

Towards Cycling Safety in Paraná: Elevated Cycling Paths to Enhance Urban Cycling

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Summary— The road infrastructure of Paraná is designed for cars, buses and trucks. Cycling around the city is difficult or risky, which restrain people from doing so. To achieve a more sustainable future, Paraná has to improve the road safety for cyclists. Developing and building an elevated cycling path in one of the principal avenues of the city can help to overcome this problem. The purpose of this work is to analyze cycling safety in Paraná and discuss the implementation of the elevated cycling path.

Keywords: *Elevated cycling paths. Cycling infrastructure. Cyclist security.*

Resumen— La infraestructura vial de Paraná está diseñada para automóviles, autobuses y camiones. Andar en bicicleta por la ciudad es difícil o arriesgado, lo que disuade a la gente de hacerlo. Para lograr un futuro más sostenible, Paraná debe mejorar la seguridad vial para los ciclistas. El desarrollo y construcción de un carril elevado para ciclistas en una de las avenidas principales de la ciudad puede ayudar a superar este problema. El propósito de este trabajo es analizar la seguridad de ciclismo en Paraná y discutir la implementación del carril elevado para ciclistas.

Palabras clave: *Ciclovías elevadas. Infraestructura para ciclismo. Seguridad para los ciclistas.*

I. INTRODUCTION

The road infrastructure of Paraná is designed for cars, buses and trucks. Walking and cycling around the city is difficult, and in some cases, it can risk the life of the pedestrian or cyclist. This intimidates the people at the time of using these means of transportation so most people choose the fossil fuel-based options.

To achieve a more sustainable future, Paraná has to improve the road safety for pedestrians and cyclists and reduce the use of cars as the principal method of transportation in the city. Developing and building an elevated cycling path in one of the principal avenues of the city can help to overcome this problem. The purpose of this work is to analyze cycling safety in Paraná and discuss the implementation of the elevated cycling path.

In order to achieve this purpose, this work follows this order: First, a section is going to define and analyze the problem. Second, the proposal to address the problem is going to be defined and analyzed. Third, the last section is going to show a conclusion for this work.

II. PROBLEM DEFINITION AND ANALYSIS

A. Description of the Context

Paraná is the capital city of the province of Entre Ríos, Argentina. It is located in the central east region of the country, on the banks of the Paraná River, as Fig.1 shows.

Its population is approximately 392,000 habitants [1] so it is a city of medium size. Paraná has many beautiful places like, the Urquiza Park, the Thompson beach and the San Martín pedestrian path because it is a city with a touristic approach [2].

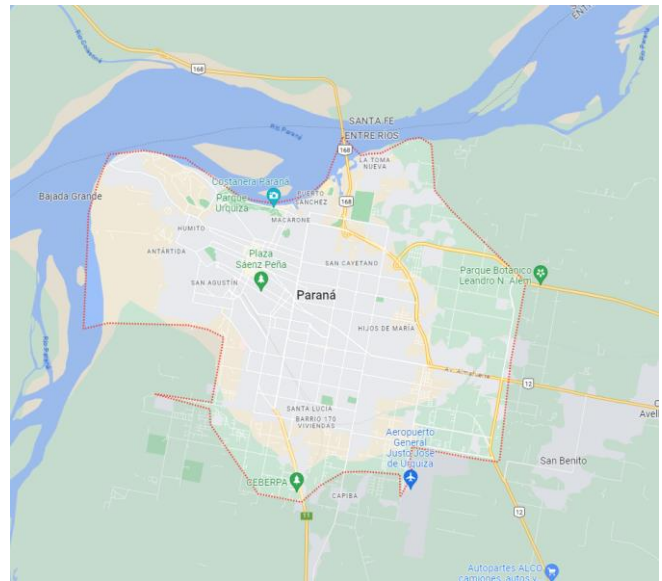


Fig.1. Map of Paraná city [3]

One of the most important avenues in the city is the *Circunvalación José Hernández* beltway. As Fig.2 shows, this beltway extends across the northeast area of Paraná and separates highly populated areas from sparsely populated ones. Its length is approximately 6 km and its traffic flow is one of the highest in the city.

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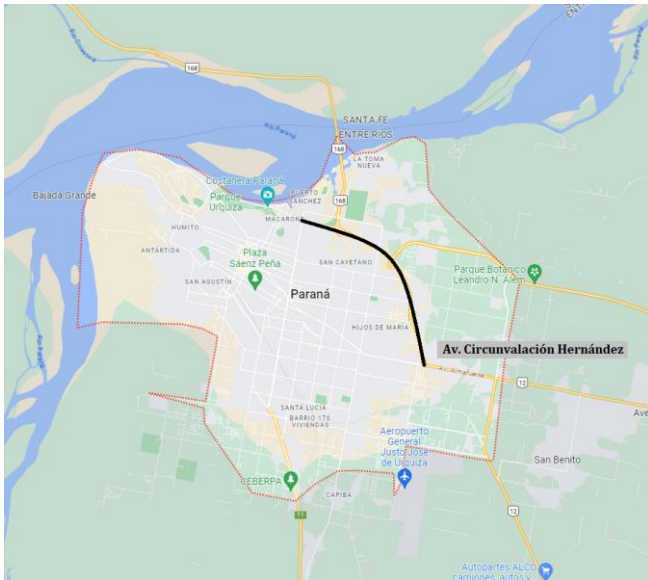


Fig. 2. Map of José Hernández beltway [2]

The design of this beltway is not suitable for cyclists or pedestrians. As Fig.3 shows, there are two double lanes for vehicle circulation with road shoulders for situations of emergency in the exterior sides of the avenue. Between the lanes there is a green path of 3-4 m of width used to place streetlights, Flex-Beams and some palm trees.



Fig. 3. Street view of José Hernández beltway

B. Problem Statement

There are many people in Paraná who do not cycle because of the lack of the appropriate infrastructure for safe cycling. Cycling in the city can be considered as a risky activity so only a little percentage of the population of Paraná go cycling in their daily routine.

C. Description of Scenes that Help Picture the Problematic Situation

There are many situations that can help picture the problem stated in the previous section. Fig.4 shows the present situation for a cyclist in the José Hernandez beltway. There are two options for a cyclist who wants to follow the beltway.

Following the orange arrow is the quick path but it is a risky option because the cars pass by very close and very fast. Following the green arrow is the secure path but the journey is slow because the path is very rough.



Fig.4. Situation for cyclists

As Fig.5 shows, not only cars go through the beltway. Trucks and buses go through the beltway at high speeds all the time. It is dangerous for a cyclist to share the road with large vehicles like these.



Fig.5. Truck and bus traveling the beltway

Another important fact is the presence of large trailer trucks in the beltway, as Fig.6 shows. This is a danger for cyclists because large trailer trucks circulating at high speeds cause a Venturi effect. This effect creates a suction of air that could pull a cyclist below the truck. A cyclist in this situation can suffer serious injuries or death.



Fig.6. A trailer truck traveling the beltway

These images clearly show the hazards for cyclists in this area. To achieve a better understanding, it is now necessary to describe the causes and consequences of this issue.

D. Identification and analysis of causes or factors that give rise to the problem:

There are many factors that give rise to the problem of lack of cycling safety in this area in Paraná. The main cause of this negative situation is the road infrastructure design. The streets of Parana are almost exclusively designed for cars. There are no cycling paths in the majority of the city areas so cyclists have to share paths with cars, buses and trucks.

Another cause is related to the fact there are not many places in the city with appropriate structures to secure the bikes. Leaving a bike in the street is risky because the robbery of bikes is not an uncommon situation.

Finally, As Fig.7 shows, Paraná is in the middle of a region characterised by rolling terrains. The existence of large differences in the topography makes the slopes a problem for the cyclist. This, along with the lack of trees for the cyclist to stop and rest under is another determining factor.



Fig.7. Rolling terrains in the Paraná area [4]

E. Identification and Description of the Consequences

There are many consequences of the lack of safe cycling infrastructure in Paraná. The main consequence of this situation is that people evade cycling in their daily routine

because they see it like a risk activity. If they have the chance, they choose the fossil-fuel options. As a result, few people cycle in the city so they miss the health benefits of cycling. This, in turn, increases the health cost of the city.

Another consequence is connected with the fact that the streets of the city are overcrowded with cars. Few people cycling means many people driving cars. High numbers of cars produce air noise and visual contamination. As a result, the quality of life of the people decreases.

Finally, the difficulties associated with cycling mean that people do less exercise, which affects the health of the people of Paraná. Diseases that could be prevented by frequent exercise are not prevented.

III. THE WAY FORWARD

A. Problem approach

Now that we have a more complete idea of the context issue, we can analyse in depth the possible solution to the lack of infrastructure for safe cycling in Paraná. The construction of an elevated cycling path in *Circunvalación José Hernández* beltway is the solution proposed in this work.

As Fig.8 shows, an elevated cycling path is a path for bikes which is elevated from the ground. In some places it is similar to a bridge but its purpose is to separate the cyclists from the rest of the traffic. The presence of these paths allow the cyclists to cycle along the routes and beltways with safety even if there is a lot of traffic going through at the same time.



Fig.8. An elevated cycling path [5]

An elevated cycling path is usually made of reinforced concrete and its structure is heavy and robust. In our case, this structure can be placed, after doing some modifications to the streetlights system, in the space between the two lanes of the beltway, as Fig.9 shows.

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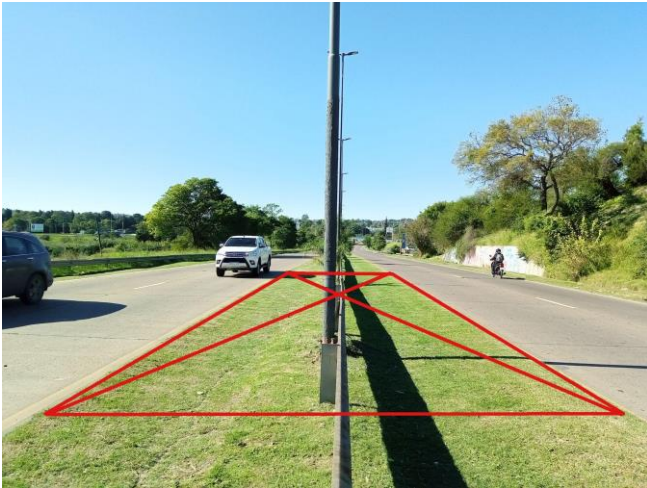


Fig.9.Hypothetical building area

B. *Strengths and Weaknesses of the Proposal*

There are many benefits of having elevated cycling paths in the city. Encouraging cycling in daily life is one of them. The people that go cycling in a regular manner have better health and are more resilient to the common diseases, improving the quality of life of the people and reducing the health costs of the city. Another strength of the proposal is the reduction of car traffic, which also reduces the CO₂ emissions and noise contamination. The design of an elevated cycling path allows for more gentle slopes, which is another strength because it allows many people that do not have a very strong pedaling stroke, like elderly people, to go cycling in their routine.

This proposal has its weaknesses too. One of them is the material for the construction of the elevated cycling paths. The reinforced concrete is a material with a high carbon footprint which, although it is durable, it is not a cheap or environmentally friendly material. Another weakness is the space required for the structure to be constructed. This fact does not allow elevated cycling paths to be constructed in many places. One last weakness is the visuals from the ground, which in many cases can be obstructed for the presence of the elevated cycling paths. However, this weak point can be minimized by a proper architectural design.

IV. CONCLUSION

In conclusion, the problem of the lack of infrastructure for safe cycling in Paraná can be addressed, in this proposal, by building a network of elevated cycling paths in the principal avenues of the city.

Developing this proposal has certain requirements such as the use of reinforced concrete, good planning and some changes at the roads structure but the benefits are many. Elevated cycling paths encourage cycling in daily life, reduce CO₂ emissions, improve the quality of life of the people, can convert Paraná into a better place to live in and contribute to making it sustainable.

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The present project is a skills integration activity in Inglés I at Universidad Tecnológica Nacional, Facultad Regional Paraná, carried out by EFL engineering students. The yearlong project requires students to delve into a problem in the city where they live and to address it by means of a simple project in English. Should the reader have any questions regarding this work, please contact Graciela Yugdar Tófaló, Senior Lecturer, at gyugdar@frp.utn.edu.ar.