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x	WP3 Demand management		WP9 Project coordination
	WP4 Influencing travel behaviour		WP10 Project management
	WP5 Safety, security & health		WP11 Research and Technological Development
	WP6 Innovative mobility services		WP12 Impact and process evaluation
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1. Summary

One of the measures within the CIVITAS-ELAN project was the development of a Mobility Plan for the Asprela Quarter (3.5-OPO – Integrated Accessibility Planning in Asprela Quarter). The major aim of this plan is to improve the mobility conditions promoting sustainable modes of transport. This document describes the infrastructure implementation works in order to implement this Mobility Plan.

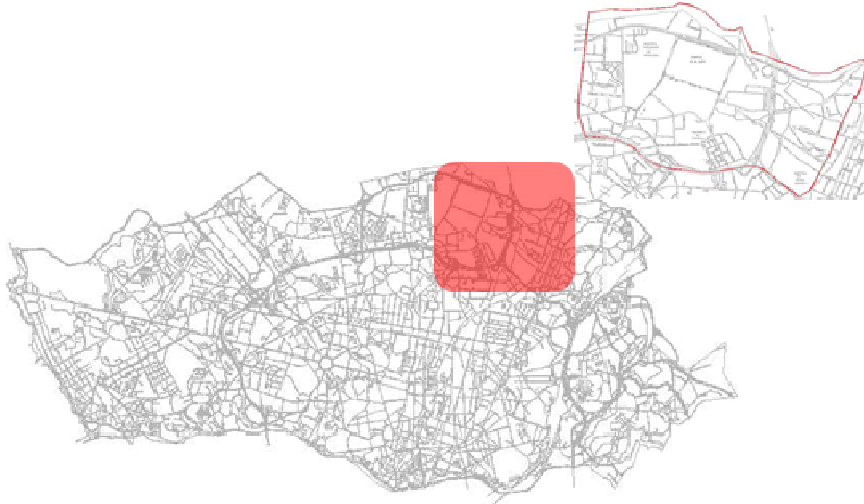


Figure 1: Intervention Area, the Asprela quarter

2. Background information on measure 3.5-OPO Integrated accessibility planning in Asprela quarter

The main objective of the measure was to change the mobility and accessibility of the Asprela area. A general plan of intervention was developed considering all modes of transport in a comprehensive transport planning perspective (including land-use, environmental and operational issues). The final work would propose specific measures that would be implemented and evaluated within the CIVITAS-ELAN project. The plan would acknowledge the following issues:

- Road network
- Public Transport network
- Pedestrian network
- Bicycle network
- Traffic management
- Traffic safety
- Parking policy and control

The main idea was to create a well succeeded sustainable mobility case study in the city that helps proving the effectiveness of the specific proposed measures when integrated into a holistic transport planning approach.

2.1. Situation before CIVITAS/ Present situation (incl. work funded through other projects)

The Asprela area faces severe mobility problems associated with illegal car parking levels and traffic congestion, which happens in spite of the relative good offer of public transports (buses, metro). The area is supplied by local and suburban buses and the recently finished yellow metro line has three stations in it. Still, the percentage of public transport users is relatively low due to the closeness to the main motorway system and the existence of free parking facilities, which on the other hand causes severe congestion traffic congestion problems. The congestion also affects the bus travelling conditions due to lack of bus priority facilities (bus lanes, priority at signals, etc) which also contributes for the low percentage of use of this mode of transport.

With regard to clean modes, there is a very low percentage of other means of transport being frequently used to access the area. In fact, and due to the quick growth of the constructed area, the local walking conditions have been largely neglected and the cycling infrastructures are inexistent.

A specific characteristic of the area is the unique transport demand patterns (strong seasonality, journey types, etc.) and existing sociological characteristics (young people, high qualifications) of the local users that might be seen as an advantage for the testing and implementation of innovative mobility solutions.

3. The process of developing the Mobility Plan

3.1. Data collection

The Mobility Plan for the Asprela quarter was developed in several stages. In 2009 FEUP (Faculty of Engineering of the University of Porto) promoted the data collection. Some of the measure partners are public transport operators (STCP, ANTROP and Metro do Porto). FEUP identified a set of variables needed to build travellers patterns. The public transport partners provided those data travellers and occupation rates. In July of 2009 CMP launched a public tender to conduct traffic counts and origin-destiny questionnaires within the Asprela quarter. In October of 2009 the traffic company that was hired, performed this task and delivered the results.



Figure 2: Traffic count junctions studied and work teams

In September 2009 FEUP implemented automatic traffic counting devices on public lights posts to collect data on traffic volumes.

In October 2009 CMP and FEUP developed a parking occupation study on the Asprela quarter. The main aim of this study was to characterize the parking occupation rates (legal and illegal). Several streets were identified and groups of people travelled at different times of the day registering the number of vehicles on both sides of the street.

Some of the questionnaires done in October didn't present the minimum quality to meet the representativeness criteria. Hence, CMP and FEUP repeated this task using people from the CiViTAS team.

3.2. Data treatment

With all the data gathered FEUP constructed an Origin/ Destination matrix. This matrix permits to identify the main pathways from different locations of the surrounding area. It is the base reference for the traffic modelling and simulation software in order to reproduce the actual situation and test different circulation schemes.

It was also possible to identify the spots that suffered the biggest parking pressure (legal and illegal) and cross this information with the main pathways described by the OD matrix.

3.3. Traffic simulation

As said before, the main objective of the new plan was to implement sustainable means of transport and at the same time solve traffic congestion problems at some particular junctions.

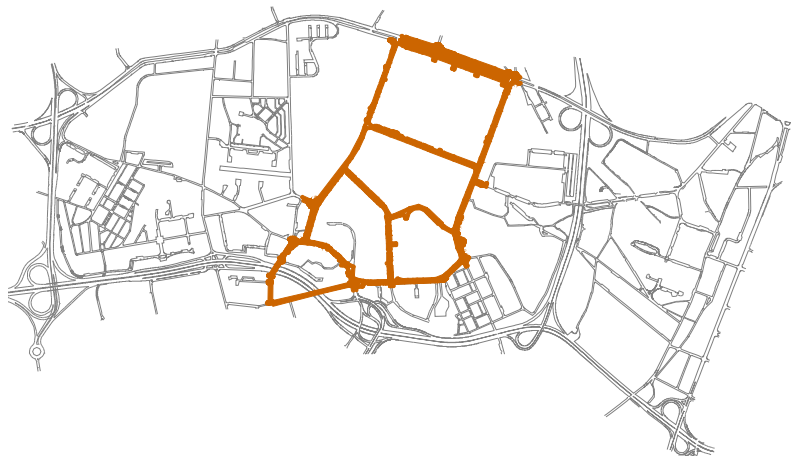


Figure 3: Streets studied for traffic modelling and simulation

FEUP and CMP have defined 18 different circulation scenarios for the Asprela quarter. Those scenarios were introduced in a traffic software programme to simulate and predict the advantages and disadvantages of each of the 18 scenarios.

One of the scenarios presented big advantages to the circulation (at some junctions the estimated reduction of delay time was minus 30% on average) which also led to major benefits for the pedestrians. In this scenario no left turns were allowed at any junction, the most dangerous for the pedestrian crosswalk. It was clear that this was the best option to accomplish the main aim.

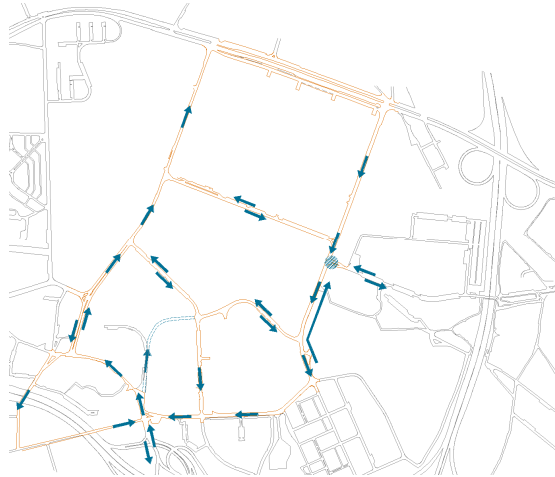


Figure 4: Chosen scenario

These results were resumed and presented internally to CMP and were approved by the Public Way Department.

3.4. Public participation

With the definition of a new circulation plan, CMP started the public presentation process. The public presentation plan consisted of different tasks: the distribution of 1,500 flyers within the Asprela quarter and two public presentations.

The distribution of the flyers occurred simultaneously with the face-to-face questionnaires on the newly planned intermodal interchange conducted in ELAN measure 2.10-OPO. The flyer included a general presentation of the plan containing a proposal for a new circulation scheme and the main objectives of the measure. The operators explained the plan face-to-face to the inhabitants. The flyer also included a detachable part where citizens could voice their opinion and make suggestions on how to adapt the plan. A specific e-mail address was created in order to receive those contributions. The detachable part could be delivered on the Mobility Shop (which is situated in the Asprela quarter). This was done during April 2011.



Figure 5: Flyer distributed to inhabitants of the Asprela quarter

The actual response to the flyers was quite disappointing. Only three citizens provided feedback. The major negative feedback to the proposed new circulation plan came from the local Catholic priest.

According to the new plan the Rua Manuel Pereira da Silva street would change from a two-way to one-way street.



Figure 6: Funeral pathway (blue: actual ways, red: new way)

The local church is located on the left side of the picture and the cemetery is indicated on the right side. Usually, the funeral procession is done from the church to the cemetery and back. According to the new circulation plan which would have turned Rua Manuel Pereira da Silva into a one-way street the funeral procession would have had to take a detours on its way back.



Figure 7: Deviation of the funeral procession according to the new circulation plan

For this reason, the priest lobbied intensively against the proposed new circulation plan and presented his objections to the president of the Paranhos district to which the Asprela quarter belongs. He also presented and discussed the plan with church visitors during the dominical speech. Consequently, the district president presented his opposition to the plan to the City of Porto.

The city administration tried hard to find a common solution and therefore invited the district president to discuss the plan in detail in June 2011. This meeting took place with the City Council with the presence of the Mobility City Councillor and all the Public Way and Traffic hierarchies and the Measure Leader. The president accepted the entire plan except the change on that street. Although the City pointed out that the purpose of this option was to segregate main traffic and to increase traffic flow the priest did not accept the proposed circulation plan. The City presented different technical solutions

including the construction of a parallel street to serve the funeral processions. None of the solutions were accepted. The priest continued to show his reluctance. Meanwhile, also inhabitants started to address the City voicing their opposition against the new plan.

As a result, the City Municipality gathered the measure partners and together it was decided that due to the political conditions it was impossible to implement the developed scenario at that moment. The solution was to maintain the actual ways on all the streets but preparing the infrastructure to implement the new plan rapidly and with minor construction works and to simultaneously increase the accessibility and all sustainable transport modes. For this reason it was necessary to totally redesign the circulation plan.

3.5. Lessons learned

While the presentation of the new circulation plan came at the right time (when the scenario was chosen by the city), the chosen approach proved to be not the best one. Although the flyer with the information on the new circulation plan was distributed directly to households of the Asprela area hardly any feedback was received. Citizens had been asked to use the detachable part of the flyer to provide their feedback and submit it at the Mobility Shop located in the Asprela quarter. However, as most of the people really living in the area are elderly people (the students and people working in the Asprela area usually commute) they weren't prepared to walk all the way from their home to the Mobility Shop to provide feedback. Also, elderly people usually don't yet use the internet to send feedback by e-mail. These two factors combined with the traditional lack of public participation in Portugal didn't lead to a critical mass to enable a public discussion on the new circulation plan.

On the other hand, the City Municipality failed to clearly identify the main and most powerful stakeholders at the early stage of the project. The priest was simply not considered. His political and social power (lobbying) inflamed the public opinion against the measure, turning the inhabitants and the district president from a passive and acceptance attitude to a total denial of the measure. The City Municipality should have chosen a different order in the public participation plan. The public presentations should happen firstly in order to create measurable support from focus groups. Probably this wouldn't have allowed the priest a large range of facilities to spread his influence.

4. Infrastructure works on each street

4.1. Rua do Dr. António Bernardino de Almeida

This street suffered the biggest change. Before the intervention it had a physical divider of the lane. That element was not homogeneous and consistent both from a functional and architectural perspective. It had vegetation and included the public light posts. The road pavement was degraded presenting cracks and bumps. The sidewalks didn't have the minimum width for pedestrian mobility and were destroyed by the growth of tree roots in all their extension. The City Municipality had a record history of complaints from disabled inhabitants that couldn't move properly due to the lack of pedestrian free space and the existence of obstacles.

The infrastructure works on this street started in September 2011. They were fully completed in December 2011. The intervention plan was divided into several stages. The first stage consisted on the removal and demolition of the lane, sidewalks, public lights and water drain system. According to the analysis of the City's environment department some trees had to be removed because they were ill or too old. Those trees were replaced by new ones and their sidewalk space redesigned in order to predict and allow normal and healthy growth without damaging the public space.

The second stage of the construction phase involved the following main activities:

- Public lights and water drain system

It was necessary to reconstruct the public lights system. Twelve poles were removed from the central divider. They were replaced by new ones and placed on the sidewalks.

It was also necessary to redesign and reconstruct the water drain system. In fact, when the City Municipality was proceeding to the soil recognition (detailed design) several zones were identified where there was no water drain system or it was done with no control.

- Increase and regularization of width of sidewalks

As proposed by the plan to give more pedonal accessibility, the width of the sidewalks was increased. The minimum free space with no obstacles has been set to from a minimum of 1,5 metres to 4,5 metres at some points. This new dimensions permits the disposal of the urban furniture and signalization without interfering with the pedestrian pathways. Also the crosswalks accesses have now a different type of material to alert the blind people.

- New traffic pavement

A new pavement was implemented in order to allow more road safety circulation.

- Cycle lane

One of the most important ways to implement sustainable local mobility and promote a new mentality on the inhabitants is the promotion of cycling. Along this street the City Municipality applied a new technique to implement a cycle lane. This consists in a segregation of the cyclists from the vehicles by using parked vehicles as a physical safety barrier. In order to prevent potential impacts when doors of parked vehicles are being opened and the cyclist trajectory, a safety zone of 0,6 m was painted between them. This solution brought some interesting discussion during the design stage because it was the first time in Portugal that this was done, although it is generally applied in countries with an established cycling culture. In the practical way and common use it was very well accepted by the users.

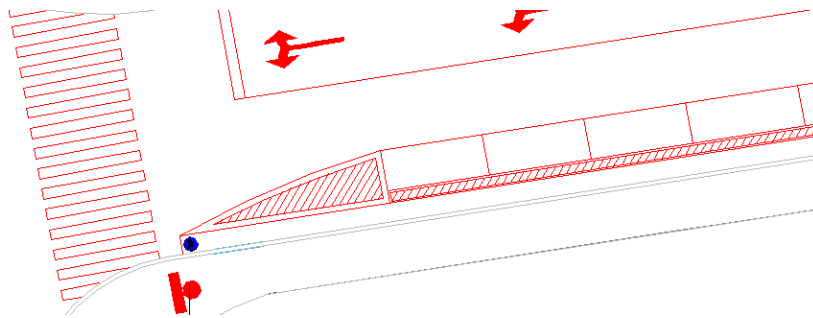


Figure 8: Cycle lane project detail

- Traffic signs

One of deficiencies of this street was the lack of signalization. In order to address this limitation all the vertical signs were replaced by new and more adequate ones to achieve low vehicles speed and to increase safety. All the horizontal signs (painted pavement) try to induce the drivers to drive smoothly and separating the different transport modes.

- New intersection geometry (roundabout at intersection of two streets)

The junction had a historical registry of pedonal unsafety. In order to increase road safety a roundabout was designed and some traffic behaviour techniques were applied. In the future, this also permits to easily implement the road ways promoted by the plan that was rejected.

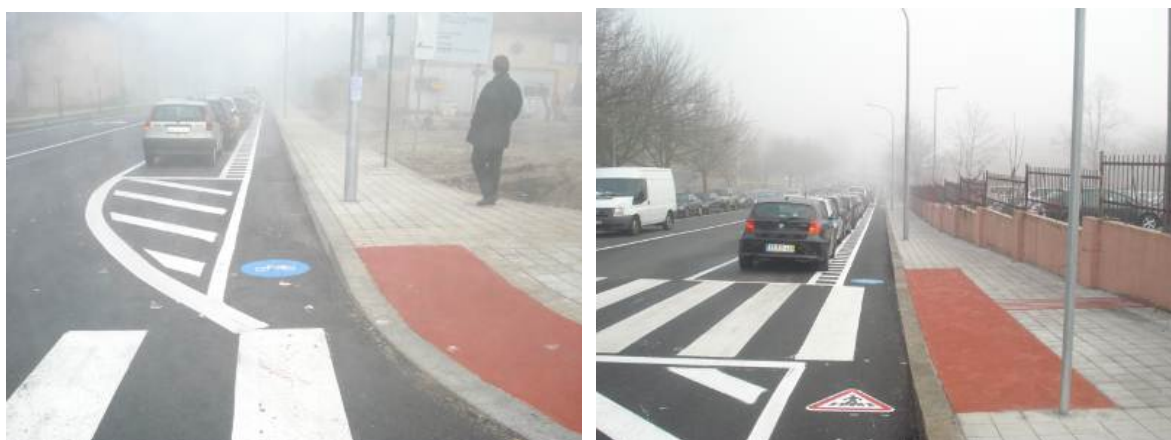


Picture 1: Roundabout on Dr. António Bernardino de Almeida with Conde d'Avranches intersection (after construction)

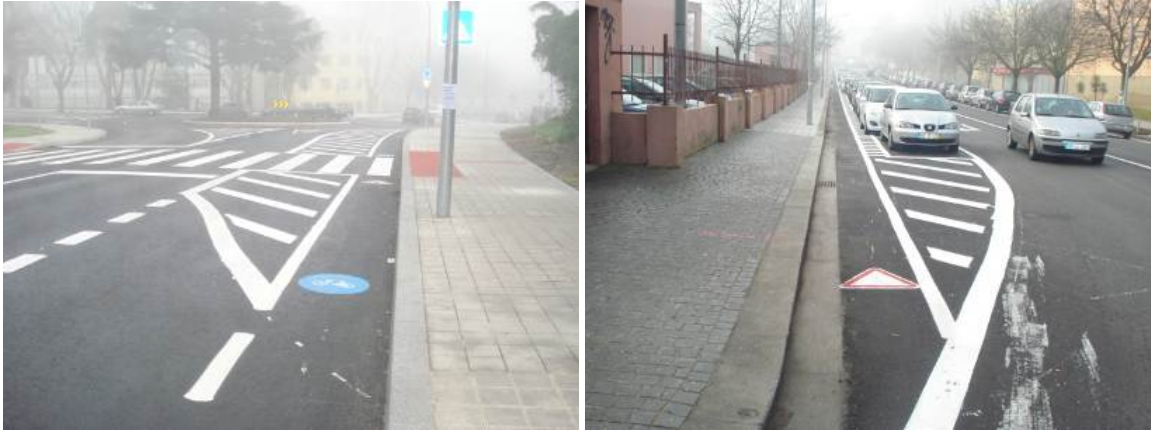


Picture 2: Roundabout on Dr. António Bernardino de Almeida street with Conde d'Avranches street intersection (after signalization)

The roundabout was designed to adapt to the existent tree. This tree was classified as a rare specimen by the environmental department. For this reason it could not be replaced by a new one. But this tree had large roots that had destroyed the pedestrian refuge and the entire lane pavement. With the chosen solution (a decentred round about) it was possible give space to the growth of the tree roots and promote pedestrian and road safety at the same time.



Picture 3 and 4: Cycle lane on Dr. António Bernardino de Almeida street



Pictures 5 and 6: Cycle lane on Dr. António Bernardino de Almeida street



Picture 7: Cyclist on Dr. António Bernardino de Almeida street cycle lane

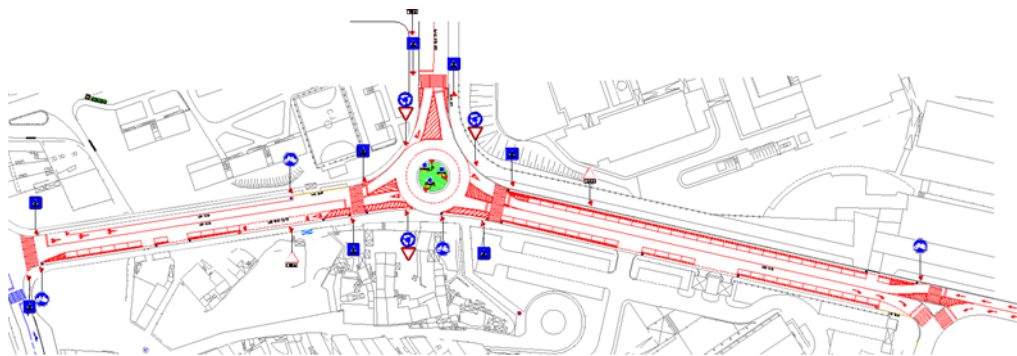


Figure 9: Project detail for the Dr. António Bernardino de Almeida street

4.2. Rua do Dr. Plácido Costa

This street was already suffering a change due to the construction of a new medicine school. Its main characteristic was the existence of several types of pedestrian obstacles (vertical barriers and steel balls). The intervention sought to remove those elements and implement a cycle lane segregated from the main traffic.

The infrastructure works on this street started in November 2011. They were fully completed in December 2011.

- Cycle lane

It was necessary to demolish and rebuilt the sidewalk on the initial part of the street in order to accommodate the cycle lane. The parking geometry suffered a new geometry (perpendicular to parallel to the street way). This permits to implement the cycle lane in a segregated channel. In order to allow a smooth ride, ramps were placed where there was different height levels between platforms. The cycle lane is one way and along the entire street. It has a width of 1,5 m.

- Traffic signs.

All the traffic signs had to be replaced in order to inform the drivers about the changes.



Pictures 8 and 9: Cycle lane details on the Dr. Plácido Costa street



Pictures 10 and 11: Cycle lane details on the Dr. Plácido Costa street

The cycle lane is already implemented and open to the general public. Unfortunately, illegal vehicle parking on the lane was blocking the circulation of cyclists at several points. To tackle this problem the City of Porto is currently implementing physical obstacles to segregate the cycle lane and protect the corridor from illegal vehicle parking.

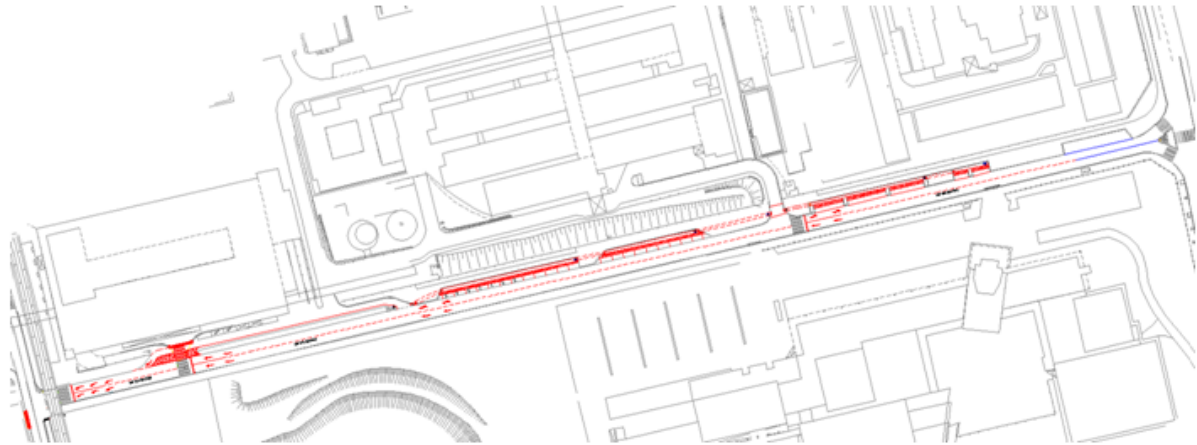


Figure 10: Project detail for the Dr. Plácido Costa street

4.3. Rua do Dr. Roberto Frias

This street has very special characteristics. It has a big traffic volume and connects the principal main accesses to the Asprela quarter. It also has an exclusive lane for public transport circulation on contra flow (circulation in the opposite direction of the general traffic). It also presented a lack of pedestrian mobility with physical obstacles on the sidewalks.

The infrastructure works on this street started in September 2011. They were completed in December 2011. Besides the introduction of the cycle lane and traffic lights an extra lane was created to reduce the traffic queues on the Júlio Amaral de Carvalho street. CMP has previously asked to FEUP to simulate this change and results were quite positive.

Main activities:

- Cycle lane



Picture 12: Cycle lane on the Dr. Roberto Frias street

The cycle lane is one way and along the entire street. It has a width of 1,0 m.

- Traffic signs

All the traffic signs had to be replaced in order to inform the drivers about the changes.

- Traffic light signs



Picture 13: Traffic lights on the intersections Roberto Frias/ Plácido Costa/ Frei D. Vicente de Soledad e Castro

The traffic lights on the intersections Roberto Frias/ Plácido Costa/ Frei D. Vicente de Soledad e Castro were implemented in the first week of January 2012. It has a specific sensor on the bus corridor which gives priority to public transport. The street has two lanes with one way to the general traffic and a bus lane on counter-flow. When the bus arrives at the intersection it touches an electromagnetic sensor on the pavement. This releases a unique and exclusive green phase for the bus vehicles. At the intersection all other traffic lights turn red and just the bus is permitted to pass.



Pictures 14, 15 and 16: Sidewalks downtrend

As planned, all accesses from sidewalks to crosswalks are now downtrend (same height as the street) to improve the mobility of pedestrians. Also sidewalks and crosswalks have been marked with differentiated pavement texture to permit orientation for the blind or citizens with less accurate vision.

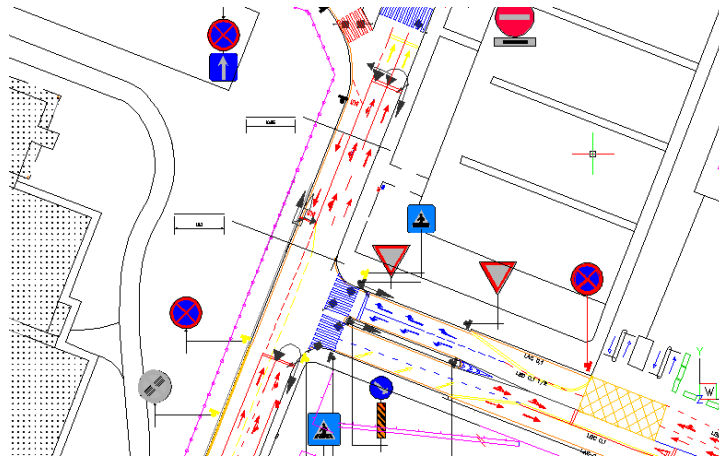


Figure 11: Project detail for Dr. Roberto Frias street

4.4. Rua do Dr. Manuel Pereira da Silva

On this street the principal change was the implementation of the cycle lane on both ways of the lane. The parking places on the northern side of the street were removed in order to put the cycling channel on that direction. This also brought the necessary traffic signs adaptation.

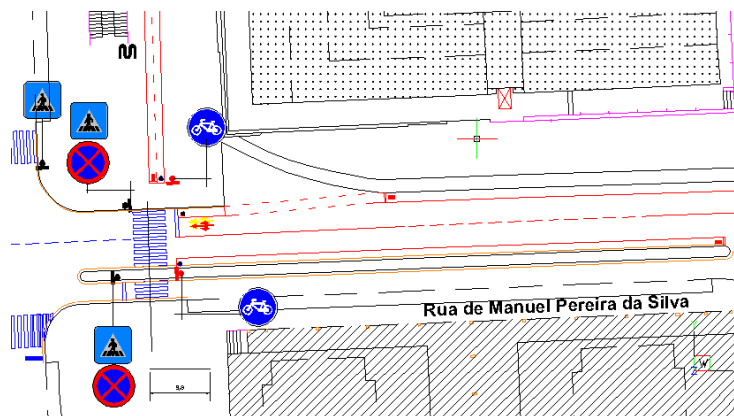


Figure 12: Project detail for Manuel Pereira da Silva street

4.5. Rua de Júlio Amaral de Carvalho

On this street also a cycle lane was implemented on one way. The street is wider and therefore allowed the implementation of a larger channel for cycling. This also brought the necessary traffic signs adaptation.

4.6. Rua de Alfredo Allen

On this street also a cycle lane was implemented on one way. The street is wider and therefore allowed the implementation of a larger channel for cycling. This also brought the necessary traffic signs adaptation.

5. Dissemination activities

In June 2012 flyers will be distributed within the Asprela quarter to inhabitants, students and visitors introducing the new cycle lane. Also, fake parking fines will be distributed alerting people to not park on that exclusive cycling lane. The fake parking fines will contain a brief description of the cycle lane pathways and a pedagogical text informing about the existence of the cycle lane.

6. Evaluation activities

In order to evaluate the results of the measure the City Municipality and FEUP will conduct face-to-face questionnaires with inhabitants. This questionnaire will have the following questions:

What do you think about the changes made in the Asprela quarter?

Do you think it had a positive or negative contribution on your day-to-day travel patterns?

Do you have suggestions in order to improve the actual solution?

The survey will be conducted in June 2012 and will be done by staff from the City Municipality.

In March 2012 a daily accompaniment of the new traffic light intersection was conducted. It started on the day after it was turned on. Every Thursday until April 2012 the City Municipality conducted traffic counts at this intersection.

In April 2012 FEUP and City Municipality conducted traffic counts at intersections within the Asprela quarter to compare the data with the situation of 2009.

7. Next steps

The infrastructure works plan is almost implemented. Currently, the City of Porto is implementing a cycle lane on the Alfredo Allen and Júlio Amaral de Carvalho street, signalization improvements and traffic lights optimization on the existing equipment all over the Asprela quarter.

As planned and described above the influence of the measures is now being evaluated.