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EXPOSITION

BICYCLE PLAN FOR THE CITY OF MEDELLIN

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SUMMARY

1. OBJECTIVES: Medellín city, with a population of two million people, is the main core of Metropolitan Area of Aburra Valley, is formed by ten Municipalities with a total of three million inhabitants. Medellín is the capital of Antioquia Department, the second city of Colombia according to its population, and commercial and industrial importance. Creating the bicycle culture and promoting it as an alternative mode of transport and provide the city with a bicycle network is part of the Integrated Transportation System (SIT), which is one of the strategic programs in the field of transport of the new Territorial Ordering Plan to be develop within the next ten years.

2. METHODOLOGY: Capitalizing the Netherlands' experience in this field, a historic joint that the city experiences is taken into account with the put in place of the massive transport system metro and the development of the Integrated Transport System (SIT), a Bicycle Plan is projected for the city of Medellin with metropolitan scope and integration. Based on a survey, basic criteria was designed, theoretical cycleways was projected, and projects was developed whose network extension is up to 70 Km, covering about 70% of the urban area of the city. Finally, implementation phases are defined to realize the Bicycle Plan.

3. PROJECTS: With the mentioned methodology, and in coordination with Faculties of Engineering of National and Medellin Universities, the following projects are developed: Medellín River Corridor, Pilot Plan, Belén-Guayabal, La América, San Javier, Universitaria, Iguaná.

4. IMPLEMENTATION PHASES: They are five.

BICYCLE PLAN FOR THE CITY OF MEDELLIN

1. DESCRIPTION OF THE CITY

The city of Medellín is located to the northeastern part of Colombia, equidistant of Atlantic and Pacific Oceans, at 1460 meters above the sea level. The city has an area of 376.2 square kilometers, with an average temperature of 23 °C and annual average precipitation of 1571 mm. Its Metropolitan Area has 1152 square kilometers, which is settled in a narrow valley of 60 kilometers long times 13 kilometers wide in its widest part, crossed by Medellín River from South to North with topographic difference in level of 700 meters.

Medellin has a population of two million people (53% between 5 and 35 years of age) and three million in its Metropolitan Area. The city has a net average density of 180 Ihab/ha. The traditional vocation of the city has been industrial, projecting itself not only as the industrial center of Colombia but also as the service and commerce center of the country.

The city is the capital of Metropolitan Area and the Antioquia Department, the second city of Colombia by its population, and industrial and commercial importance, it is the first city of Colombia with a metro system and integrated transport system. Besides, it has a great number of collective, ecological, commercial and transport equipment. The project of the city becoming as Botero city is under way with a broad collection of master's works.

According to statistical analysis, in the year 1997 the total trip generation Index was 2.3 trips per inhabitant and 1.2 trip per inhabitant for public transport, with a transfer index of 45%. The modal split is the following: 22.6% for buses, 2.5% for busetas, 1.0% for microbuses, 3.5% for informal, 6.2% for metro, 19.2% for taxis, 24.7 for cars, 3.6% for motorcycle, 0.2 for bicycle, 15.4% on foot, and 1.1% for others.

The road network has 2800 Km, from which 14% is rural and 86% is urban. From the latter a 0.6% are highways, 4.8% major arterial roads, 2% minor arterial roads, 10% collector, and 82.5% local. There are 25 levels different highways interchange, 350 signalized intersections and 650 traffic agents for its control. It is estimated that an average of 80% of registered vehicles in the metropolitan area run over it, which in total reaches 450.000 vehicles. The motorization index is 8.5 inhabitants per vehicle.

Public transport is served with three levels of service:

- **Massive:** The metro system operates since 1995, with 32 Km in two lines A and B and 25 stations, connecting 5 the most densely populated municipalities of the Aburra Valley: Bello, Medellín, Envigado, Itagüí and Sabaneta. It carries on average about 320000 passengers per day. Under 8 of these stations the metro has built motorcycle and bicycle parking facilities.

- **Collective:** operated by 25 private companies that operate a supplementary network to the city center of 123 routes, with a total 3943 vehicles among buses, busetas and microbuses, carrying an average of one million passengers per day. Also, between Medelín and the rest of the municipalities of the metropolitan area, 16 private companies operate with 74 routes and 3265 vehicles. Today, also 64 integrated routes to metro system operate, from which 9 are urban.

- **Individual**: 25 private companies operate with 25.000 taxis.

2. OBJECTIVE

According to the model for the city considered in the Territorial Ordering Plan (POT), it is intended to create the bicycle culture and introduce it as a non-pollutant alternative mode of transport. To provide the city with a cycle network of 70 kilometers and 100 public parking places, increasing the bicycle users from 0.2% to 6% within the next 10 years.

3. HISTORIC JOINT

The Medellin city is experiencing a historic moment, which is characterized by the starting of the metro system operation, rapid growth of vehicle fleet (10% per year), minimun growth of road network (2% per year), serious levels of saturation in the road network, and pollution.

4. BICYCLE TRANSPORT SURVEY

In 1996, the Metro company, in collaboration with Metropolitan Planning Bureau and supported by private bicycle companies, contracted Consulting and Advising Center of EAFIT University of the city a study market named "**Feasibility of bicycle use as alternative mode of transport from an to metro stations".**

The study showed the following conclusions:

- The bicycle is an important alternative mode of transport.
- Construction of a cycle network is required and so are parking facilities.
- More traffic and social safety for bicycle users must be ensured.
- Easier to implement on flat areas.
- The most adequate age for the use of the bicycle is between 5 and 35 years.
- The most motivated users of the bicycle are students and workers.

5. WORKING BASIC TECHNICAL CRITERIA

Capitalizing the Netherlands' experience in the field with its Bicycle Plan, the positive results of the survey conducted and taking into account the historic joint of the city, the following working basic criteria were established:

- To define the main centers of generation and attraction of trips for the potential bicycle user: large factories and schools, shopping centers, parks and metro stations.
- To create a bicycle network with parking facilities, that connect the defined main centers and cover a wide part the city.
- To follow the cross sections of the available road network.
- To create or modify some road projects.
- To implement traffic administration and regulation systems

6. THEORETICAL ROAD CORRIDORS DESIGN

With the working basic technical criteria, road corridors were selected aiming at:

- Connecting the main centers of generation and attraction of defined trips.
- Adequate continuity of road corridors.
- Longitudinal gradient between 0 and 5%.
- Preferably on environmental axes or lateral roads along brook.
- Minimum number of critical spots or crossings on roads and roads with medium or low traffic.
- Collectors or local roads
- Roads with no or few public transport routes.

7. BICYCLE PROJECTS STUDIED (See figure 1)

Under the Municipal Secretary of Planning's direction, it was coordinated with the Civil Engineering Faculty at Medellín University and National University of Colombia's Roads and Transport's Post-graduate Program, the elaboration of the first seven projects, which are also meant as graduation projects for the students of these universities.

7.1. MEDELLIN RIVER CORRIDOR

Located along the eastern side of Medellin river between Caribe and Industriales stations of Metro Line, passing on perimetrally by the city center. It has a flat topography and a length of 5.6 Km and a direct area of influence of 2.8 square kilometers, serving 8 neigborhoods with a population of 22500 inhabitants that generate a potential demand of 3116 trips per day in the year 2000. (See figure 1).

7.2. PILOT PLAN

Located on the central-western of the city, it has a flat topography. It is composed of several lines as follows: one, on the northern side of brook La Hueso under Metro Line B, that runs East-West, between Medellín river and San Javier station, connecting San Javier, Santa Lucía, Floresta, Estadio and Suramericana metro stations on Line B. Other line, along the eastern side of Carreras 78 and 84 between Calles 30A and 65 from North to South that connect to the above cycleway at Floresta station. Other line, from North to South, along Carreras 77, 78 and 79, connecting to the first line at Floresta station, has a length of 12.4 Km and an area of direct influence of 12.4 square kilometers, serving 23 neigborhoods with a population of 101961 inhabitants that generate a potential demand of 14071 trips per day in the year 2000. (See figure 1).

7.3. BELÉN - GUAYABAL

Located on south-western part of the city, with a flat topography. It is composed of seven lines, that connect among themselves and with the Pilot Plan, are integrated to Industriales, Poblado and Ayurá stations of Metro line A. It also gives access to Nutibara hill ecological park. It has a length of 21.3 Km and a direct area of influence of 17.4 square kilometers, serving 28 neigborhoods a population of 167889 inhabitants that generate a potential demand of 23168 trips per day in the year 2000. (See figure 1).

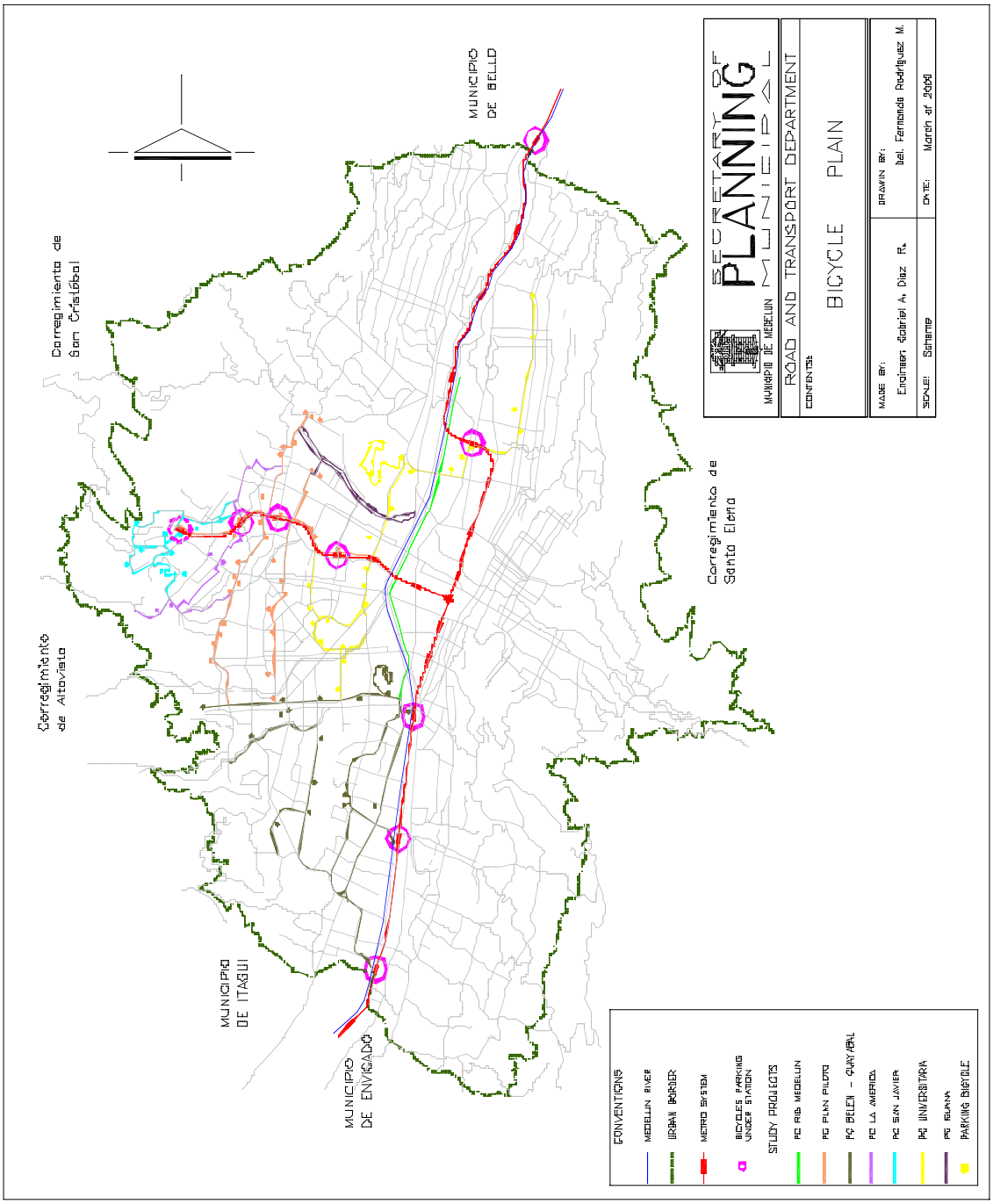
7.4. LA AMÉRICA

Located on the Central- Western part of the city, with a soft and flat topography. It has a line that begins at Belencito neighborhood and crosses Calle 44 at Carreras 90 and 92, with integration to Santa Lucia station of Metro line B. The second line, starts at this station to the North along Carreras 86 and 87 up to Calle 50 to connect with the Pilot Plan at Carrera 81. The third line, starts at Calle 35 with Carrera 32 and goes along Doña Maria brook to the north-west to connect with the Pilot Plan at Carrera 84. It has

a length of 7.2 Km and a direct area of influence of 7.2 square kilometers, serving 12 neigborhoods a population of 62584 inhabitants, that generate a potential demand of 8.637 trips per day in the year 2000. (See figure 1).

7.5. SAN JAVIER

Located on the central-western part of the city, with a hilly topography. It has four lines; the first, which connects with La América cycleway at the crossing of Carrera 92 and Calle 35 to the West up to the integration with San Javier station. The second line, covers 20 de Julio neighborhood, the third line covers San Javier neighborhood, and the fourth line covers Los Alcazares and Santa Lucía neighborhoods. It has a length of 8 Km and a direct area of influence of 6.4 square kilometers, serving 14 neigborhoods a population of 81195 inhabitants, that generate a potential demand of 11205 trips per day in the year 2000. (See figure 1).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CONTENTS:
BICYCLE PLAN
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SCALE: Schame
DATE: March of 2006
MUNICIPIO DE BELLO
Corregimiento de San Cristobal
Corregimiento de Santa Elena
MUNICIPIO DE ITAGUI
MUNICIPIO DE ENVIGADO
CONVENTIONS
MEDELLIN RIVER
URBAN BORDER
METRO SYSTEM
BICYCLES PARKING UNDER STATION
STUDY PROJECTS
PC RIB MEDELLIN
PC PLAN PILOTO
PC BELEN - GUAYABAL
PC LA AMERICA
PC SAN JAVIER
PC UNIVERSITARIA
PC GUAYABAL
PARKING BICYCLE

Figure 1

7.6. UNIVERSITARIA

Located on the central-west and north part of the city, with a soft and flat topography. It connects the three largest educational centers of the city: National, Antioquía and Bolivariana Universities with Estadio, Suramericana and Universidad metro stations. It gives access to Volador Hill ecological park and extends to north-east up to Aranjuez park and Calle 100. It has a length of 15.2 Km and a direct area of influence of 15.2 square kilometers, serving 32 neigborhoods a population of 133561 inhabitants, that generate a potential demand of 18413 trips per day in the year 2000. (See figure 1).

7.7. IGUANÁ

Located on the central-western part of the city, with a soft and flat topography. It goes along south and north sides of the La Iguaná brook between Medellín river and 80-81 Avenue, where it gets connected with the cycleway of La America and Pilot cycleway at Carrera 77. It has a length of 6.4 Km and a direct area of influence of 6.4 square kilometers, serving 12 neigborhoods a population of 30350 inhabitants, that generates a potential demand of 4188 trips per day in the year 2000. (See fig. 1).

The Plan includes a 73.3 km network and a direct area of influence of 70.8 square kilometers with 129 neighborhoods, a population of 660120 inhabitants, that would generate a potential demand of 82798 trips per day in the year 2000.

8. IMPLEMENTATION PHASES

8.1. LEGAL ASPECT

It is led by the Secretaries of Planning and Transportation and Traffic of the city.
It includes the elaboration of a national and local Decree, so that a bicycle culture is initiated, and some basic concepts are regulated and some missing signs.

8.2. INFRASTRUCTURE PROVISION

It is led by the Municipal Secretaries of Planning and Public Works. It includes the study, design, construction, and maintenance stages. Today, 8 parking facilities operate under metro stations. A 1.5 Km-study at San Javier cycleway already exists as well as 7 feasibility studies.

8.3. PROMOTION OF THE POPULAR BICYCLE

It is led by the Recreation and Sport Institute-INDER, the advising of the University and economic support of the Presidential Advising.
It includes the design, manufacturing, selling, and financing stages of two prototypes of popular bicycles: one, with a little motor, and the other without it.

8.4. EDUCATION AND DIFFUSION

Led by INDER and the Secretary of Transportation and Traffic.
A traffic track for children is available to create the new culture.
It must be included in the Traffic subject, included in the school program and in the training to get the driving license.
Designing and promoting massive campaigns about the bicycle culture and its implementation as alternative mode of transport.

8.5. OPERATION AND CONTROL

Led by the Secretary of Transportation and Traffic.
Three dimensions for using the bicycle must me regulated:

- Permanent cycleways: permanent road space, on which the bicycle runs as a mode of transport.
- Recreational cycleways: defined temporary road space, on which the bicycle runs and others recreational vehicles, with velocity.
- Recreational way: defined temporary road space, on which a bicycle and other minor vehicles, such as recreational vehicles and others sports.

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