the transit authority. The number of people who contest the finding is still relatively low. Multiple cheaters are subject to higher fines and possible legal proceedings.

There is no known profile of the average cheater. Fraud does not appear to vary significantly according to socio-economic class, but it is felt that students and tourists do abuse the system more often than other groups. Students usually are poor and adventuresome while tourists are more often confused as to the system's operation. Although the amount of fraud does not vary significantly according to the rider, the amount of fraud does vary more significantly by mode of transport. People are less likely to cheat on buses than on the U-Bahn for two reasons. First, people are more embarrassed when conspicuously controlled and fined on an uncrowded bus which they ride every day than on a crowded, anonymous subway car. Second, people are less willing to defraud when the mode of transport puts them in a close physical relationship with the operator (such as on a bus).

Certain factors that may actually encourage cheating are: (1) a high fare, a low superfare, and a low rate of controlling; (2) a system characterized by complicated fare structures and collection devices; and (3) a system perceived by the passenger as a poor quality operation, which leads him to feel that he is not getting his money's worth.

The penalty for fraud is theoretically a product of the risk of being caught and the amount of the fine if one is caught. On this basis, the 40 DM fine set by the Central Government is too low. Assuming the cheater's chances of being detected is 3% (the policing rate), for each "free" ride, the cheater runs an actuarial cost of 1.2 DM, whereas the average trip fee is two to three times as much.

## Analogous Self-service Experiences

When deciding whether to implement a barrier-free system in Los Angeles, Metro Rail planners should look to analogous self-service experiences. Several business situations in the United States and Europe rely on the assumption that the user is basically honest. Although the following experiences are very diverse, they must continue to be profitable as they are still used with widespread regularity.

Self-service gas stations. More and more stations today operate self-service islands, where the customer is expected to operate the pump himself under minimal supervision. Although "drive aways" don't appear common, it must be noted that an increasing number of stations in Los Angeles demand payment before pumping.

Self-service newspaper vending machines. The locked box system has long been in use in the United States, and in Munich the newspaper boxes are unlocked. Payment there runs about 96% and is strictly according to the honor system.

Self-service parking lots. There are several central stall box honor parking lots in downtown Los Angeles. In these lots, a locked rack of boxes is provided with coin slots and corresponding parking space numbers. Patrons are expected to deposit the correct parking fee in the box that corresponds to the space in which his or her car is parked.

## Conclusion

Based on these observations, the author concludes that the self-service fare system has several advantages. First, it is flexible and especially appropriate for multi-modal, complex zone, and/or graduated fare structures. Second, the system is appealing to passengers because it is simple and convenient. Third, it is efficient because it reduces queuing times and allows for multi-door loading of buses and light rail. Fourth, it is cost effective because its operation is not labor intensive.

Before Los Angeles transit officials make any decision regarding the implementation of a no barrier system, they should consult other American cities such as San Francisco and Washington, D.C., which chose not to implement a self-service system. If after further study the barrier free system is still being considered, every effort possible should be made to extensively market the pre-payment of fares through passes. Since valid passholders cannot cheat, it will be primarily the single-trip ticket holders who will commit the fraud. If the size of this latter group can be decreased, the concomitant fraud rate will also diminish.