Members of the Group: Cáceres Franco, Fálico Nicolás, Ramonda Brisa.

Title of the Project: Sustainable Improvement of the University Premises: Ecological Asphalt at the UTN FRP Parking Lot

1. Introduction

The National Technological University in Paraná has an exclusive car and motorcycle parking lot for the use of students and workers. However, the parking lot is not paved or covered. For this reason, when it rains, the parking lot floods and parking inside this facility is not possible, so many students and teachers must park their vehicles on the street.

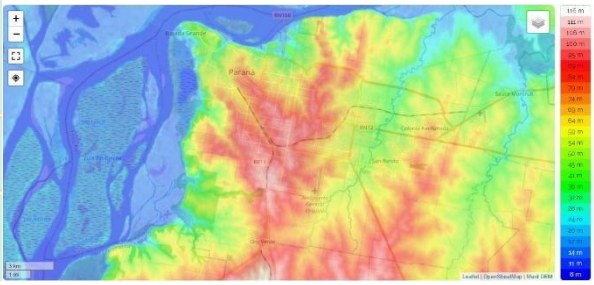
The purpose of this presentation is to discuss improvements in the parking lot conditions in a sustainable way, with materials that do not harm the environment. We are also going to analyze a possible solution by paving the UTN FRP parking lot with ecological asphalt. In this way it will be possible to always use the parking lot despite weather conditions.

First, we are going to show the area of the city where the UTN is located, which is the focus of this work. Second, we are going to describe the context and we are going to mention the causes of the problem. Next, we are going to state and describe the consequences that the problem generates. After that, we are going to present a possible solution to the problem, taking into consideration the different factors. Finally, we are going to describe the process that will be used with the positive and negative aspects of the solution.

2. Problem definition and analysis

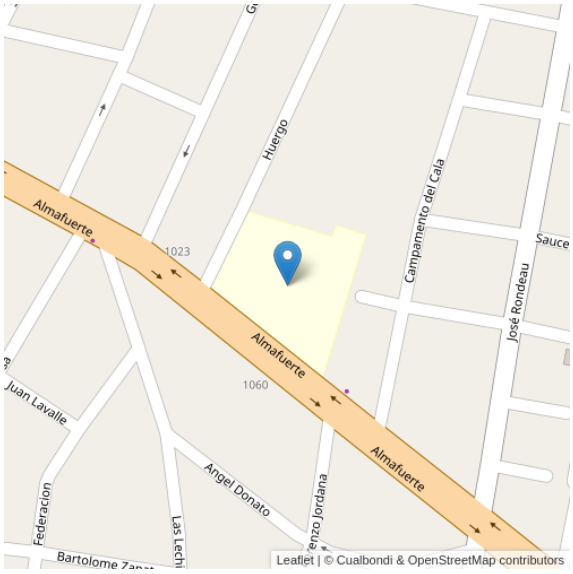
2.1. Description of the context

The National Technological University is located in the city of Paraná, which is the capital city of the province of Entre Ríos. This city has an many relief features in the area, so when it rains, some areas of the city are flooded. The images below show the territory of Paraná and its topography.

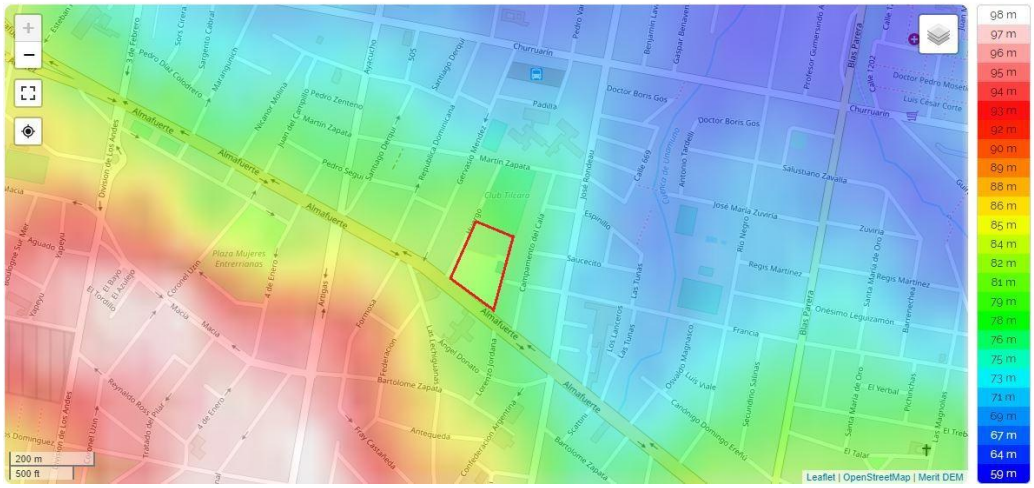


The image on the right shows the topography of Paraná, where the highest areas with the sea level are represented by the color red and the most affected areas are represented by the color blue.

The University premises are located on 1033 Almafuerte Avenue and the entrance to the parking lot is on Huergo Street.



The UTN FRP is located 80 meters above sea level, but the university is close to areas above 90 meters, so flooding in the area is very frequent, as the picture shows.



2.2. Problem statement

The surface of the UTN parking lot is made of soil and stones and it is not covered. On rainy days, it utterly floods, and the university authorities have decided to close the parking lot on those days to prevent damage to the ground with the passing of vehicles. The closure of the parking lot takes place because there are some large potholes with water and in some parts of the parking lot there is a lot of mud.

2.3. Description of scenes that help picture the problematic situation

In these images we can see the material of the parking lot floor. A little bit of grass and soil can be seen in some parts. We can also see that it does not have a roof.

When it rains, the parking lot fills with water in some parts and there is a lot of mud. For this reason, it is impossible to use the parking lot. For a better understanding the following images were taken on a rainy day.

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

There are different causes of this problem. The main causes of the flooding of the parking lot are two. First, the parking lot is not adequately maintained. The gravel on the ground is not replaced frequently, which helps to generate new potholes. Also, existing potholes worsen with the passing of the vehicles. Second, as the parking lot does not have a roof, it facilitates the entry of water into the area. As it is unpaved, it generates a lot of mud.

2.5. Identification and description of the consequences

There are also many consequences of this problem. First, flooding of the parking lot results in the closure of the parking lot. As a consequence, on rainy days, the students and workers have to park their vehicles outside the university premises. Sometimes it is very difficult to find parking near the premises, so their cars must be parked on the street, usually 2 or 3 streets blocks away.

3. The Way Forward

3.1. Problem approach

We have analyzed the problem and detailed its causes and consequences. We are now able to start talking about solutions to the problem that take care of the environment at the same time.

After researching on the Internet, we found a solution that is going to be innovative for the students, faculty and staff who study and work at the place. The solution implies paving the parking lot with asphalt based on recycled rubber.

We decided that the best option would be one that is manufactured in Argentina because it is more resistant to the sun's UV rays. This type of rubber is called EPDM (ethylene propylene diene rubber). It is an elastomeric thermopolymer that has good resistance to abrasion and wear. With this recycled asphalt, the FRP parking lot at UTN would be repaved to solve the problems that arise on rainy days.

Its application is easy since it has an embedded method, and it is placed in the form of panels but, first, the place where they are to be placed must be dug from 5 centimeters to 10 centimeters.

3.2. Strengths and Weaknesses of the Proposal

In the following section, we will detail the positive and negative aspects of our solution.

The positive aspects include increased durability, which ensures that vehicles do not break or crack the product. It is also highly resistant to climate factors, so it is possible to place it outdoors. The product provides flexibility, allowing shock absorption while protecting surfaces and, being composed of recycled rubber, it provides easy cleaning and a non-slip surface.

The negative aspects of this asphalt are a few. Recycled rubber flooring is a rather expensive option. In addition, if digestion is insufficient, it may result in poor compactness, low water resistance and poor mix composition.

Now, it is necessary to compare the negative and positive aspects. The probability of a negative aspect occurring in its application or use is very low because many studies and tests are carried out on the material during its manufacturing process. The Ebonit S.A company also provides a 5-year warranty if any of the negative aspects mentioned above occur.

4. Conclusion

4.1. Final statement

In conclusion, with the ecological pavement, UTN FRP will be able to address the causes that led us to carry out this project, reducing potholes and facilitating the care of the parking lot. Thanks to this, the students and employees of the university will be able to park inside the premises without running the risk of leaving their vehicles on the street with the possibility of suffering material damages. Also, by using recycled pavement materials, we are helping the environment.

References

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