

EVALUATION SYSTEM FOR THE PORTO MUNICIPALITY'S "RUA DIREITA" PROJECT

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To my dear family

I am convinced that a real city can only be read properly on foot, below your shoes.

Bogdan Bogdanovic

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ABSTRACT

Street rehabilitation serves as an important mechanism for enhancing urban quality of life and fostering careful urban development. This work will attempt to define and evaluate the outcomes of the street rehabilitation initiative under the name *Rua Direita*, a program coordinated by the municipality of Porto in Portugal. By examining the multi-dimensional parameters of infrastructure enhancement and urban revitalization, this study tries to explore the implications within the municipality for promoting urban quality, accessibility, permeability, safety, and socioeconomic vitality within urban environments. Emphasizing the transformative outcome of the rehabilitation of narrow streets, the *Rua Direita* initiative sets the goal of verifying the optimization of pedestrian accessibility while harmonizing with the predominantly residential land use surrounding these thoroughfares. Through an interdisciplinary lens encompassing urban planning, transportation engineering, and social geography, this study presents critical insights into the complexities of urban regeneration strategies and their implications for fostering sustainable, inclusive, and vibrant urban landscapes. By analysing the mechanisms driving the successes and issues of the *Rua Direita* program, this dissertation contributes to the discourse on the effective assessment of urban infrastructure development and cultivation of liveable, resilient cities in today's world.

Keywords: Urban renewal; Rehabilitation program evaluation; Municipal lead initiatives; Infrastructure improvement; Street quality assessment.

RESUMO

O processo de reabilitação de ruas é um mecanismo importante para melhorar a qualidade de vida urbana e promover um desenvolvimento urbano holístico. Este trabalho tentará definir e avaliar os resultados da iniciativa de reabilitação de ruas sob o nome de programa *Rua Direita* coordenado pelo município do Porto em Portugal. Ao examinar os parâmetros multidimensionais da melhoria da infraestrutura e da revitalização urbana, este estudo tenta explorar as implicações dentro do município para a promoção da qualidade urbana, acessibilidade, permeabilidade, segurança e vitalidade socioeconómica nos ambientes urbanos. Enfatizando o resultado transformador da reabilitação de ruas estreitas, a iniciativa da *Rua Direita* tem como objetivo verificar a otimização da acessibilidade pedonal, harmonizando-a com o uso do solo predominantemente residencial em torno destas vias. Através de uma perspetiva interdisciplinar que engloba o planeamento urbano, a engenharia de transportes e a geografia social, esta dissertação esforça-se por mostrar uma visão crítica das complexidades das estratégias de regeneração urbana e das suas implicações para a promoção de paisagens urbanas sustentáveis, inclusivas e vibrantes. Ao analisar os mecanismos que impulsionam os sucessos e os problemas do programa *Rua Direita*, esta dissertação contribui para o discurso sobre a avaliação efectiva do desenvolvimento de infra-estruturas urbanas a produção de cidades habitáveis e resilientes no mundo de hoje.

PALAVRAS-CHAVE: Renovação urbana; avaliação de programas de reabilitação; iniciativas de liderança municipal; melhoria de infra-estruturas; avaliação da qualidade das ruas.

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SYMBOLS, ACRONYMS AND ABBREVIATIONS

AMP – Área Metropolitana do Porto (Metropolitan Area of Porto)

CMP – Camara Municipal do Porto (Porto City Municipality)

DEC – Departamento de Engenharia Civil

DR - Diário da República (Republic Diary)

GO Porto – Gestão e Obras do Porto (Porto Management and Works)

MPPU – Master in Spatial Planning and Urban Project

PDM – Plano Diretor Municipal do Porto (Porto Municipal Master Plan)

TIC – Terminal Intermodal de Campanhã (Campanhã Intermodal Terminal)

VCI – Via de Cintura Interna (Inner Ring Road)

Ref. – Reference

Fig. – Figure

Tab. – Table

Dept. – Department

1

INTRODUCTION

Urban rehabilitation programs play a crucial role in shaping the physical, social, and economic fabrics and functions of cities and their further development. Within this context, the Municipality of Porto, Portugal, has embarked on a transformative initiative under the name of the *Rua Direita* project. The name *Rua Direita*, if it were to be translated in a literal sense, in Portuguese would mean “straight street”. In addition, the meaning of this name goes further, bringing the historical background of this term, where, in the Middle Ages, *rua direita* was the main street of the Portuguese cities’ urban fabric. Although this municipality’s project does not focus on the main streets of the city but on smaller ones, these streets still play a significant role in the road network and connecting surrounding areas.

The evaluation of urban renewal projects has become increasingly crucial as the demands and expectations of local citizens have grown over the years (Lee & Chan, 2008, p. 538). This is a natural thing to occur in a constantly developing urban area. Continuing onto this program’s initiative, *Rua Direita* seeks to revitalize and enhance certain degraded streets within the wider city area, aiming not only to improve the physical infrastructure but also to foster vibrant and inclusive urban spaces that cater to the diverse needs of its residents and visitors. Municipalities are now expected to ensure that new developments maintain the characteristics and identity of the area, while also preserving the structures that reflect the collective memories of the community. Additionally, public consultation through traditional or single means is no longer sufficient, as citizens today desire a more inclusive and transparent decision-making process.

This study focuses on creating an evaluation system through multiple steps. Beginning with research of relevant literature, a list of criteria is to be defined, which focuses on evaluating the outcomes of the *Rua Direita* program. In addition to defining criteria for evaluating the program, this work will also present a study case consisting of quality assessment of post-reconstructed streets through observation, empirical analysis and communication with the residents through questioning. This is considered important because by defining the improvements and possible issues, these results will be useful for making conclusions about such street rehabilitation initiatives. Studying the post-rehabilitation effects will be done through cases of eight streets situated within the municipal area of Porto. These streets, characterized by their narrowness, are envisioned to prioritize pedestrian and soft mode transport use over vehicular traffic, thereby fostering safer, more accessible, and more human-scale public spaces. The rehabilitation process in these chosen cases has already been completed. Therefore, data collection and assessment through predefined indicators were performed on-site.

The significance of this research lies in its potential to provide valuable insights into the strengths and weaknesses of urban renewal, mainly focusing on the transformation of narrow streets into pedestrian-oriented spaces. By systematically evaluating qualitative aspects of the rehabilitated streets, such as their functionality, accessibility, aesthetic value, legibility and socioeconomic impact, this evaluation system will enable stakeholders to gauge the overall success of the initiative and be able to serve as a helpful reference for future works within the *Rua Direita* program or similar initiatives. Furthermore, this evaluation system could also provide valuable insights for policymakers and urban planners, helping them to develop more effective and sustainable urban infrastructure solutions for the future.

However, in order to start going towards the core of the work, first it is important to get the reader better acquainted with the wider context of the city of Porto. With this, a preferable starting point is getting to know better the territory of the city and a brief historic background. Besides the fundamental information, it is also important to understand the progression of the urban structure of Porto and its development in the past decades, so that one gets a clear picture of the city's relationship towards spatial planning and urban projects.

1.1. THE CITY OF PORTO

The second-largest city in Portugal, Porto, also known as the capital of the northern region, stands as a significant urban centre both nationally and within the broader European context. Situated along the banks of the Douro River in northern Portugal, it is not only culturally and historically important but is becoming a metropolis. As of the latest data, the municipality of Porto houses approximately 237,559 residents, according to World Population Review (<https://worldpopulationreview.com/world-cities/porto-population>). However, the city's true metropolitan influence is reflected in the larger Porto Metropolitan Area (AMP), which comprises around 1.7 million people, making it one of the most populous and economically vital regions in Portugal.



Fig. 1 (left) – Porto on the map of Portugal. Source: GO Porto and Barreira de Almeida – Detailed plan for Vila Nova (Poente), June 2022

Fig. 2 (right) – The 6 municipalities, 5623 km² and 1.1 million inhabitants in Greater Oporto. Source: Fernandes et al, 2023.

From a demographic standpoint, Porto exhibits a diverse and dynamic population. The city has a relatively high population density of about 5,400 residents per square kilometre within its 41.42 square kilometres. This density underscores the urban challenges and opportunities the city faces, particularly in terms of housing, transportation, and public space management. A significant number of Porto's daily population consists of commuters from the surrounding metropolitan area. These commuters contribute to the city's bustling environment, as they travel for work, education, and other activities. The efficient public transportation network, including buses, trams, and a metro system, facilitates this daily influx and outflow of people, helping to maintain the city's vibrant economic and social life.

1.1.1. PORTO: EUROPEAN CAPITAL OF CULTURE 2001

In 2001, Porto was honoured with the title of European Capital of Culture, a recognition that catalysed significant cultural and infrastructural transformations within the city. This designation not only highlighted Porto's rich cultural heritage, but also sparked a wave of investment and development that reshaped its urban landscape. The year-long celebration served as a springboard for extensive public space rehabilitation projects, fostering a legacy of urban renewal and cultural vitality.

The influx of funding and attention in 2001 led to substantial investments aimed at revitalizing Porto's public spaces. Several key projects have been undertaken to enhance the city's urban environment, improve accessibility, and promote sustainable development. These initiatives were crucial in addressing both the aesthetic and functional aspects of the city's infrastructure.



EUROPEAN CAPITAL OF CULTURE



Fig. 3 (left) – European Capital of Culture (left). Source: <https://culture.ec.europa.eu/policies/culture-in-cities-and-regions/european-capitals-of-culture>

Fig. 4 (right) – Construction of Casa da Música (2001-2005). Source: <https://www.perihk.com/projects/cultural-buildings/casa-da-musica.html>

It is useful to note what Balsas (2004) mentioned about Porto's role as the European Capital of Culture: there were (...) *“three main areas of intervention: (1) urban regeneration, (2) the upgrade and construction of cultural facilities, and (3) cultural events.”* Divided into these main thematic points, the aim of the program brought more exact goals to achieve. The urban regeneration process involved the revitalization of public spaces, economic growth, and residential development in the central area of the city. Additionally, it involved the restoration of the waterfront at *Parque da Cidade* and *Caminhos do Romântico*. Additionally, this initiative also included the construction of music hall (*Casa da Musica*), a modernistic project of the 2000 Pritzker award winner architect Rem Koolhaas. The third intervention area comprised more than 450 cultural events spread across 11 diverse categories, encompassing music, dance, theatre, fine arts, architecture, cinema, new technologies, and science, as well as literature, to name a few (Balsas, 2004, p.400).

1.1.2. THE URBAN STRUCTURE

It is important to mention that, as Fernandes et al. (2023) noted, “ever since the 18th and 19th centuries, Porto has been the city of long and narrow “Gothic-mercantile” blocks, traditionally occupied by three- and four-floor single family residences, 300–500 m² “bourgeois houses”, mass-subdivided for investments in multiple units from 20 to 50 m².” The process of maximizing profits by dividing properties into smaller units while preserving their appearance has led to significant changes in the city. Many traditional houses have disappeared, particularly in their structure, along with the traditional materials such as wood and gypsum that were commonly used. This occurred in the area designated as a World Heritage Site, resulting in the loss of some notable elements as well.

Furthermore, continuing onto the 20th Century, an important improvement in the street network of Porto was done with the completion of the road system consisting of the outer surrounding road “Estrada da Circunvalação” and the inner road “Via de Cintura Interna”. The Estrada da Circunvalação, constructed in the early 20th century and completed in the 1930s, is a crucial ring road that has significantly influenced Porto’s urban structure. Designed to facilitate the flow of traffic around the city’s periphery, the Circunvalação encircles Porto, delineating the boundary between the city and its surrounding municipalities. The Via de Cintura Interna (VCI) was constructed much later, between 1984 and 1994. Built to alleviate traffic congestion and improve connectivity, the VCI encircles the central area, facilitating smoother transit between different districts and suburbs. Its development has led to the redistribution of traffic, reducing pressure on inner-city roads and promoting more balanced urban growth. This improved accessibility has spurred economic activity and residential development in previously underutilized areas, fostering a more polycentric urban layout.

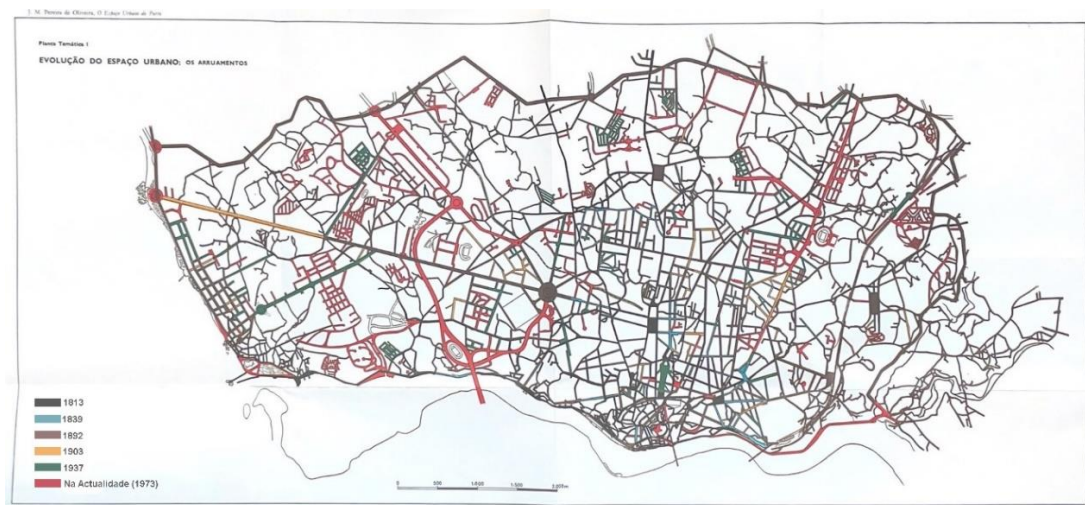


Fig. 5.1 – Porto Street network evolution, 1973. Source: J. M. Perreira de Oliveira, *O Espaço Urbano do Porto*, 2006



Fig. 5.2 – Street network of Porto Today. Source: Michel Ferreira, 2007

(https://www.researchgate.net/publication/242632482_Spatial-Yap_A_Spatio-Deductive_Database/figures?lo=1)

The urban structure of Porto has undergone significant transformations over the past two decades, reflecting a blend of historical preservation and modernization initiatives. Porto, renowned for its rich architectural heritage, UNESCO World Heritage status, and picturesque setting along the Douro River, has experienced dynamic evolution in its urban fabric. The city has witnessed a series of urban renewal projects aimed towards revitalizing its urban core, enhancing connectivity, and improving liveability. Redevelopment projects have been focusing on infrastructural improvements designed to enhance mobility and accessibility. The expansion of public transportation networks, including metro systems and tramlines, has facilitated easier movement within the city and its surrounding areas. Furthermore, urban redevelopment initiatives have led to the creation of modern mixed-use development and public spaces. Areas such as Boavista and the waterfront were reimagined, featuring contemporary architecture, commercial complexes, and recreational amenities. These developments have not only revitalized underutilized areas but have also provided spaces for social interaction and cultural events, contributing to the city's sense of community.

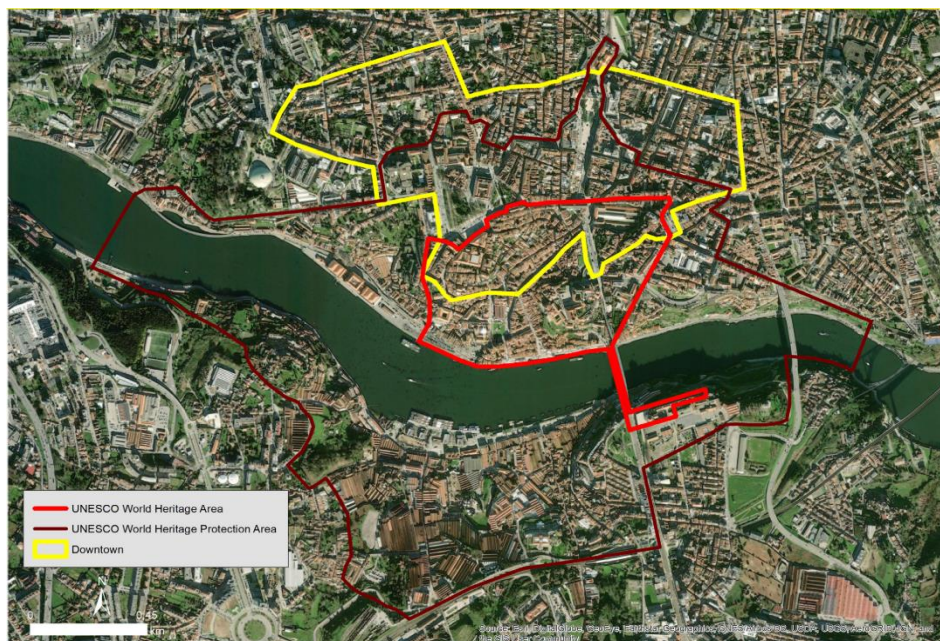


Fig. 6 – Porto's city centre and the area listed as World Heritage by UNESCO in 1998. Source: Fernandes et al, 2023.

The transformation of the city's urban landscape in the recent past has also been driven by a combination of public and private sector investments, efforts towards community engagement, and sustainable development principles. While progress has been made in revitalizing the city and enhancing its infrastructure, challenges such as gentrification, affordable housing, and environmental sustainability remain pertinent issues that Porto continues to address. Porto's continued efforts to address these complex issues demonstrate the city's commitment to promoting equitable development and ensuring a high quality of life for all residents, while also preserving its unique cultural identity and historic charm.

An introduction to the characteristics of the city and its urban fabric is crucial for understanding better the temporal and physical circumstances and increase the chances of comprehensive assessment of public space. A wider context should be analysed so that it can serve as a starting point from which the scale of the work can narrow down to certain neighbourhoods and streets. It is important that the whole time while carrying out the work, the approach should aim to be as objective as possible, so that it can result in reliable results and conclusions.

1.2. URBAN REHABILITATION

Urban rehabilitation serves as an effective method for revitalizing and modernizing existing urban environments while preserving the integrity of real estate assets and infrastructure. This approach should harmonize the past with the present, maintaining historical integrity while integrating contemporary elements. Over time, urban intervention strategies have evolved beyond mere refurbishment to encompass urban renovation, renewal, and regeneration. Urban renovation, once synonymous with large-scale demolition and redevelopment, now acknowledges the intricate balance between replacement and conservation. Urban renewal extends this narrative by addressing the socio-economic decay of distressed neighbourhoods, striving to uplift communities through improved housing, infrastructure, and services (Fernandes et al., 2023, p.4). Meanwhile, urban regeneration embodies a holistic paradigm, combining physical upgrades with social and environmental rejuvenation to achieve strategic urban development goals. This shift towards comprehensive urban strategies reflects a need for understanding of urban dynamics, embracing both the legacy of historical structures and the demands of modern urban living. Notably, cities like Porto illustrate this evolution, where early 21st century projects focused on integrated regeneration, blending physical space enhancements with economic and social initiatives. In contrast, recent trends favour private investments, transforming historical buildings through functional renovations and modern facadism, reflecting a neoliberal penchant for profit maximization. These layered interventions underscore the transformative potential of urban rehabilitation, fostering vibrant, sustainable cities that honour their heritage while embracing future possibilities.

According to CMP, Porto Municipality has been working towards improving land use by developing and supporting projects that implement nature-based solutions, which promote biodiversity, respect the city's natural water cycle, increase carbon storage capacity, make the best use of soil, reduce energy consumption, and ultimately create a more pleasant and comfortable environment for both residents and visitors. Achieving a complex goal such as (...) *"sustainable urban regeneration can be achieved only through the cooperation between institutions, universities, urbanists, environmental associations and builders"* (Alpogi & Manole, 2013, p.179).

A given example of documents like “Environment Quick Guide 2020” presented by the CMP, show some already achieved goals as well as the aims for the future urban development of the city. This document is available online, for all the citizens, both in Portuguese and English. Therefore, anyone interested in the goals for future urban developments, the website of CMP and GO Porto intend to be up to date with the news regarding the projects, whether they are private or public investments.

1.3. INTRODUCTION TO THE *RUA DIREITA* PROGRAM

Rua Direita is an ambitious municipal program for the in-depth rehabilitation of the city's fine network of public spaces which, for decades, have received no intervention. The aim of the program is to restore conditions for circulation and enjoyment of public spaces in areas that have long been forgotten. Geographically wide-ranging, the *Rua Direita* program is located throughout the city, covering not only public spaces, but also old rural roads, urban areas undergoing transformation and degraded streets in consolidated fabric.

There was an estimated investment of 30 million euros for a delicate job, with the aim of reconverting a hundred streets, corresponding to around 15 kilometres of intervention. (Translated from Portuguese, <https://goporto.pt/grandes-intervencoes/programa-rua-direita>)

The program's objectives encompass the selection of streets spanning a broader city region, segmented into seven distinct zones. Aside from their positions, the chosen streets ought to exhibit a narrow configuration, thus presenting a challenge in ensuring their accessibility. Consequently, the program prioritizes the promotion of soft transportation modes and pedestrian-friendly environments. Another, relatively more apparent objective involves enhancing the infrastructure to improve both aesthetic and practical aspects, as well as an overall appeal of the street.

The CMP team, in selecting streets for rehabilitation, adhered to specific criteria that guided their decision-making process, thereby determining the streets to be included in the Program. Regarding this, the focus of the *Rua Direita* Program consists of: (1) Streets that are locally important for the citizens and the traffic system; (2) Streets with a narrow profile; (3) The Program had to include streets more-less evenly spread throughout the city area.



Fig. 7 – Map of the *Rua Direita* program. Source: <https://goporto.pt/grandes-intervencoes/programa-rua-direita>, Accessed on 26th November 2024.

As shown in the Figure 7, the distribution of the program is over the whole municipal area of the city. This map provides information on the progress of rehabilitation efforts for each street, allowing the viewer to determine which works are in the development phase, which are about to begin, which are currently undergoing, and which have been completed. This map can be accessed by everyone through the website of the Porto City Municipality. Following this, people can have an insight of the work development through time.

1.3.1. THE SYNOPSIS

Rua Direita is designed to upgrade degraded public spaces, integrated into the capillary network of the municipal road system, relating to old rural roads, urban areas undergoing transformation or degraded streets in a consolidated fabric.

The program is planned be developed in 4 phases:

1. Launch of 5 public tenders for the acquisition of design and surveying services.
2. The projects are outsourced and monitored by the municipal services;
3. Launch of public tenders with international advertising for the works, divided into five lots;
4. Carrying out the works.

1.3.2. THE SCALE

In this public space evaluation, the scale is already predefined because the work focuses on existing projects that have been implemented. This case includes specific streets, which means that the focus is on the local scale. Thus, it is essential to examine the impact of these public interventions on the local community and their daily lives. Some of these streets, when the construction was considered, were not limited to a linear extent. There are cases where the rehabilitation was done on the nearby square and side streets, so that the space would give an impression of wholeness and completeness. Still, the size of the project, in all cases, is narrowed down to a neighbourhood with not more than two streets and space in form of a square, a pocket of the street or a parking.

1.3.3. THE NUMBERS

The *Rua Direita* program allocates a global investment of 21 million euros to the rehabilitation of the fine network of around 100 streets, in a total of around 15 kilometres of intervention. In the beginning, the estimated cost was 18.5 million euros, distributed as follows:

Tab. 1 – Estimated costs of the *Rua Direita* program. Source: CMP, 2018.

Lot	nº of works	Extension	Estimated costs	Project VB
L1	8	1 630,5	2 445 718,09 €	150 000,00 €
L2	7	2 377,0	3 565 495,77 €	207 000,00 €
L3	8	2 089,4	3 134 151,28 €	185 000,00 €
L4	10	1 522,6	2 283 860,30 €	140 000,00 €
L5	8	2 408,3	3 612 524,80 €	209 000,00 €
L6	17	2 318,3	3 477 409,47 €	203 000,00 €
Total	58	12 346,1	18 519 159,71 €	1 094 000,00 €

Naturally, it is expected for the estimated costs not to match with the costs by the end of the rehabilitation work, though estimation is a useful tool for having a clearer picture of the size of the investment. As it can be seen in the Table 1, the cost estimation is divided to six lots that are encompassing a certain area of the city. These lots feature a varying number of works, although making sure to include as much diverse locations of the streets included in the program. In the Figure 8 a map shows a spatial distribution of the lots in the municipality. Each lot is marked with a different colour, so the streets that are attributed to the same lot share the same colour.



Fig. 8 – Map of the distribution of the streets in the *Rua Direita* Program. Source: CMP, 2018.

In addition, this method of choosing the streets done by the Municipality of Porto ensured to fulfil the criteria of avoiding putting the focus on the central parts of the city. In this initiative it was considered important to spread urban rehabilitation to the whole municipality.

1.4 OBJECTIVES

This study, using certain streets within the municipality of Porto as the study area, poses the following research question: What were the outcomes according to our evaluation system, and what was the overall quality assessment result of the *Rua Direita* program?

This research question has generated several subsequent questions, such as the following:

- Q1. Which are the major improvements and least improved aspects of the program?
- Q2. Are the previously developed criteria fulfilled?
- Q3. What are the key factors that should be taken into account when implementing a project of this nature in the future?

Lastly, the hypothesis of this work is to verify whether the Porto City Municipality's *Rua Direita* program could improve the overall quality of public spaces that have been chosen for requalification. The challenge is to figure if certain standards are achieved, mainly referring to improved quality of everyday life of the residents.

These listed questions and posed hypothesis will be addressed in the "Discussion" and "Conclusion" chapters. This way, by bringing back the questions created in the beginning of the work, their answers should give a better insight into the results and achievements of this Dissertation.

Within the process of forming the work strategy, the starting point naturally occurs to be doing the research through scientific literature, specifically texts that will help in constructing a system for reliable evaluation for the post-rehabilitated street.

In the following section, our work will delve into the theoretical framework research underpinning the evaluation of urban development projects. Reviewing the relevant literature on performance evaluation criteria and indicators and proposing a comprehensive evaluation system tailored to the specific objectives and context of the *Rua Direita* program in the City of Porto. Finally, the result of the work should define the overall quality of the municipal project work that has been concluded, based on a systematic methodology and clearly defined steps seeking to have a reliable, clear result in the form of conclusions and recommendations. Methodologies used for evaluation aim towards having a universal character, with the intention of having the ability to be applied to future similar studies and works. Nevertheless, local specificities demand adaptations and selections. Therefore, it is crucial to ensure that the chosen methodology is well-suited to the specific study and the research questions being posed, so that it can be effectively applied to future similar studies and works.

2

LITERATURE REVIEW

The purpose of this literature review is to explore existing studies related to the evaluation of urban rehabilitation projects. This review provides a thorough search for the various methodologies, criteria, and case studies that present effective evaluation practices in municipal programs and projects similar to *Rua Direita*, our study case. The case of this Dissertation is quite defined and specific, as already described. Because of this, while going through the literature platforms, the choice of reliable references had to be made in order to find useful information. The narrowness of the theme has limited the amount of literature that can be considered as useful, therefore, the list of literature may not be as long, although all the references used were carefully studied and used for the criteria and methodology development.

The essential question that serves as the starting point for this research is: How can we develop a reliable evaluation system for the urban renewal project led by the city municipality? Going through related literature with the aim of developing a list of criteria for evaluation as well as considering existing data is crucial for forming a base to start the development of the methodology. Therefore, based on defined references and existing methodologies, this chapter presents an analysis of existing papers related to our theme. It is important to have a clear division of significant factors that should be considered when forming an evaluation system. Therefore, by trying to list the important themes, they are considered to have the potential to later become criteria for evaluating the quality of a post-rehabilitated public space.

The literature review was carried out using Scopus, Web of Science, Google Scholar and other similar engines as well as cross-referencing with a goal to have reliable sources. Besides internet, the classic physical literature research through books, dissertations and publications in the library of FEUP was done as well. Considering that more diversity is put in this researching process, the work is more likely to have more reliable outcomes. In order to incorporate the most relevant search results, a thorough selection process was implemented, while a certain number of references that did not meet the specific focus and methodological depths was excluded.

2.1. IMPORTANT REFERENCES

Some specific objectives of this literature review were to identify and analyse the current evaluation systems used for urban rehabilitation projects globally and locally, examine the criteria and indicators that are most effective in assessing the success of these projects, review case studies and examples of urban rehabilitation projects similar to *Rua Direita* to understand best practices and common challenges as well as evaluate the relevance and applicability of these systems and criteria to the Porto municipality's *Rua Direita* program.

Regarding the question of street use reallocation, transferring space from private vehicles to other modes of transport can bring about a significant change in the streets, altering their design and layout, which may have been the same for years (Cordeiro, 2023, p.23). The implementation of such initiative can also lead to a decrease in traffic congestion and air pollution, making streets safer and more environmentally friendly. This change can impact the way people, vehicles, and goods move and can serve different objectives. Nevertheless, in many cases the residents of the street are not likely to change old habits which provide more comfort, such as accessing the housing unit by car, as near to the house entrance as possible. Decreasing the amount of road space designated for general vehicular traffic and repurposing it for pedestrian, cycling, bus, tram, or other high-occupancy transportation modes can also improve their appeal and optimize the utilization of the road network. However, these proposals often generate heated debates (Cairns et al., 2001, p.13). For example, reassigning more space for bicycles, pedestrians, or public transport requires careful consideration of the common needs associated with the specific case to determine the best solution. The main question to put here is whether the users of the streets of our study case prefer this way of requalification. The challenge for a street redevelopment program is the attempt to both satisfy the needs of the citizens-users of the streets and going towards the idea of minimizing vehicle use.

Urban rehabilitation often aims towards enhancing the quality of life and investing in the future. It presents a substantial project that often brings challenges, but with determination and resources, it is achievable and necessary. Throughout the urban transformation process, society also usually faces both the benefits and challenges of such initiatives. Over the past decade, urban transformation initiatives have been the subject of both praise and criticism from practitioners and scholars alike. As a result, *(1) the construction does not go to all potential beneficiaries and (2) the interest span of the participants has not become continuous. (3) Phased construction is a very useful possibility; (4) it is a low-cost alternative; (5) it is socially fit and (6) as long as it protects the ease of access to the social facilities*” (Alkışer et al., 2009, p.34). The complexity of urban development and the importance of implementing strategies that prioritize inclusivity, cost-effectiveness, and sustained community involvement should not be left behind. By emphasizing the critical synergy between planning processes and actionable projects, the urban regeneration framework should promote common initiatives that enhance the attractiveness of an area, reduce energy consumption, enhance structural safety, improve public spaces, remediate environmental issues, and enhance sustainable mobility options. Depending on the scale, the implementation of diffuse urban regeneration interventions in a city requires specific regulatory and legislative frameworks.

Furthermore, the enhancement of green infrastructure is crucial when evaluating urban rehabilitation projects. While some post-rehabilitation green infrastructure elements with straightforward functions and objectives are easy to measure, developing comprehensive evaluation methodologies that use quantitative scientific procedures to encompass all objectives of green infrastructure practices is challenging (Geberemariam, 2017, p. 8). Monitoring and evaluating these practices are essential, focusing on baseline mapping, impact assessment, and considering performance standards and added benefits. To achieve lasting urban and cultural revitalization that is beneficial for all members of the community, it is crucial to maintain the active participation of the community and reinforce their sense of place identity, which will ensure the project's economic, social, and environmental sustainability (Sepe, 2014, p.39).

With an aim to nurture the cultural aspect and include it in the process of evaluation, one should highlight the importance of involving city residents in urban development to maintain high-quality greenery and create new local spaces while maintaining a characteristic cultural identity. *“For landscape objects in a*

historically formed environment, valuable qualities are the restoration of the tradition of the place, although keeping the previous character so that the space retains with as similar ambience as it had before, enhancing the comfort and safety. Additionally, enhancing (...) *“saturation with artefacts and new functions, introducing ideas of balanced development, and considering the psychological needs of society”* present some other aspects to consider for retaining the genuine quality of a public space (Petryshyn et al., 2022, p.31). The importance of preserving the individual character of urban spaces is increased by the ongoing trend of globalization and the risk of losing it. Urban spaces can be transformed into vibrant, meaningful environments that reflect both their historical roots and contemporary aspirations. The transformative impact of urban vision and intervention on existing city conditions should align with community needs and preserve historical value. By drawing on features derived from thorough analysis of the environment and its history, as well as engaging in discussions with city residents, the interventions should aim not only to enhance physical spaces but also to alter perceptions and meanings within the urban landscape. As Ciepiela (2019, p. 7) mentioned, *“the revitalization process carried out in a comprehensive way results not only in a space with improved aesthetics or higher quality, but it also strengthens social ties and increases the sense of local identity of the inhabitants”*. Related to this, a comprehensive revitalization process can lead to the development of new community spaces and the preservation of historical and cultural landmarks, further enriching the sense of place and fostering a keen sense of community among residents. In addition, it allows residents to take ownership of their community, actively engaging in its activities and contributing to its well-being.

As Slotterback & Lauria (2019) mentioned, *“(...) planning research in the last 50 years has studied strategies to involve community stakeholders and has noted the problem of lack of representation and exclusion of groups within communities as a part of the planning process, including people with disabilities”*. This aspect of accessibility is quite often neglected when taking into account providing the equal qualitative performance for the community. According to Eisenberg et al. (2024), aiming towards better presentation of the technical aspects of the neighbourhood rehabilitation planning process to institution leaders and residents with challenged mobility could provide larger acceptance, leading to a desirable cultural shift of embracing barrier-removal. Whilst developing a methodology for urban project quality assessment or evaluation, the role of accessibility and inclusiveness should be acknowledged as one of the main indicators, making sure that the level of inclusivity of the public space is according to the municipal standards.

Before stepping into a process of urban rehabilitation, *“(...) understanding the problematic specificities and the characteristics of the context is fundamental in order to identify the qualities of the urban (and social) fabric and apply a set of surgical and specific solutions to the needs of the place”* (Salamagy et al., 2023, p.19). Characteristic for the northern Iberian Peninsula, the climate consisting of significant amounts of rain during the winter season is another factor with an influence worth mentioning. In addition, climate adaptation, mostly referring to stormwater and overall precipitation mitigation is an important aspect specific for the case of Porto that has to be considered. In order to ensure the efficacy of their programs, municipalities must incorporate performance monitoring and validation into the planning process. Green infrastructure projects can be designed in various ways, forms, settings, and technologies, depending on their intended functional goals and objectives. While this factor has a certain amount of unpredictability, it is safe to highlight that (...) *“green infrastructure practices are not simple, one-size-fits for all solutions”*. In order to effectively protect public space resources and manage stormwater for long-term periods, it is essential to carefully plan out, implement, and maintain these systems. (Geberemariam, 2017, p.2)

Furthermore, it is important to highlight the importance of doing the field work, whereas *“physically visiting sites allows researchers to observe the built environment and human behaviour within it,*

enhancing understanding of the current urban identity". Accordingly, a visit to the site provides researchers with the opportunity to gather data and make observations that may not be possible through other means such as photographs or theoretic resources. Thereby enhancing the accuracy and completeness of their analysis and understanding of the urban environment, which "(...) *could involve taking photographs, sketching, and noting important features and activities.*" (Mansour et al., 2023, p.20)

Moreover, in the following part of the work, after commenting on relevant literature and developing a certain character of the work, the next step is attempting to create criteria based on the literature review, combined with the criteria set by the CMP.

2.2. DEFINING THE CRITERIA FOR EVALUATION

Definition of the criteria for such work needs to be based on multiple side-elements. Nevertheless, the criteria, including literature background, should as well be considered by different opinions or statements coming from different actors important for this exact program. This means that it is crucial to include the criteria defined by the Porto City Municipality, as well as criteria from citizens, and ones developed through profound literature research. Considering all three, a set of criteria to be included in the system for evaluating a street rehabilitation project would yield more consistent and reliable results.

During the development of the program, the CMP team defined the criteria that were followed throughout the work and aimed to be fulfilled by the end. These criteria include both qualitative and quantitative aspects. Some of the qualitative aspects that were considered are (1) the enhancement of soft mobility usage, (2) implementation of natural elements and green spaces, and (3) improvement of the overall quality of the urban space. The quantitative aspects of the criteria include (1) complete renewal of infrastructure of the street (pavement, illumination, draining system, water networks, communication network, electricity); (2) enhancing the use of comfortable materials that will motivate pedestrian mobility and adapt to all ages; and (3) spreading the program throughout the entire city area, avoiding focusing on a specific part of the city.

Considering the objective of the work and having the literature as the main guide, a list of criteria was developed, which will be used as the main tool for further definition of our system for evaluating the *Rua Direita* Program:

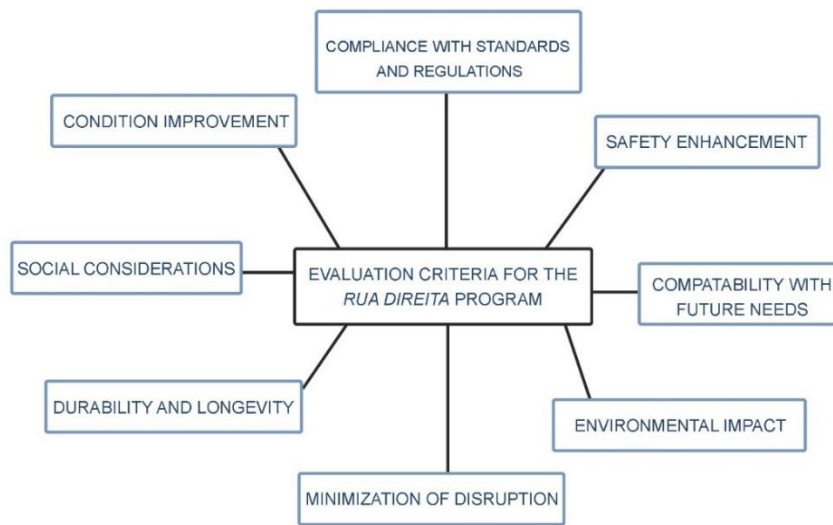


Fig. 9 – Set of criteria for evaluation of the *Rua Direita* program.

Urban redevelopment initiatives present a comprehensive effort to transform a city's infrastructure, focusing on various crucial aspects to enhance the overall quality of urban life. To start with, one of the primary goals would be **improvement of the overall condition**, such as pavement renewal and involving extensive reconstruction to address deteriorated road surfaces. This initiative includes the implementation of advanced draining solutions to prevent waterlogging and ensure durability, while simultaneously enhancing the walkability of the streets to promote a comfortable and accessible environment for pedestrians.

Moreover, strict adherence to **engineering standards and guidelines**, along with compliance with local, regional, and national regulations related to construction and transport, ensures that the project meets all necessary legal and safety requirements. This comprehensive approach guarantees that the urban redevelopment in Porto not only addresses current challenges but also prepares the city for future growth and development, fostering a safer, more accessible, and sustainable urban environment.

Nevertheless, **safety enhancement** should be one of central concerns of this project, aiming for a substantial reduction in accidents and collisions through improved legibility of roadways. Enhanced visibility, better signage, and clear road markings are crucial elements in this strategy, designed to facilitate safer navigation and adherence to traffic regulations. Additionally, traffic calming measures will be implemented to moderate vehicle speeds, creating a safer environment for all road users.

Moreover, the *Rua Direita* should put efforts towards being **compatible with future needs** by incorporating flexibility to accommodate potential changes in traffic patterns, land use, and infrastructure upgrades. This adaptability is essential for maintaining the relevance and functionality of the urban improvements amidst evolving urban dynamics. Specifically in our study case, there will be cases in which the surrounding of rehabilitated streets is yet to be constructed and redeveloped, according to the municipal regulation plan.

Addressing the **environmental impact** of the redeveloped street is an important component to consider within the program and its quality assessment. Efforts are made to reduce greenhouse gas emissions and energy consumption both at the construction and maintenance phases. The use of sustainable materials and practices, including recycled materials and permeable pavements, underscores a project's commitment to environmental sustainability. Additionally, measures to mitigate stormwater runoff and drainage solutions are likely to be implemented to enhance the ecological health of urban environments. By increasing walkability and effectively managing traffic, as previously mentioned, the project also aims to reduce the overall traffic burden on the city.

Minimizing disruption during the redevelopment process is another important aspect. The project is committed to timely completion within scheduled timelines, maintaining effective communication and coordination with stakeholders such as residents and businesses to mitigate inconvenience. This strategy aims to uphold community support and minimize the negative impacts of construction works on daily life. Although the main focus of this work is on post-rehabilitation conditions, through collecting opinions of residents and looking into the timelines of the reconstruction periods, one is able to collect information about this posed criterion.

To guarantee the sustainability of the improvements, the program should also put focus on **durability and physical longevity** by selecting materials and construction techniques resistant to the weather conditions characteristic of Porto and the intensity of use. This approach ensures that the infrastructure enhancements are resilient and long-lasting.

Social considerations are deeply embedded in the project's planning and execution. The redevelopment emphasizes accessibility improvements for pedestrians, cyclists, and individuals with disabilities, ensuring inclusivity across the urban landscape. Enhancing the aesthetic appeal of streets and public spaces is also a priority, aimed at fostering vibrant and inviting community areas. Importantly, the project actively integrates community input and engagement, ensuring that the development reflects the needs and aspirations of the local population.

These criteria present an important tool, which acts as a sort of a set goal, which we will come back to after the study case, to conclude the process of evaluation after the data collected with quality assessment.

After the set of criteria has been defined, followed with an explanation why each one should be fulfilled, the work continues towards further development of its methods.

3

METHODOLOGY

In this chapter, development of methods for this work will be presented. This will involve multiple steps, some of which will be qualitative, while others will involve measuring or collecting data. By utilizing references and literature to determine the criteria, this approach aims to be as reliable as possible.

In the initial phase of our research, we carried out a thorough review of existing literature to explore the various definitions, theories, viewpoints, and methodologies that have been proposed in the academic domain of urban rehabilitation programs and their assessment. Equally important, the review provided the material which was essential to discuss before creating the adequate system with criteria for final evaluation of the program. That is to say, after our study case, getting back to make sure whether and in which sense this system of criteria has been fulfilled. Doing this, a specific act of circling the work will be done, in a way that starting with defining the criteria for the *Rua Direita* program, the work continues by narrowing down the focus onto exact cases – streets chosen by the Porto Municipality. After the study case and assessing the quality of the work done in these certain streets, gained results will be used for making conclusions about the whole requalification initiative, finishing with comments on primarily posed criteria and whether they are fulfilled.

3.1. STREET ANALYSIS

When assessing the quality of a post-rehabilitated street/public space, before starting the process it is important to understand the micro and macro context of the street/public space. In order to do this, a thorough study of the exact street should be done. The following aspects are essential to include in a comprehensive assessment of each street: physical components, typology of the street, surrounding aspects, and road/public transport connections. Nevertheless, the immaterial aspects such as urban identity and comfort also have an important role in defining the public space. Additionally, it is important to gather information about the investment costs of the completed work, deadlines, and a detailed description of the rehabilitation work conducted on the street.

To start with, identifying the basic information of the street (location, physical characteristics, materialization, slope, narrowness, connectivity, public transport connections, surroundings, accessibility, social aspects) is necessary to have as much clear of an insight as possible, applied to each street and its surroundings.

The geographic position of a street affects its climate, exposure to environmental elements, and its role within the broader urban fabric. Knowing the location helps in contextualizing the street's function, potential traffic, and its integration with the city. Typology of the environment, including buildings, parks, and other infrastructure, influences the street's character and functionality. Surroundings impact factors like noise levels, air quality, and the street's aesthetic appeal. In terms of street dimensions, shape, and layout, one can determine its usability, traffic flow, and capacity to accommodate different types of

transportation and users, whether they are residents or using the street as a transit. Physical characteristics, besides having functional motives, influence the street's aesthetics and functional design as well. The materials used in street construction impact durability, maintenance needs, and environmental footprint. Different materials can affect pedestrian comfort, road safety, and the urban heat island effect. Furthermore, the gradient of a street affects water drainage, accessibility for people with disabilities, and ease of navigation for vehicles and pedestrians. Steeper slopes may require special design considerations to ensure safety and usability. The width of a street influences traffic congestion, pedestrian safety, and the potential for street-side activities such as markets or outdoor seating. Narrow streets can foster a more intimate, pedestrian-friendly environment but may limit vehicle access, especially in the case of streets chosen for this study case.

A street's connectivity to other streets and transportation networks determines its role in the broader mobility system. Good connectivity enhances access to services, reduces travel times, and supports economic activities. Proximity to public transport stops and the frequency of service affect the street's accessibility and the ease with which residents and visitors can travel to and from the area. Effective public transport connections can reduce reliance on cars and promote sustainable mobility. Ensuring that the street is accessible to all individuals, including those with disabilities, is essential for inclusivity. Accessibility features like ramps, tactile paving, and adequate crossing points enhance safety and usability for everyone. The social dynamics of the area, including the presence of community spaces and social interactions, affect the street's vibrancy and sense of place. Understanding social aspects helps in designing spaces that foster community cohesion and engagement.

In the following section, one will be able to delve into the list of indicators that are important in order to assess the street and public space in the most reliable way. This part also shows why are these indicators were chosen and how will the evaluator be able to define them in each case.

3.2. QUALITY ASSESSMENT WITH INDICATORS

Following the definition of the fundamental features of the street, the focus on the quality assessment comes next. Through previously defined indicators supported by the researched references, one is able to collect specified information and process it through a table of indicators. The quality of each indicator is assigned to the street by observing, examining, comparing the state of the street before and after the rehabilitation. Additionally, there was also a chance to do a survey including the residents of the street. Due to the diverse street typologies and varying number of residents, some streets encountered more success in obtaining data through surveys than others.

Assessing the quality of public space which represent the outcomes of a program led by the Municipality presents a task that will be supported by firstly defining indicators. These indicators should ensure a qualitative data collection. Since the nature of urban environment is multi-dimensional, encompassing social, cultural, historical and spatial elements, it also presents a complex phenomenon to define and measure, leading to its neglect in applied studies (Mansour et al., 2023). D

Furthermore, as shown in Table 2, our defined indicators were attributed with the relevant literature, serving as important references. The table is trying to show how the indicator has been defined, with a paragraph from the reference referring to the indicator. Providing theoretical background for each indicator ensures their reliability for street quality assessment. This as well gives the reader an insight into the process of criteria definition and overall comprehensiveness of the work. In the Table 2 one can notice the connection between the indicator and the literature relevant for our case, where the importance of one indicator is described through the citations of reviewed papers.

Tab. 2 – List of the indicators and reference sources

Indicator	Source	Description
1. <i>Community Engagement and Satisfaction</i>	Alkışer et al., 2009: "An Evaluation of Urban Transformation Projects"	"There are several dilemmas involved in the urban transformation projects: firstly, collaboration of public institutions and the community. In most cases, the dwellers are uninformed about the decisions about their settlements which will directly affect their lives. These decisions may carry adverse consequences and may be deliberately hidden from them" (Alkışer et al., 2009)
2. <i>Preservation of Historical Identity</i>	Sepe, 2014: "Urban transformation, socio-economic regeneration and participation: Two cases of creative urban regeneration"	"Planners should be aware that urban development based merely on physical and material aspects, disregarding intangible culture, threatens to produce repetitive places that fall an easy prey to globalisation. To support local identities and enhance the distinctiveness of a place, the accent must be placed on art and culture" (Sepe, 2014)
3. <i>Environmental Sustainability</i>	"Petryshyn et al., 2022:" Changing the Qualities of Urban Space by Means of Landscape Architecture"	"The concept of sustainable development is new and important for rethinking the existing urban environment. However, like every accepted general theoretical area for the development of the profession, it relies on many issue-related approaches in the area of the development of society and its needs and branch concepts, theories, means, etc." (Petryshyn et al., 2022)
4. <i>Quality of Public Spaces</i>	Lee & Chan, 2008: "A sustainability evaluation of government-led urban renewal projects"	"(a) Percentage of open spaces being provided: It calculates the total percentage of the open spaces being provided in the renewal area. (b) Quality of open spaces: It identifies whether the open spaces provided by the renewal project are adequate and properly located, and of appropriate design?" (Lee & Chan, 2008)
5. <i>Social and Cultural Impact</i>	Mansour et al., 2023: "A Comprehensive Methodological Approach for the Assessment of Urban Identity"	"Cultural and traditional activities within a city reflect the community's meanings and values, with social relationships, special rituals and festivals in public urban spaces serving as vital indicators of the city's identity" (Mansour et al., 2023)
6. <i>Economic Sustainability</i>	Sepe, 2014: "Urban transformation, socio-economic regeneration and participation: Two cases of creative urban regeneration"	"Thus, economic sustainability can be defined as 'the ability to generate income, profits and work within a system of equal opportunities for all the elements of society, inside a model which enhances and increases land resources, and furthermore does not produce a collapse of the same in quantity or quality'" (Sepe, 2014)
7. <i>Accessibility and Mobility</i>	Ribeiro et al., 2021: "Urban Planning Revolution for Increasing Pedestrian Mobility in Lisbon, Portugal" United Nations–Habitat III: "Nova Agenda Urbana [New Urban Agenda]"	"Cities are expected to be safe, healthy, accessible, resilient, and sustainable places, providing, and fostering prosperity and quality of life for those who live or use these places. The connection of places in the city through architecture with urbanism, encouraging walkability, will strengthen intergenerational and social interactions, will also reinforce cultural expressions, and provide social cohesion and security of the societies" (Ribeiro et al., 2021)

With an aim to have an effective and reliable study case of eight chosen streets/public spaces around the broader area of the municipality of Porto, it is required to define indicators which will be taken into consideration while visiting the completed streets and defining their current performance. Each indicator should preferably be elaborated and split into multiple simplified performance indicators, as shown in the following table:

Tab. 3 – Table of indicators, goals and instructions

Indicator	Goal	Instructions
Community Engagement and Satisfaction	Measure the level of community involvement in the planning and implementation process through surveys, public consultations, and feedback mechanisms. Evaluate resident satisfaction with the reconstructed streets and their perception of the improvements made.	<i>While visiting: Prepare a survey which results in defining the amount of involvement of the residents in the reconstruction plan and development, if the complaints/requests were made and fulfilled. Try to identify overall satisfaction of the everyday users of the space.</i>
Preservation of Historical Identity	Assess the extent to which historical elements are preserved or integrated into the reconstructed streets. Consider indicators such as the retention of historical architecture, incorporation of heritage features, and adherence to historical design principles.	<i>While visiting: Recognize elements of historical value being preserved, enhanced or redone in a more functional/aesthetically pleasing manner.</i>
Environmental Sustainability	Evaluate the program's impact on environmental sustainability by assessing factors such as the incorporation of green infrastructure (e.g., trees, rain gardens), rain drainage (e.g., permeable pavements), additional measures to mitigate pollution and enhancements to pedestrian and cyclist accessibility to promote sustainable mobility options.	<i>While visiting: Indicate the presence and management of blue-green infrastructure, how easy their maintenance is, cost effectiveness of this infrastructure and overall adaptation and mitigation to the environment.</i>
Quality of Public Spaces	Measure the quality of public spaces created through street reconstruction, including amenities for pedestrians and cyclists, accessibility features, aesthetics, and usability for various community activities.	<i>While visiting: Consider the establishment of the connection with the surroundings (houses, public and private neighbouring lands), how approachable the street is; which are the target groups of traffic users; if it is accessible/usable for its target groups.</i>
Social and Cultural Impact	Assess the program's social and cultural impact by evaluating its contribution to community cohesion, local identity preservation, and cultural enrichment. Consider indicators such as the creation of new local spaces, maintenance of cultural heritage, and opportunities for community engagement and participation.	<i>While visiting: Consider if the public space reconstructed in favour of its everyday users? Try to do an effective survey with the habitants of the reconstructed street; Analyse if the cultural heritage present in the street, and if yes, if it is well preserved/reformed. Try to define whether the reconstructed space gives more usage opportunities, provides more security and overall feel of comfort.</i>
Economic Sustainability	Evaluate the economic sustainability of the program by assessing urbanization and construction costs relative to intervention priority levels. Consider indicators such as cost-effectiveness, return on investment, and long-term financial viability.	<i>While visiting: Try to figure if the new-made functionality of the street is economically efficient, more self-sustainable, easy to maintain etc. After/Before visiting, investigate cost effectiveness and budget plan made for the street renovation. If possible, make approximate calculation of the maintenance costs.</i>
Accessibility and Mobility	Measure the program's impact on accessibility and mobility by assessing improvements in pedestrian and cyclist infrastructure, public transportation integration, and overall connectivity within the urban environment.	<i>While visiting: Identify basic materialisation of the space, how functional it is, if it is adapted to as many user types as possible. Identify how much a street is likely to be a meeting point or a connecting element in the wider local context – this will be useful for defining if the street is adapted to the frequency of its passers on a daily/weekly/monthly basis.</i>

By using these listed indicators during the process of assessing the quality of the street, one can use a reliable way to comprehensively verify the effectiveness of municipality's street reconstruction work and public space performance, as well as ensure if they align with community needs, preserve historical and cultural identities, promote environmental sustainability, and contribute to the overall quality of urban spaces.

While carrying out the process of quality assessment, it is crucial to define the objectiveness/subjectiveness of the empirical analysis, such as impressions from the site, and what do these impressions depend on, besides the primary information received from our senses. It is also important to consider the time of the day, day of the week, time of the year: all these aspects should be recorded in order to show precise and relevant data. A critical component in the methodology determination involves developing a strategy that can assess qualitative and some quantitative (as much as circumstances are allowing) aspects of street infrastructure, encompassing both tangible and intangible elements. As Mansour et al. (2023) noted, *"urban identity is a complex concept encompassing both physical and emotional elements. The material dimension of urban identity consists of visual elements constituting the urban space, including geographical location, natural features, territorial boundaries, regional characteristics, vegetation cover, and climatic conditions"*. Nevertheless, this is essential in shaping the way residents and visitors perceive and interact with their surroundings, as these elements provide a unique sense of place that helps create a distinct comfort and functionality. Furthermore, *"(...) forming a mental image of the city for individuals"* (Mansour et al., 2023,p.17) plays an important role for both adults and younger habitants. Living in healthy and well-planned surroundings brings many opportunities for the individuals who happen to live in this neighbourhood.

Formation of the tool for assessment through indicators can facilitate the process and make it more legible. In this case, a tool for assessing is created in a form of a table. This table (Tab. 4) is made in a way that it can be used for assessing each street of our study case. Next to the column listing the indicators, each indicator should be given a number from 1 to 5, depending on the reliable information received, whether the indicator shows positive and desired results (in best case indicator receives a number 5), or it shows less favourable results (in the worst case the indicator can receive number 1). Therefore, given the information gathered from empirical analysis, interviews, and pre/post-rehabilitation comparisons through images, the quality assessment of the street will comprise of specific indicators, accompanied by a detailed justification for the mark awarded to each indicator. This way, an effort is put to ensure systemized comprehensive results, keeping the same character of the assessment within the case of each street.

Regarding the survey and its execution, it was an information collection process process after which the results were used as a form of a feedback from the residents. The survey was formed, consisting mainly of questions regarding the satisfaction of the post-reconstruction conditions of the street, as well as questions asking if the residents were involved in decision making process during the development of the project for their street. The actual survey is attached to the Dissertation and can be found in the annex in the end of this document. The survey has been carried out in Portuguese language, there is a version of the survey in English language as well. Certain streets posed more challenges for collecting the answers, therefore the quantity of answers in some cases were fewer than in others. Overall, the information from the surveys has been presented through indicators, as well as comments within the chapters of each street case.

Tab. 4 – Quality assessment of the street with Indicators.

<i>Indicator</i>	<i>Evaluation (1 to 5, from least favourable to most)</i>					<i>Description</i>
1. Community engagement and satisfaction	1	2	3	4	5	
2. Preservation of historical identity	1	2	3	4	5	
3. Environmental sustainability	1	2	3	4	5	
4. Quality of public space	1	2	3	4	5	
5. Social and cultural impact	1	2	3	4	5	
6. Economic Sustainability	1	2	3	4	5	
7. Accessibility and Mobility	1	2	3	4	5	

3.3 PLAN FOR THE EVALUATION SYSTEM

After posing criteria for the program, introducing the characteristics of streets and defining the indicators with which the quality of the renewed streets can be assessed, comes integration of these components into our system with a goal to compose a structured thorough process that will produce reliable and useful results. The plan for carrying out the whole evaluation process is shown in the Fig. 10. It can be seen that, by defining the criteria and indicators, a first part of the methodology is complete. Afterwards should come the study case, consisting of closely defining the general aspect and further assessment of quality of the street. This will be shown in a form of a "Street Catalogue", section within the "Study Case" chapter. After finishing the study case with all the eight streets, their definition and quality assessment, next step in the work is returning to the previously posed set of criteria which should be applied onto the program *Rua Direita* respectively. Carrying out this part should show if the criteria is fulfilled.

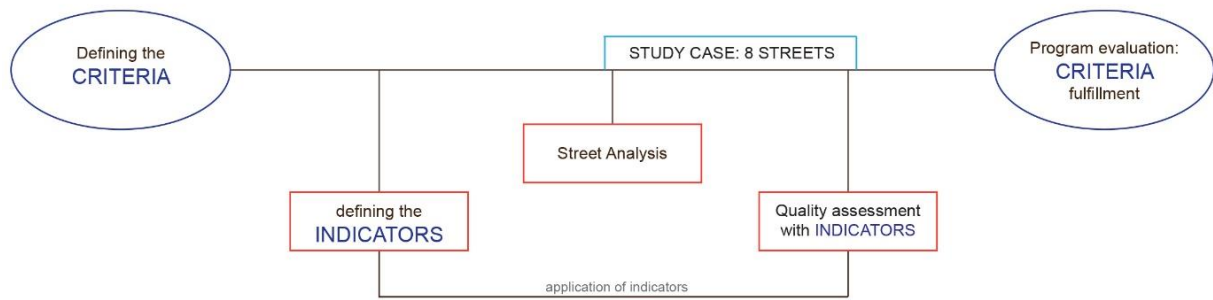


Fig. 10 – Step to step plan for implicating the evaluation.

The purpose of this section is to revisit the program and its initiatives in light of the study case conducted on the streets, with the aim of determining whether the primary criteria have been satisfied. Doing this, a complete picture of the outcomes will be accessible, addressing the benefits, weaknesses and possible improvements for the similar Municipal initiatives.

The streets that have been selected to be in the study case for later evaluation of the program are in different parishes around the city of Porto, varying in length, narrowness, steepness and other physical characteristics, and will be described in the study case chapter.

4

STUDY CASE

This chapter focuses on implementing our previously developed system for quality assessment of the streets, examining eight different cases. Each case consists of one project for rehabilitation of a public space which encompasses at least one street.

The spatial scale of this study case is specifically limited to the local, as already mentioned, focusing on the exact streets that have undergone rehabilitation by the Porto City Hall program *Rua Direita*. Within the case of each street, the scale used for the assessment can be divided into:

1. Inside (Micro): Street itself and its elements
2. Outside (Macro): Surroundings of the street that are affected by the rehabilitation in any way.

When doing the analysis of the street, both of these scales are taken into account and examined to better understand the street's own features, its relationship with its surroundings, and its connection to the rest of the city.

Limiting the study to eight specific streets was influenced by several reasons, one being that the street rehabilitation had to be concluded – the work had already been done. This alone narrows down the choice to a much smaller number of streets. The variety of chosen streets also ensured to provide context analysis of different neighbourhoods, giving the evaluator a chance to analyse a variety of terrains, surroundings and characteristics of each street. This can represent a beneficial circumstance for the evaluation process, regarding the variety of collected data, although it can also be challenging, having to consider the different nature of each surrounding and which changes that brings. Seeing which aspects are common for the streets in different neighbourhoods and which make the streets stand out from the others in this study is an important trait to add while doing the analysis and at the part of quality assessment. Meanwhile, gathering the traits that are shared among each case of our study can help to understand better the identity of the *Rua Direita* program, as well as enhance those characteristics to make it as recognizable. Bringing a unique identity to a certain initiative helps to have a more direct communication with the community and citizens. Therefore, both individual and common characteristics can bring beneficial outcomes in terms of adaptation to circumstances, appearance, comfort and identity maintenance.

4.1. STREET CATALOGUE

A street catalogue, being a main part of the study case, is a chapter where the case of each street will be presented to a reader. Here, the reader will get to know eight cases of already renewed streets, firstly through showing the location of the street in the wider context. Furthermore, description of the street followed with a table consisting of describing specific traits, though in the same order for each street. This way, an organized overview of each street is shown.

Having a detailed and clear description of the streets that have been rehabilitated within the *Rua Direita* program surely will help to understand their position, importance, function and overall traits in the city and parish. Afterwards, introducing the components of the rehabilitation work is attributed by a segment of the detailed plan drawing for rehabilitation, made by the contractor.



Fig. 11 - Porto city map with the 8 study cases of rehabilitated streets marked. Source: Google Earth (accessed on March 26th, 2024) edited by the author.

Introducing the reader to the base information of the street, the analysis proceeds by analysis of its position in the surrounding area on the map, including its dimensions, layout, and the dominant architectural typology present. Additionally, it takes into account the surrounding context, such as the nearby public institutions, public transportation options, and the overall urban fabric of the area. Furthermore, the description of the intervention typically includes details such as the materials used, the specific parts of the infrastructure that were replaced, the required investment and the associated timelines and completion dates. The next step contains the before and after pictures of the street (for having a clearer insight of the reconstruction work done). This will help with understanding the character of rehabilitation and all the elements that were affected by it. Lastly, it is important to include explanation how the assessment was carried out, including various methods like conversations with the residents, surveys, observing and documenting. Each street has provided different conditions for carrying out the assessment, mainly because each street had its own typology and specific surroundings. Whereas, for example, the Vila Nova Street, which consists of two parts divided by the roundabout, western and eastern, has a big difference in the typology in these two parts. Because of this, the eastern part of the street with more residential buildings was much easier for carrying out the survey than the western part, where the only residential lots are large, gated properties.

4.1.1. RUA DE VILA NOVA (WEST)/TRAVESSA DA COSTIBELA

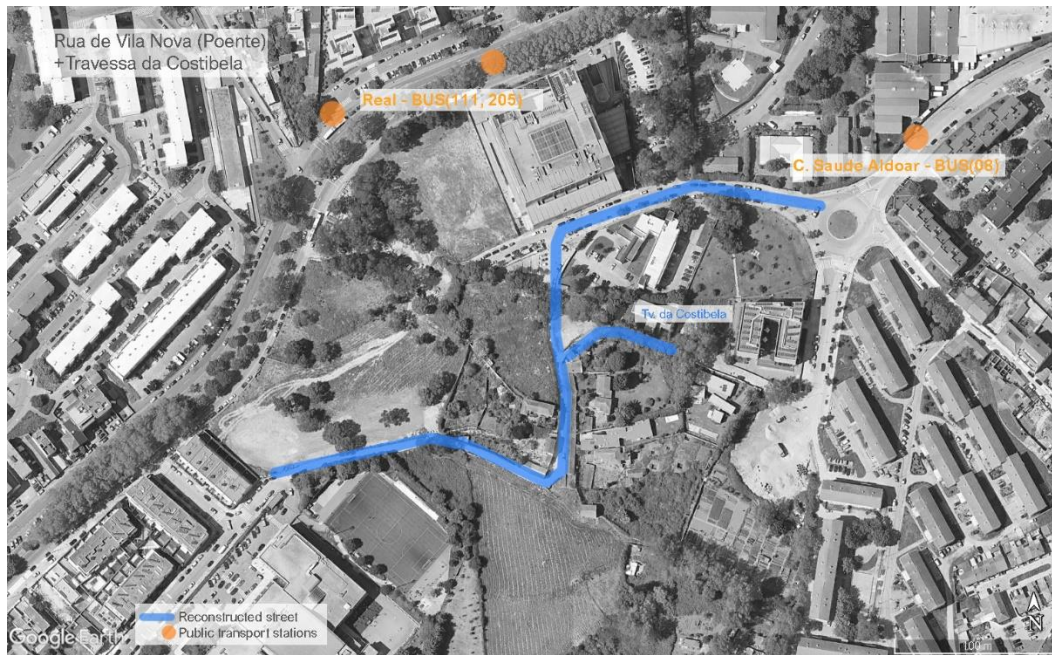


Fig. 12– Context map of the Vila Nova (West) Street. Source: Google Earth (accessed on April 30th, 2024), edited by the author.

On December 15th of 2020, Porto City Council, through GO Porto (Porto management and works department), launched the public tender for the contract “Rua Direita Requalification of Rua Vila Nova (west) and Travessa da Costibela”, with publication of the notice in the Republic Diary (DR - Diário da República). The submission of proposals for this tender was completed in January 2021. Also shown in the table 9, the execution of the rehabilitation work started in the beginning of 2022, whereas it was concluded seven months later.

The continuation of the Vila Nova Street towards the west, including the Travessa da Costibela side street, the rehabilitation took part at the same time as the eastern part. It is important to mention that the majority of the street typology are either private property lots, or properties in the process of construction of a residential complex. This street is situated in the green field area between two residential neighbourhoods. One part of this green field area is soon to become a residential complex “Vila Nova Parque”, which will give this street more residents, contributing to urbanization of the surrounding. Besides this complex, as it could be seen in PDM (Master plan of Porto), one part of this green field is planned for a public park. The construction of the park is expected in the near future, complementing the residential complex that is already being constructed. As one can see when visiting the street, currently it acts as a connector between two neighbourhoods. Because of this, and because of the proximity of the outer ring road of the city, this street, despite being very narrow, is being used by cars very frequently. This situation, and the current absence of the sidewalks does not provide a favourable environment for a pedestrian. Considering that the street awaits the development of its surroundings, implementation of sidewalks or any intervention in order to mitigate traffic flow would improve the safety and mobility for residents and pedestrians passing by. On the other hand, Costibela side street has a situation of already promoting soft mode transport and walking by having vehicles permitted, unless the vehicle is from the resident of the street. Being a very narrow street, this decision is likely to produce a calmer, safer and more sustainable environment.

Tab. 5 – Vila Nova (West) Street Basic Information.

City Area (Parish)	Aldoar
Approximate Length	470m
Number of Turns/Curves	4 curves (5 parts)
Slope	Starting from a roundabout, the street has a slight downhill slope. After the first turn to the left, the slope gets more or less even, horizontal.
Connectivity	The Vila Nova West side of the street is connecting the roundabout where the western part continues with Rua José Saraiva, all the way to Rua da Vilarinha. This street plays an important connecting part.
Investment	€479,525.41 + VAT
Deadline	300 days
Completion Date	October 2022

Street typology	The one building outstanding is the private hospital "Cuf". Other typologies along the street are private properties, residential houses and buildings. The majority of the surrounding is social housing.
Surroundings	Nearby is a big Park "Parque da Cidade". Also, more near and around this street are smaller green open public areas for local residents.
Nearby Public Institutions	(Same as Rua de Vila Nova (East))
Public Transport Connection	Bus Stations: 1. Real (111, 205); 2. C. Saúde Aldoar (208)

• INTERVENTION DESCRIPTION

Besides the visible rehabilitated elements, the street went through complete infrastructure renewal including, water network, draining systems, telecommunication and gas networks, illumination system and water supply. These two streets, looking just at the pavement, are rehabilitated in a more simplified way, where pavement is mostly cobblestone with metal shafts and grids and stone pavement in the middle of the road. Additional helpful information provided by the contractor are the analysis of the surrounding typology, public traffic and heritage. This information served as helpful aspects within the execution plan.

The figure 13 shows a segment of the detailed drawing of the street followed by the legend. The segment shows which materials were going to be implemented and in which manner. This is also useful in order to see whether the current condition of the rehabilitated street aligns with the drawing of the plan.

The table 6 provides us with the information that the whole process started in 2018 with contracting the project whereas the execution of the work was done in 2022 and took short time to be finished.

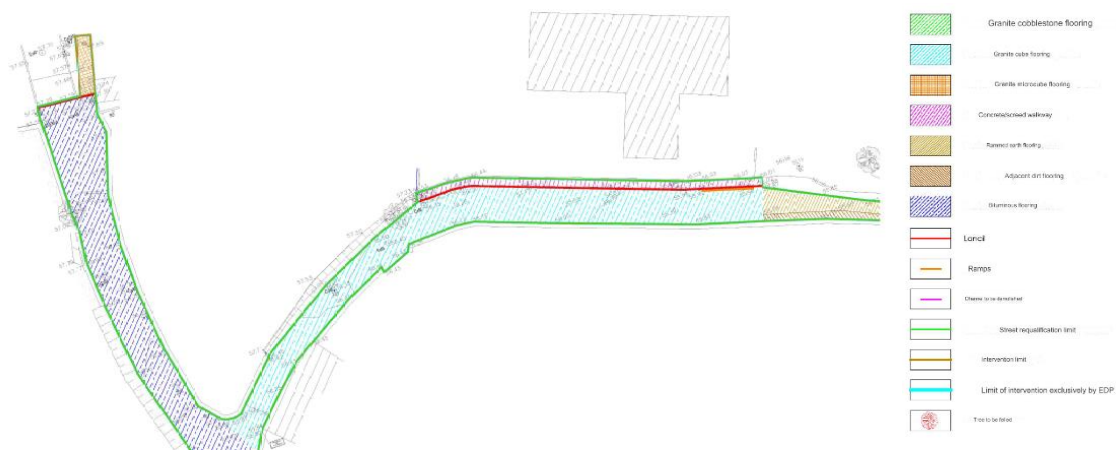


Fig. 13 – Segment drawing of the Vila Nova (West) and Travessa da Costibela structure plan with a legend. Source: CMP.

Tab. 6 - Timeline of the program implementation on the Vila Nova (west) and Costibela Streets. Source: CMP.

RUA DE VILA NOVA (POENTE)/TRAVESSA DA COSTIBELA				2018	2019	2020	2021	2022	2023
	Início	Prazo	Final						
Project contracting	01/08/2018	114	23/11/2018						
Project development	02/04/2019	605	27/11/2020						
Work contracting	04/12/2020	84	26/02/2021						
Work execution	14/07/2021	461	18/10/2022						

• COMPARISON THROUGH THE PICTURES: BEFORE AND AFTER THE REHABILITATION

The comparison of the pictures showing the state of the street before and after the rehabilitation work serves as a clear insight into the physical changes and replacement of the visible infrastructure. The choice of photos was made in a way to capture the same part of the street, putting the photos side to side so that the comparison can be done in the most accurate way. One can see that the choice of pavement is different from the previous in terms of material and implementation, which will contribute to easier adaptation of the road in the future, since the surroundings of this street are yet to be build. The chosen type of pavement is also considered as a more sustainable choice because it doesn't fully block water absorption to the ground, like the case with asphalt. The replacements of sewage systems, water supply network, telecommunication and electricity networks are noticeable as well.



Fig. 14.1 – Vila Nova (West) before/after comparison.



Fig. 14.2 – Vila Nova (West) before/after comparison.

Continuing onto the process of quality assessment of the Vila Nova (west) Street by using the previously made table of indicators is highlighting the qualitative aspects of the street. Giving the numbers from 1 to 5 for each indicator makes the assessment more legible. The neighbourhood of the street does not include many residents, since the surrounding lots are either vast properties with gated yards or private empty lots. Therefore, this presented a difficulty for reaching to people and discussing the rehabilitation of the street. Although, by having the chance to survey one resident, they stated that they weren't asked/informed about the planned rehabilitation before the start of the work. Though, during the rehabilitation process residents were able to see what was planned for their street on the signs. Moreover, on the website of Porto Municipality, citizens were able to find the information about the works in this street, as well as when the rehabilitation was finished.

Tab. 7 – Evaluation of Vila Nova (West) Street through indicators.

<i>Indicator</i>	<i>Evaluation (1 to 5, from least favourable to most)</i>					<i>Description</i>
1. Community engagement and satisfaction	1	2	3	4	5	The street habitants weren't informed about the rehabilitation nor asked for opinion before the start of rehabilitation. During and after the execution, citizens could inform themselves through street signs and media or CMP website.
2. Preservation of historical identity	1	2	3	4	5	Well incorporated with the environment, materials used are characteristic for the city identity
3. Environmental sustainability	1	2	3	4	5	The street will most probably have to go through additional reconstruction after the construction of the surrounding lots.
4. Quality of public space	1	2	3	4	5	There are no sidewalks along the street; there is a turn with a blind spot. Frequent car use. Not much adapted for pedestrian use.
5. Social and cultural impact	1	2	3	4	5	This street will have more impact in this field after construction of the big residential complex "Vila Nova".
6. Economic Sustainability	1	2	3	4	5	This street is in a development phase, which means it will gain its economic value in the near future, after finish of the construction of the residential complex.
7. Accessibility and Mobility	1	2	3	4	5	Very unsafe for pedestrians. The street is not adapted to users with challenged mobility.

4.1.2. RUA DE VILA NOVA (EAST)

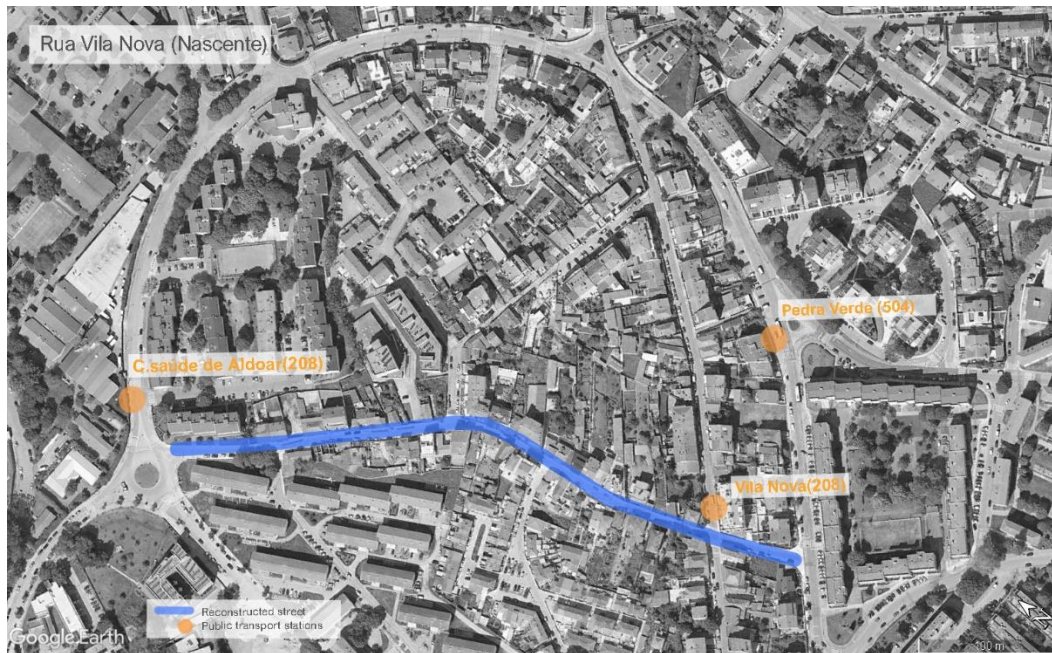


Fig.15 – Context Map of the Vila Nova (East) Street. Source: Google Earth (accessed on April 30th, 2024), edited by the author.

The eastern part of the Vila Nova Street has undergone a rehabilitation process in 2021 and was finished in February 2022, as the table 9 shows us. The area of redevelopment starts at the crossroad with Jornal de Notícias Street and ended at the roundabout. This street is in the neighbourhood called *Aldoar*, a parish in the north-western corner of the municipality area of Porto. In the Table 8 important fundamental description is listed to understand the physical traits of the streets as well as information about the surrounding context and public transport connections. Unlike the west of the Vila Nova Street, the typology of this part of the street consists of much more residential buildings and gives a much more social impression. There is a small café in the street as well, where residents come by. Collecting the answers was easier to carry out, since the circumstances were providing more chances to talk to the residents of this street. This street serves as an important connector in the neighbourhood, playing a vital role by connecting multiple crossroads. It features a roundabout and four intersections, finally culminating at a fifth one. To mitigate the frequency of vehicles while maintaining its connectivity function, the street has been converted into a one-way road.

Tab. 8 – Vila Nova (East) Street Basic Information.

City Area (Parish)	Aldoar
Approximate Length	470m
Number of Turns/Curves	2 curves (3 parts)
Slope	This street is long, starting with an uphill slope, first being a bit higher and then a bit less angled elevation.
Connectivity	The street starts at the crossroad with Rua do Jornal de Notícias, after 4 crossroads along the way (Rua de Martim Moniz; R. Alcaide de Faria; R. Martim de Freitas; R. de Pelagio as the last one) it finishes at the roundabout with R. Prof. Álvaro Rodrigues.
Investment	€682,767.28 + VAT

Completion date	February 2022
Street typology	This area is mostly a residential social housing typology, some residential multi- store buildings. Surroundings along the street are well preserved and the street looks well incorporated into it. Cars are parked along the way, on the places not indicated for parking, which shows that the number of parking lots is insufficient. The overall impression is that accessibility and safety is on a high level.
Surroundings	Residential: Social housing mixed with private residential houses, buildings and lots.
Nearby Public Institutions	- Private Hospital "Cuf" - "Aldoar" Health Center - "CLIP" Porto International School - Vocational and training center - Parque da Cidade - Social center "Martinho de Aldoar" - "Vilarinha" Theatre - Primary School "Fonte da Moura" - Kindergarten "Biquinha"
Public Transport Connection	Bus stations: 1. Vila Nova (208); 2. Pedra Verde (208,501,504); 3. Centro de Saúde de Aldoar (208)

• INTERVENTION DESCRIPTION

The contractor aimed to restructure the sidewalks and traffic road on this street, as well as laying new paving along with implementing small garden areas. In addition to this, the work also included replacing the water supply network for which *Águas e Energia do Porto* is responsible, creating recollection points for solid urban waste, installing a telecommunications pipe network and remodelling the existing public lighting network. Materials used for pavement include cobblestone, concrete and metal (for shafts and grids). New litter disposal elements were added, along with concrete benches and islands with vegetation. The impression is, safety wise, besides it being a lively street, the mobility and accessibility is improved along with the appearance of the street. A set of selective garbage disposal metal elements has also been implemented, ensuring their proximity to the residents.

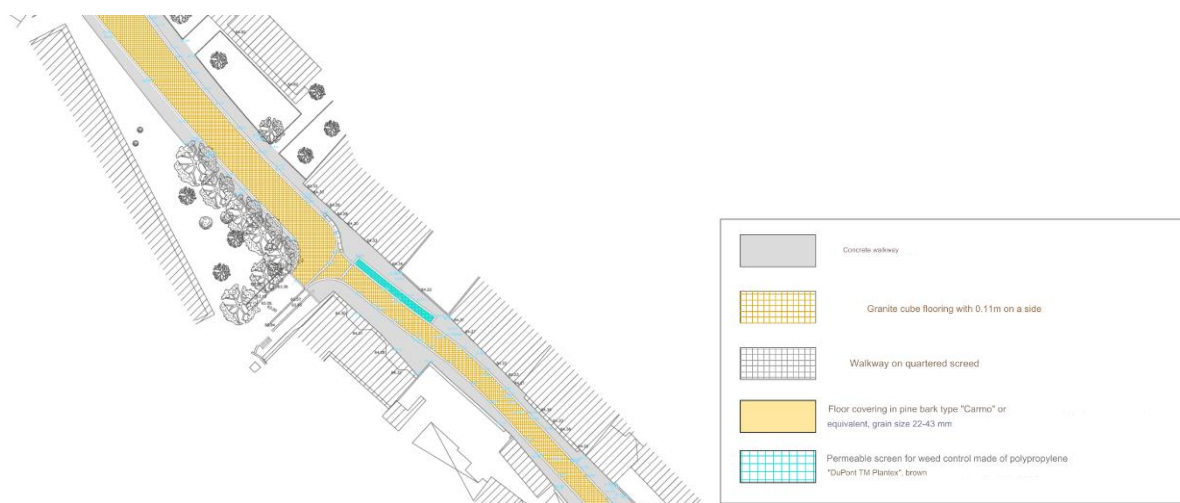


Fig. 16 – Segment drawing of the Vila Nova (East) structure plan with a legend. Source: CMP.

Tab. 9 - Timeline of the program implementation on the Vila Nova (east). Source: CMP.

RUA DE VILA NOVA (NASCENTE)				2018	2019	2020	2021	2022	2023
	Início	Prazo	Final						
Project contracting	01/08/2018	114	23/11/2018						
Project development	02/04/2019	301	28/01/2020						
Work contracting	30/12/2019	116	24/04/2020						
Work execution	31/08/2020	535	17/02/2022						

• COMPARISON THROUGH THE PICTURES: BEFORE AND AFTER THE REHABILITATION

By comparing the photos of the eastern part of Vila Nova Street, before and after the rehabilitation work done, a noticeable improvement is made in terms of overall appearance, pavement refurbishment, addition of islands with greenery and visible infrastructural renovations. The overall impression while visiting the street is a harmonized relationship between the new materials and the existing forms: walls, gates or buildings. A noticeable increase in sidewalk area is an also improvement that should be noted.



Fig. 17.1 - Vila Nova Street (East) before/after comparison.



Fig. 17.2 - Vila Nova Street (East) before/after comparison.

Taking pictures, writing down notes and talking to the residents of the street, information collected about the street, mainly put in order through indicators which is used as a main evaluation tool, an effort is made to present an evaluation of the street. Regarding the assessment through the table, indicators helped us to critically approach and list the problems of this street, even though many improvements were noticed. By carrying out the survey, this assessment was made sure to be objective and reliable. In this street, 3 people gave their opinion about the community engagement, improvements and lacking

factors regarding the refurbished store. The main problem, according to the residents, is the lack of parking spaces. This problem results with irregular parking and a large number of vehicles, blocking the sidewalks and affecting the legibility and mobility of the street.

Tab. 10 – Evaluation of Vila Nova (East) Street through indicators.

<i>Indicator</i>	<i>Evaluation (1 to 5, from least favourable to most)</i>					<i>Description</i>
1. Community engagement and satisfaction	1	2	3	4	5	Residents weren't informed/asked for the opinion before the start of rehabilitation. They were informed during and after the reconstruction through street signs and media.
2. Preservation of historical identity	1	2	3	4	5	Street is well incorporated with the existing surroundings, keeping elements with historical importance.
3. Environmental sustainability	1	2	3	4	5	Sustainable materials, presence of vegetation.
4. Quality of public space	1	2	3	4	5	Residents complain about presence of too many vehicles. Although the common opinion is that the quality of the street has improved.
5. Social and cultural impact	1	2	3	4	5	Street residents are not very satisfied with the communication with authorities
6. Economic Sustainability	1	2	3	4	5	Improved conditions are more likely to increase economic vitality in the area. This street, besides being residential is also an important transit in the area, especially for pedestrians.
7. Accessibility and Mobility	1	2	3	4	5	A problem with irregular parking. Sidewalk space is increased. The placement of the pavement clearly communicates with the use of the street.

Besides mentioning the problematic aspects, it is also important to mention that the residents weren't satisfied with the way of communication with the authorities about the rehabilitation and the program. Whereas during the execution and after conclusion, citizens were informed about the rehabilitation work done in the eastern part of Vila Nova Street, by sign boards, internet and media. The fact that a type of communication was established, however involving the community in the process of decision making and planning can result in better satisfaction and outcomes.

Improved aspects are mentioned to be mainly circulation through the street, better condition in terms of material and appearance, presence of vegetation and green areas, more space provided for children top play, improved overall quality of day-to-day life.

4.1.3. RUA DA GRANJA DE LORDELO

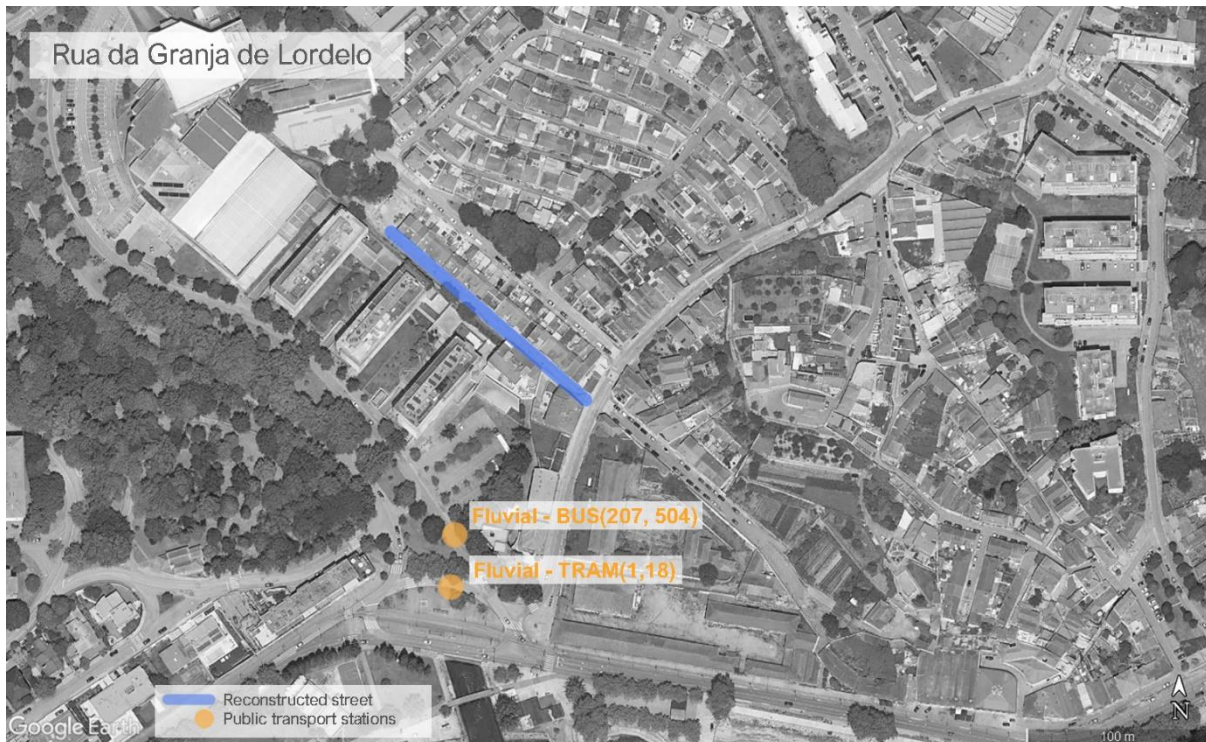


Fig. 18 – Context map of the Granja de Lordelo Street. Source: Google Earth (accessed on April 30th, 2024), edited by the author.

The municipal company GO Porto oversaw managing the work. The work represents an investment of around 519,000 euros and had an execution time of 270 days. Rehabilitation of the street was concluded in the end of 2022. This street has specific traits, one of them being that it is a *cul-de-sac* in terms of vehicles. Therefore, only cars that pass this street are the cars of residents. In the end of the street is a large parking space providing an organized space. Even though these parking spaces exist, an interesting fact that can be noticed is the preference of the residents to park their vehicles as close to the entrance as possible, leaving it on the sidewalk.

Tab. 11 – Granja de Lordelo Street Basic Information.

City Area (Parish)	Lordelo do Ouro
Approximate Length	150m
Number of Turns/Curves	No turns, street is straight all the way.
Slope	The street has a decline towards R. das Condominhas, where, by reaching the crossroad the level difference of the sidewalk and the street is around 3 meters high. Denivelation appears on the sides of the street in a form of a wide concrete ramp, meant for pedestrians, mostly residents of the street.
Connectivity	The street is a narrow, one-way cul-de-sac with a parking lot in the end. The continuation of the street takes form of a staircase, leading towards the upper levelled Primary school and Figueira da Foz street. This means it is mainly used by its habitants or by the pedestrians passing through.
Investment	€519,400.00 + VAT
Deadline	270 days
Completion Date	November 2022

Street typology	<i>Left side:</i> In the beginning of the street there are residential buildings, continuing with a wall separating the street from the field that is on a lower level. <i>Right side:</i> Along this side is a continuous residential housing. Street is divided from residential housing by denivelation, sidewalk, benches and green space. By the end of the street, the level of the houses becomes the same as the street level. The beginning of the street, at the crossroad, the upper part (sidewalk) is accessible by the stairs.
Nearby Public Institutions	- Primary School and kindergarten "Condominhas" - Sports centre, swimming pool - Supermarket "Supercor Fluvial"
Public Transport Connection	Bus station: 1. Fluvial (500) (207,504) Tram station: 1. Fluvial (1,18)

• INTERVENTION DESCRIPTION

The specific aspect of this street is the two levels of it. The access for cars is on a different level than the pedestrian one, which starts with a staircase. By reaching the end of the street, these two levels even out to the same altitude. The rehabilitation consisted of complete renovation of the pavement, incorporating vegetation and parking spaces. The rehabilitation work in this case included paving the street, landscaping and opening up pedestrian access to Largo da Póvoa de Varzim, as well as water supply, sanitation and rainwater infrastructures, telecommunications and public lighting. Besides these infrastructural refurbishments, vegetation elements were implemented along the pedestrian platform.

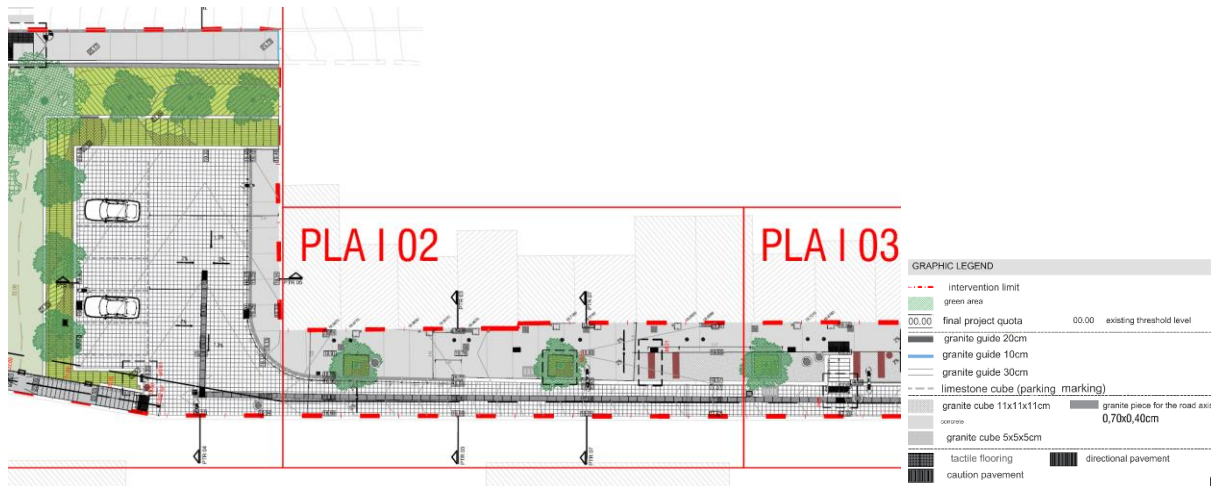


Fig. 19 – Segment drawing of the Granja de Lordelo structure plan with a legend. Source: CMP.

Tab. 12 - Timeline of the program implementation on the Granja de Lordelo Street. Source: CMP.

RUA DA GRANJA DE LORDELO				2018	2019	2020	2021	2022	2023
	Início	Prazo	Final						
Project contracting	01/08/2018	163	11/01/2019						
Project development	29/04/2019	823	30/07/2021						
Work contracting	06/08/2021	84	29/10/2021						
Work execution	10/01/2022	329	05/12/2022						

• COMPARISON THROUGH THE PICTURES: BEFORE AND AFTER THE REHABILITATION

In this case, a drastic change in the overall appearance of the street is made, as seen on the figures 20.1 and 20.2. This process of requalification posed specific challenges and requests, since the topography of the street divides it into two levels, one being for vehicle use and the other, higher one, for pedestrians. Interesting thing to point out is that the area meant for pedestrians is larger than the road for vehicles.



Fig. 20.1 – Granja de Lordelo Street before/after comparison.



Fig. 20.2 – Granja de Lordelo Street before/after comparison.

A specific thing that brings attention from the survey is complaints from two residents about the narrowness of the street and how this challenges the accessibility of the street. This example shows well how in certain cases it is hard for a community to indulge in changes of habits, in order to aim towards a more sustainable and healthy choices. The motivators of the Municipality are exactly promoting healthy changes in an everyday life of the citizens, although these changes can cause discomfort among the population.

The feedback from the survey, having four people give answers and opinions, gave quite positive results. As an aspect that stands out from the rest of the cases, residents of the Granja de Lordelo Street were involved and informed about the planning process of the street before the start of the execution. Whether this act was done by the contractor or by the Municipality, it is an important component within the project development. Besides the community involvement, residents pointed out how now there is more space for children to play outside and residents to use the street. Improvement of the safety, conditions and implementation of vegetation are also aspects noticed by the street residents.

Tab. 13 – Evaluation of Granja de Lordelo Street through indicators.

<i>Indicator</i>	<i>Evaluation (1 to 5, from least favourable to most)</i>					<i>Description</i>
1. Community engagement and satisfaction	1	2	3	4	5	Residents of the street were consulted and informed before, during and after the execution of rehabilitation, in different ways (questioning, street signs, media, internet)
2. Preservation of historical identity	1	2	3	4	5	The materials are well incorporated with the existing surroundings, important historic elements are preserved.
3. Environmental sustainability	1	2	3	4	5	Sustainable materials (stone and metal), vegetation presence, decreased use of vehicles.
4. Quality of public space	1	2	3	4	5	The quality of space is visibly improved visually and functionally.
5. Social and cultural impact	1	2	3	4	5	People are using the space, staying, walking, children playing. Residents are feeling secure and comfortable.

6. Economic Sustainability	1	2	3	☒ 4	5	This is a residential street, a cul-de-sac. It doesn't have an important economic role. It connects residents with the surroundings; therefore, it is not meant to develop economic sustainability.
7. Accessibility and Mobility	1	2	3	☒ 4	5	Street is highly adapted for pedestrians, favourable for all ages. Therefore, it's narrowness creates a challenge to access it by car.

One of the more significant improved conditions is the connection with the school, which is topographically situated at a higher level than the street, and this connection is established by stairs. This enables passers-by and street residents to shorten their journey to the school and the surrounding streets.

Suggestions for further improvement of the street involve increasing the maintenance of the vegetation in the street, as well as having a more accessible entrance for the vehicles. Involving community and enabling the population to offer criticism stands as a useful tool for creating a caring environment, adapted to its residents.

4.1.4. RUA DO MIRANTE



Fig. 21 – Context map of the Mirante Street. Source: Google Earth (accessed on April 30th, 2024), edited by the author.

The rehabilitation project was designed by architect Nuno Abrantes, the contract included paving the carriageway and sidewalks, renovating the water supply, sanitation, rainwater and telecommunications networks, as well as refurbishing the existing public lighting network. Assured by GO Porto, the work represented a municipal investment of around 380,000 euros. The execution was carried out in the end of 2022. and first part of 2023, lasting 9 months. The location and topography of this street plays an important role defining its function. Being a very steep and narrow street that connects a frequent Cedofeita Street (a pedestrian zone) with the upper Coronel Pacheco Square, it is mostly used by pedestrians. However, now that the pavement has been renewed, the accessibility has improved for the cars, therefore vehicles can be found irregularly parked in this street.

Tab. 14 – Mirante Street Basic Information.

City Area (Parish)	Cedofeita
Approximate Length	162m
Number of Turns/Curves	2 turns (3 parts)
Slope	The street has a high slope, descending from Praça do Coronel Pacheco towards the Cedofeita street.
Connectivity	This street forms a connection between economically very important Cedofeita street and the upper Coronel Pacheco square, continuing towards Mártires da Liberdade Street. It is a part of a connection to Republica square.
Investment	€378,223.01 + VAT
Deadline	180 days

RUA DO MIRANTE				2018	2019	2020	2021	2022	2023
	Início	Prazo	Final						
Project contracting	23/11/2018	112	15/03/2019						
Project development	02/04/2019	958	15/11/2021						
Work contracting	22/02/2022	90	23/05/2022						
Work execution	04/07/2022	276	06/04/2023						

- **COMPARISON THROUGH THE PICTURES: BEFORE AND AFTER THE REHABILITATION**

The biggest difference that one is able to notice is the change in the pavement of the street. This readaptation of the street is ought to facilitate mobility of the users, however some concerns regarding sustainability are occurring. Nevertheless, this change in paving developed a new character of the street. In terms of water drainage, it is managed in a different way, by implementing rainwater collecting shafts along the middle line of the street. The edges of the street lead the water through a slight slope towards the central line, lastly ending in the collecting shaft.



Fig. 23.1 – Mirante Street before/after comparison.



Fig. 23.2 – Mirante Street before/after comparison.

Even though the different choice of pavement for the street gave a new character to the street, the concrete that replaced the cobblestone now provides less permeability of the ground. Being a very steep street, during the rainy days this can cause bigger amounts of water flowing into the Cedofeita Street.

Since the majority of the building in the street are touristic units, where a very little number of people actually live in the Mirante street, the possibility to gather the answers from the survey was quite low. However, one indicator that verifies the quality of the renewed street is qualifying to the finals of the National Architecture Awards "Forma 2023" within the category of "Public Space".

Tab. 16 – Evaluation of Mirante Street through indicators.

<i>Indicator</i>	<i>Evaluation (1 to 5, from least favourable to most)</i>					<i>Description</i>
1. Community engagement and satisfaction	1	2	3	4	5	The citizens were informed about the program during and after the execution of the work through sign tables, internet and media. Whether the residents were informed/consulted before the rehabilitation started, there was no data collected to show.
2. Preservation of historical identity	1	2	3	4	5	Well incorporated with the surrounding buildings. The new character of the street compliments the neighbourhood
3. Environmental sustainability	1	2	3	4	5	No vegetation or any natural elements. The materials used are sustainable and long-lasting.
4. Quality of public space	1	2	3	4	5	The street is adapted to the topography. It faces a problem with irregular parking.
5. Social and cultural impact	1	2	3	4	5	This street is an important passage; therefore, the reconstruction had an impact on making it a safer and more comfortable for use.
6. Economic Sustainability	1	2	3	4	5	This street has multiple touristic units. It connects an economically vital Cedofeita street to Coronel Pacheco square towards República Square.
7. Accessibility and Mobility	1	2	3	4	5	Despite a steep terrain, the Mirante street increased the accessibility because of the materials used for the pavement. It is adapted for pedestrians. Although the street is facing a problem with irregular parking.

As mentioned, in the case of Mirante street, a major improvement is considered to be the accessibility, mobility and overall appearance of the street, where it successfully incorporated with the surroundings. Comments regarding the downsides are lack of vegetation and loss of the ground permeability due to the change in the paving. Therefore, we can conclude that the main motifs of the contractor while developing a plan was improvements in functionality, appearance and infrastructure conditions.

4.1.5. RUA DE SILVA PORTO

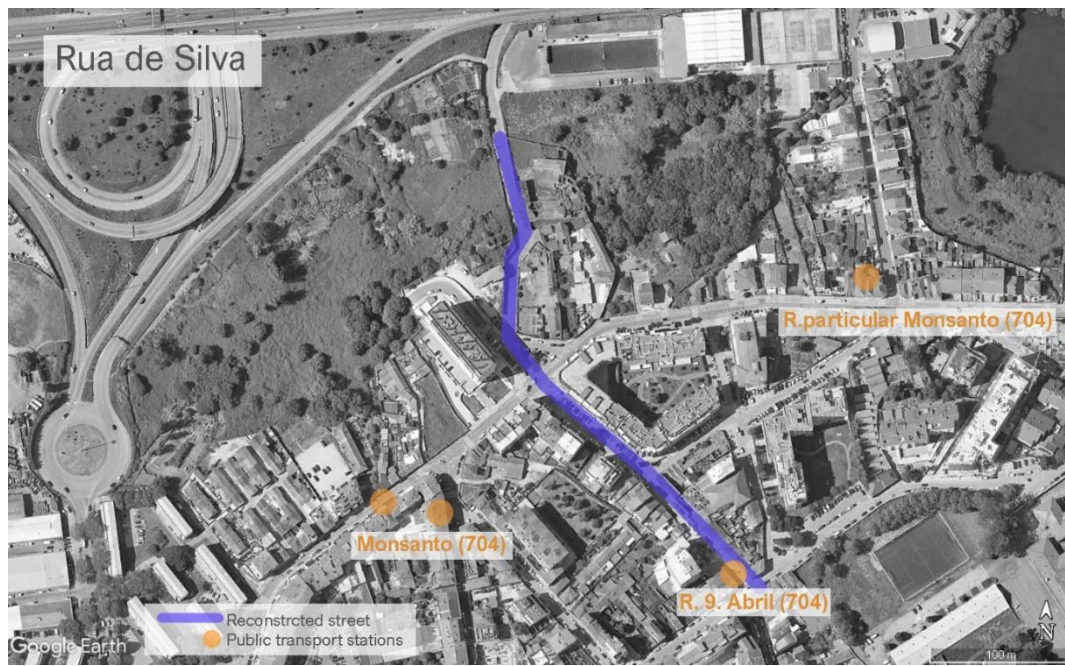


Fig. 24 – Context map of the Silva Porto Street. Source: Google Earth (accessed on April 30th, 2024), edited by the author.

The aim of the rehabilitation was to upgrade Rua de Silva Porto (partially), by paving the road and sidewalks, improving pedestrian accessibility, implementing vegetation and leisure elements. In addition to this, water supply, sanitation and rainwater infrastructures were installed, as well as telecommunications, public lighting and waste collection, making it a more sustainable and resilient street.

Tab. 17 – Silva Porto Street Basic Information..

City Area (Parish)	Paranhos
Approximate Length	200m
Number of Turns/Curves	3 turns (4 parts) This street goes through 2 crossroads (side streets), one of them being Travessa da Silva, and the second one Rua de Monsanto.
Slope	Being a long street, it has a changing slope following the topography.
Connectivity	The Silva Street is connecting Rua de Nove de Abril with the part of the city that goes north from VCI highway.
Investment	€909,895.70 + VAT

Street typology	The typology of the land around the street is mostly residential buildings (mostly) with commercial components on the ground floor and family houses. Besides the street, public spaces along the Silva Street went under reconstruction, including a square at the crossroad with Monsanto Street. The renewal included surrounding public spaces, not just the street itself.
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Surroundings	Nearby there is an artificial lake Lago de Salgueiros and a park "Jardim Arca d'Água". VCI is nearby, the Silva Street goes underneath this highway at one point the Majority of the area is residential typology with restaurants, cafes and supermarkets.
Nearby Public Institutions	- Sports centre "Nun'Álvares" - Soccer Association and Club "Arca d'Água" - Social Centre - Supermarket "Pingo Doce"
Public Transport Connection	Bus stations:1. Monsanto (704); 2. R. 9. Abril (704); 3. R. Particular Monsanto (704)

• INTERVENTION DESCRIPTION

The reconstruction of the Silva Porto Street was done in four phases due to its length. The program included complete rehabilitation of pavement, water network, draining systems, telecommunication and gas networks, illumination system and water supply. Materials used for the final surface differ throughout the street: asphalt, concrete, cobblestone, metal. The figure 25 shows us a segment of the detailed plan showing how the square at the crossroad with Monsanto Street was imagined to look like. Comparing the current state with the drawing, it shows that the execution was done according to the plan.



Fig. 25 – Segment drawing of the Silva Porto structure plan with a legend. Source: CMP.

Tab. 18 - Timeline of the program implementation on the Silva Porto Street. Source: CMP.

RUA DE SILVA PORTO				2018	2019	2020	2021	2022	2023
	Início	Prazo	Final						
Project contracting	23/11/2018	112	15/03/2019						
Project development	26/06/2019	540	17/12/2020						
Work contracting	08/01/2021	147	04/06/2021						
Work execution	23/11/2021	671	25/09/2023						

- **COMPARISON THROUGH THE PICTURES: BEFORE AND AFTER THE REHABILITATION**

The interesting trait that makes the Silva Porto Street stand out from the rest of the cases is its wideness. At first, coming from the part that underpasses the VCI road, the street is a wide, two-way road with sidewalks. By comparing the pictures, it can be noticed that the condition of the sidewalks was very poor and neglected. Adapting the street to the users and the needs is an important achievement. The kept cobblestone pavement will allow the better absorption of the rainwater. Defining the use of the space by using different materials is a creative and functional solution for communicating and marking the space. In this case, cobblestone part unambiguously indicates the road for vehicles, whereas the concrete path of the street indicates the sidewalks, squares and pedestrian-friendly spaces.



Fig. 26.1 – Silva Porto Street before/after comparison.



Fig. 26.2 – Silva Porto Street before/after comparison.

The rehabilitation of the Silva Porto Street, being a quite large project, involved refurbishment of many different elements of the urban space. Within this case, sidewalks, road, building entrances and a square present main elements that were rehabilitated. Being a long street, according to the detailed plan, it has been divided into four parts.

Tab. 19 – Evaluation of Silva Porto Street through indicators.

<i>Indicator</i>	<i>Evaluation (1 to 5, from least favourable to most)</i>					<i>Description</i>
1. Community engagement and satisfaction	1	2	3	4	5	The community was involved only after the beginning of the execution, through sign tables, internet and media. Direct involvement of the community was not undergone.
2. Preservation of historical identity	1	2	3	4	5	Preserved historical elements, well incorporated with the existing surrounding.
3. Environmental sustainability	1	2	3	4	5	Sustainable materials, long lasting. There could be more green areas.
4. Quality of public space	1	2	3	4	5	The street is well marked, has enough litter disposal elements, resting areas and vegetation.
5. Social and cultural impact	1	2	3	4	5	Being a large street, the improvements in the social and cultural aspects were impactful, according to the residents.
6. Economic Sustainability	1	2	3	4	5	Street is important economic factor because of its location and connecting role.
7. Accessibility and Mobility	1	2	3	4	5	It is adapted for users with challenged mobility. After rehabilitation the street is providing much easier mobility.

By being a long and wide residential street, there is without a doubt many residents living in Silva Porto. Therefore, including the residents in the planning process shouldn't be excluded. Besides improving the public participation in the project development, other aspects of the street are quite satisfactory, according to the residents, as well as by observing the users of the street. As an important traffic connector this street posed a challenge for providing a public space that supports soft modes of traffic and pedestrians, while still maintaining the flow of the traffic.

4.1.6. RUA DO ENCONTRO

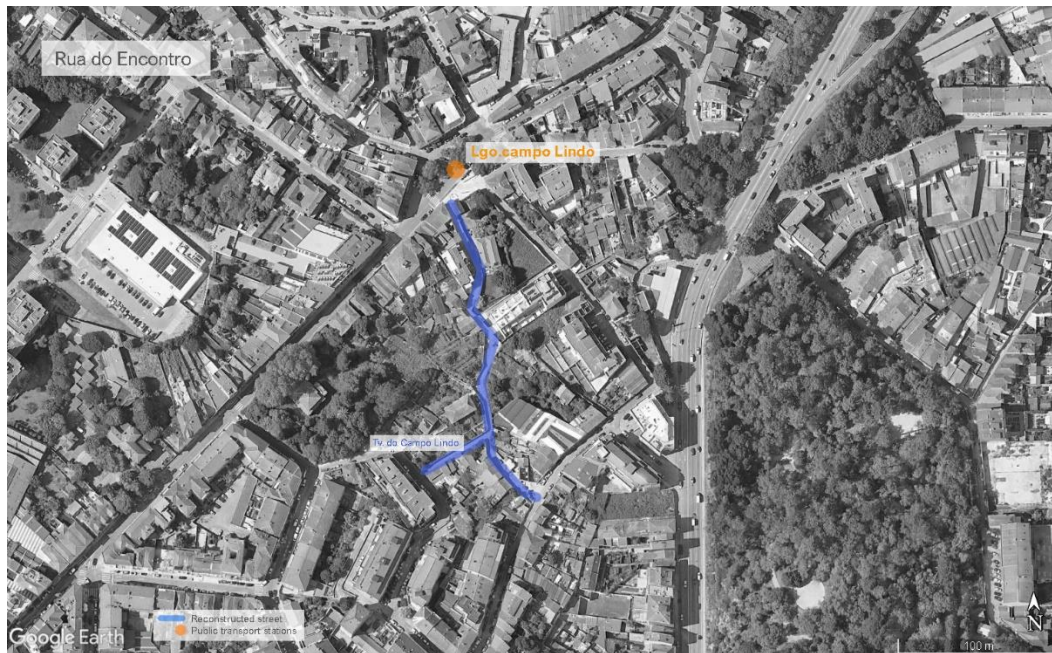


Fig. 27 – Context map of the Encontro Street. Source: Google Earth (accessed on April 30th, 2024), edited by the author.

The municipal company GO Porto has scheduled to start the contract to improve Rua do Encontro and others, as part of the *Rua Direita* program, on January 4th, 2022.

The contractor had an aim to upgrade Rua do Encontro, Travessa do Campo Lindo (partial) and a section of Largo do Campo Lindo, by paving the streets, placing vertical and horizontal road signs and improving pedestrian accessibility by adopting sections of shared lane. In addition to these works, water supply, sanitation and rainwater infrastructures are built, under the responsibility of *Águas e Energia do Porto*, as well as telecommunications and public lighting. The work represents a municipal investment of around 389,000 euros and had an execution time of 270 days.

As part of this intervention, some traffic restrictions have been put in place, namely a traffic ban on Rua do Encontro and Travessa do Campo Lindo. As usual, pedestrian accessibility, loading and unloading operations and access to garages is ensured, as are all emergency situations.

Tab. 20 – Encontro Street Basic Information.

City Area (Parish)	Paranhos
Approximate Length	205m
Number of Turns/Curves	6 turns (7 parts)
Slope	Street goes uphill starting from R. do Campo Lindo towards Tv. do Covelo, in constant steepness.
Connectivity	This street is connecting Rua do Campo Lindo and Travessa do Covelo. It has one crossroad along the way (with Travessa do Covelo) and a staircase connecting it to Rua do Dr. Pedro Dias. The street is very narrow most of its length, allowing only a one-way pass. It presents one of the connectors between Rua de Faria Guimaraes (the eastern part) and Rua do Campo Lindo (with western part of Paranhos)

Investment	€389,300.00 + VAT
Completion Date	October 2022

Street typology	The beginning of the street starting from R. do Campo Lindo has a form of a small square in front of the chapel "Nossa Senhora da Saúde". This part begins with old residential houses, private properties; continuing uphill there are more recent residential buildings, more private properties, some of which have houses in ruins. Going forward along the street there are a few resting point pockets. The last part of the street with an end connecting to Tv. do Covelo, most of the surrounding buildings are residential family houses with backyards.
Surroundings	The street is on the border of the neighbourhood, situated very near the high traffic frequency Faria Guimaraes street that ends going into the VCI nearby. The "Quinta do Covelo" park is located nearby as well. The whole area is mostly residential.
Nearby Public Institutions	- Church "Capela de Nossa Senhora da Saúde" - Largo Campo Lindo (square – meeting point) - "Quinta do Covelo" park
Public Transport Connection	Bus station: Largo do Campo Lindo (803)

• INTERVENTION DESCRIPTION

This one-way narrow street went under full infrastructure rehabilitation including pavement, water network, draining systems, telecommunication and gas networks, illumination system and water supply. There are no indicated sidewalks because the street is very narrow and adapted for pedestrians and residents. There are significant expansions in forms of "pockets" with benches as resting points. Concrete and cobblestone are the materials used for pavements.



Fig. 28 – Segment drawing of the Encontro structure plan with a legend. Source: CMP

Table 21 - Timeline of the program implementation on the Encontro Street. Source: CMP.

RUA DO ENCONTRO				2018	2019	2020	2021	2022	2023
	Início	Prazo	Final						
Project contracting	23/11/2018	112	15/03/2019						
Project development	26/06/2019	540	17/12/2020						
Work contracting	30/12/2020	261	17/09/2021						
Work execution	04/01/2022	272	03/10/2022						

- **COMPARISON THROUGH THE PICTURES: BEFORE AND AFTER THE REHABILITATION**

The side-by-side pictures show the fundamental change in the material used in terms of pavement, as well as the improvement of the accessibility of the street. After the rehabilitation, the sidewalks have been put to the same level as the road, providing more “openness” to the street. Furthermore, the street is adequately incorporated in the surroundings, contributing with the effects achieved with the pavement method. Along the street the wideness varies, this additional space is used as sidewalk “pockets” including concrete seating elements and bins. Enlargements at both ends of the Encontro Street are having a form of a small square, where pedestrians can use them as resting points.



Fig. 30.1 – Encontro Street before/after comparison.



Fig. 30.2 – Encontro Street before/after comparison.

Tab. 22 – Evaluation of Encontro Street through indicators.

<i>Indicator</i>	<i>Evaluation (1 to 5, from least favourable to most)</i>					<i>Description</i>
1. Community engagement and satisfaction	1	2	3	4	5	According to the residents, the community was not included in the planning process. The information about the program and the plans for rehabilitation was presented when the execution work started, keeping the citizens informed through a sign table, internet and media platforms.
2. Preservation of historical identity	1	2	3	4	5	Well incorporated with the existing elements. Some old elements of the street are preserved.
3. Environmental sustainability	1	2	3	4	5	Sustainable and long-lasting materials. Not a lot of vegetation.
4. Quality of public space	1	2	3	4	5	The street enhances slow traffic. It has resting points and multiple litter disposal elements.
5. Social and cultural impact	1	2	3	4	5	It can be noticed that people passing by and residents feel safe. The street itself is calm.
6. Economic Sustainability	1	2	3	4	5	Street has a connecting role in the economic aspect., although mostly for pedestrians, due to partially restricted access for vehicles.
7. Accessibility and Mobility	1	2	3	4	5	The street is accessible for users with challenged mobility, it is well marked. Accessibility for vehicles is limited for the residents only, which some residents find good, and some don't understand the reason behind this.

In the case of Encontro Street, some specific complaints were expressed by the residents. In fact, considering that the street is very narrow, the presence of wild vegetation on the sides and lack of their maintenance (clearing the road by removing the unregulated weeds) was one of the main complaints among the surveyed residents. Second problem that the residents expressed is the lack of garbage disposal elements. Even though there are bins implemented in the street, not enough of them was placed in order to cover the street sufficiently in these terms.

The street in question is equipped with adequate markings to facilitate easy accessibility for individuals with limited mobility. Vehicle access for local residents is restricted, which has elicited mixed reactions, with some appreciating the measure while others are at a loss to comprehend the reason behind it.

4.1.7. RUA DA VIA-SACRA

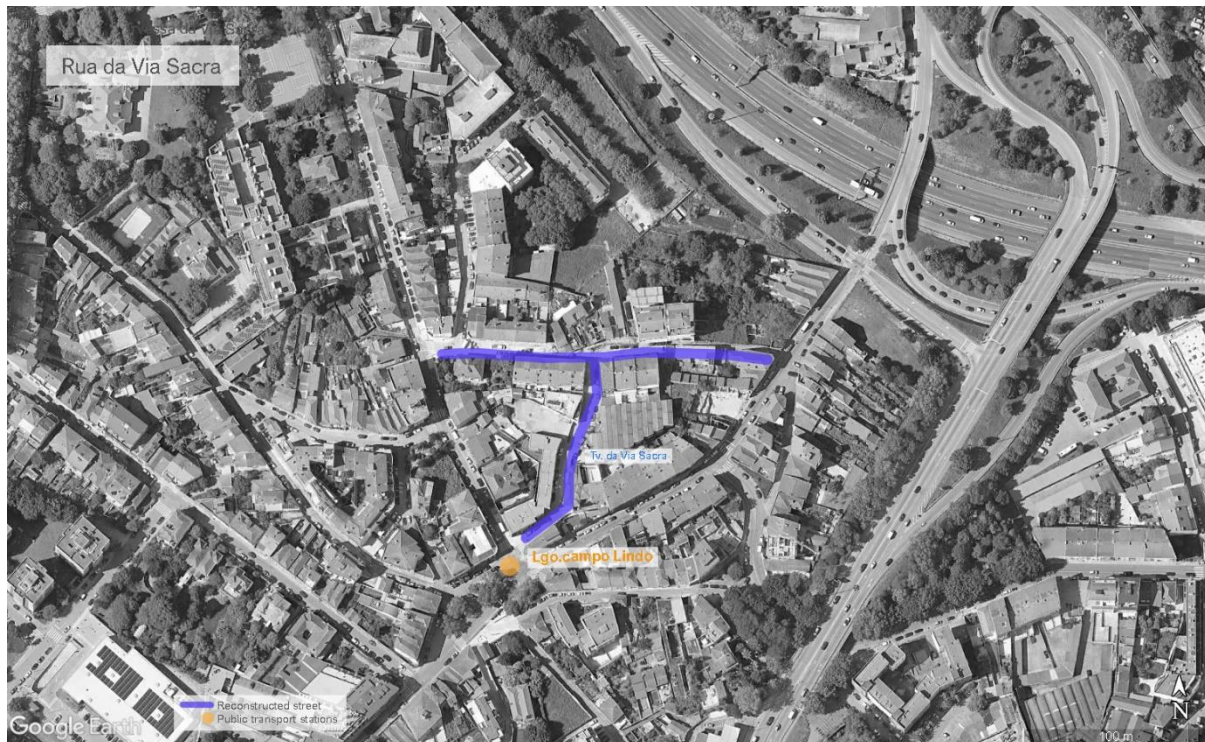


Fig. 30 – Context map of Via-Sacra Street. Source: Google Earth (accessed on April 30th, 2024), edited by the author.

Situated in the Paranhos parish, near the VCI road, Via-Sacra Street is a quiet residential street, well isolated from the frequent traffic flow nearby. Being used mostly by the residents and workers, this street has a connection role of minor importance in terms of vehicles, whereas in one point it ends as a *cul-de-sac*, whereas the pedestrians have access to the lower level of the street through stairs. Moreover, more pedestrians can be seen in the street, whether being passers-by or residents, especially after the rehabilitation, where the street has noticeably adapted to soft mode transportation and walking.

As the table 24 shows, the reconstruction of the street began in the end of 2021, and was concluded in April of 2023. Compared to other durations of the rehabilitation work, execution in this case took significantly more time.

Tab. 23 – Via-Sacra Street Basic Information.

City Area (Parish)	Paranhos
Approximate Length	187m
Number of Turns/Curves	2 (3 parts)
Slope	Street has a slight slope. At one part, the street ends as a <i>cul-de-sac</i> , making the connection with the lower part through the stairs (making it accessible only for pedestrians)
Connectivity	There are two crossroads along the street: 1. With Travessa de Ferreira; 2. With Travessa da Via Sacra. The Via-Sacra Street is narrow, with widenings along the way, covered in concrete with following concrete elements. The street is located on the "edge" of the city part defined by the VCI highway.

Investment	619.995,30€ + IVA
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Street typology	The typology of the buildings along the street is residential, mostly single-family houses. There are some multi-level residential buildings. In Tv. da Via-Sacra there is one auto mechanic shop, the only building that is not residential.
Surroundings	The street is very near VCI, though not very frequent with cars, due to its narrowness and difficult access, as is a one-way <i>cul-de-sac</i> . Some houses along the street are neglected and abandoned.
Nearby Public Institutions	- Supermarket "Lidl" - Educational Institution "UFP"
Public Transport Connection	Bus Station: Largo Campo Lindo (803)

• INTERVENTION DESCRIPTION

The rehabilitation of Rua da Via-Sacra and Travessa da Via-Sacra improved the street by paving the road and sidewalks, laying small garden areas and improving pedestrian accessibility. In addition, the existing fountain was preserved, also water supply, sanitation and rainwater infrastructures were installed, as well as telecommunications, public lighting and elements for garbage disposal. At some points of the streets, leisure elements in form of concrete benches were installed along with vegetation islands and plants.



Fig. 31 – Segment drawing of the Via-Sacra structure plan with a legend. Source: CMP.

Tab. 24 - Timeline of the program implementation on the Via-Sacra Street. Source: CMP.

RUA DA VIA-SACRA				2018	2019	2020	2021	2022	2023
	Início	Prazo	Final						
Project contracting	23/11/2018	112	15/03/2019						
Project development	26/06/2019	608	23/02/2021						
Work contracting	26/02/2021	132	08/07/2021						
Work execution	11/10/2021	540	04/04/2023						

- **COMPARISON THROUGH THE PICTURES: BEFORE AND AFTER THE REHABILITATION**

In terms of accessibility and mobility, condition has drastically improved in a way to make the street more functional and welcoming for the residents and pedestrians. Marking the sidewalk with a change in the material use is a legible, more accessible way to manage the functions of a narrow street like Via-Sacra. The multi-levelness of the street is managed in a functional way for pedestrians, although not providing solutions for the users with challenged mobility, leaving the vertical communications with a staircase only. Improvements in terms of sustainability include managements of wastewater, including permeable pavements in the street (although on a much smaller area than it was before the rehabilitation) and implementation of natural elements.



Fig. 32.1 – Via-Sacra Street before/after comparison.



Fig. 32.2 – Via-Sacra Street before/after comparison.

Tab. 25 – Evaluation of Via-Sacra Street through indicators.

<i>Indicator</i>	<i>Evaluation (1 to 5, from least favourable to most)</i>					<i>Description</i>
1. Community engagement and satisfaction	1	2	3	4	5	The residents were not consulted about the plan for the rehabilitation of the street. During the refurbishment, as well as after, the community was informed by street signs and media (television and internet platforms).
2. Preservation of historical identity	1	2	3	4	5	Certain preserved historic elements can be noticed. The street is well incorporated with the existing surrounding buildings.
3. Environmental sustainability	1	2	3	4	5	Sustainable materials are used. Street is designed to promote slow traffic and pedestrian use.
4. Quality of public space	1	2	3	4	5	There is a sufficient pedestrian path space. Vegetation is present along the street as well as resting areas (benches).
5. Social and cultural impact	1	2	3	4	5	The everyday life of the residents has improved, as the mobility of the pedestrians is facilitated and promoted.
6. Economic Sustainability	1	2	3	4	5	The street has a connecting role, as well as two auto mechanical workshops.
7. Accessibility and Mobility	1	2	3	4	5	Insufficient amount of parking spaces, there is a ramp indicating slow traffic at the end of the street.

As a result of asking the residents and workers in the street, it has been found that they were not consulted/asked about the plan for the rehabilitation of the street, before the start of the execution. The Municipality communicated with the residents indirectly, through sign tables, internet and media platforms. Major problem in the new street, according to the surveyed residents, presents a lack of parking spaces, resulting with irregularly parked vehicles. Even though the management of the parking spaces can be noticed in the detailed plan, as well as in the street itself, the street still has insufficient number of parking spaces for its residents. One more thing commented by the residents and noticed by the evaluator as well is presence of large plain concrete “pockets” within sidewalks, often misused as parking spaces. This situation affects the mobility and legibility of the street. Furthermore, even though the work execution took more than a year to complete, residents did not complain about the durability of the execution process.

4.1.8. RUA DA ARADA

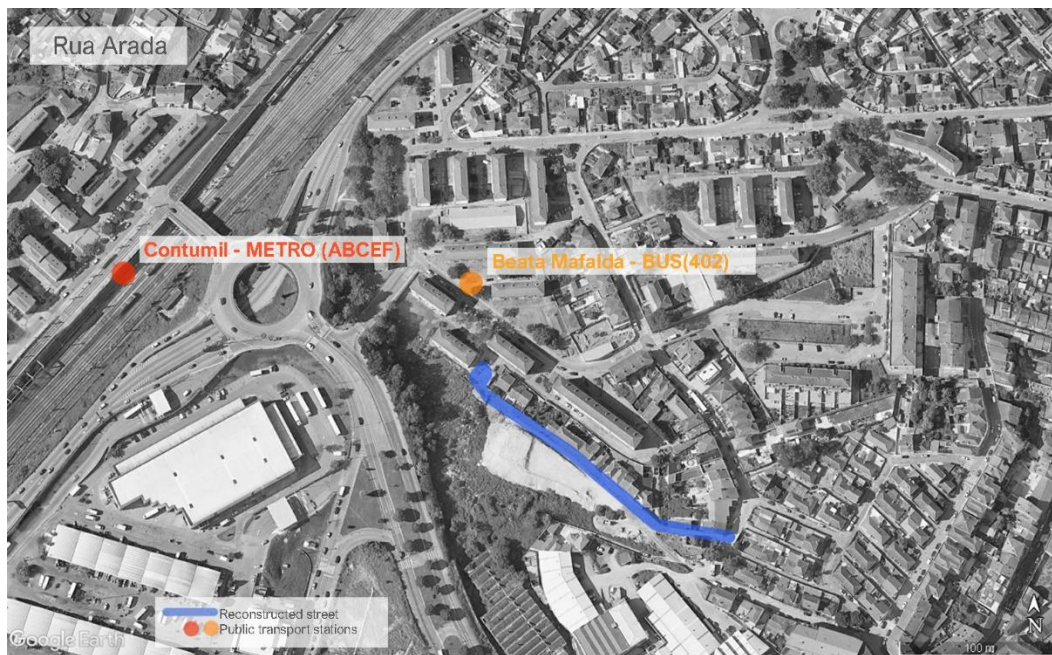


Fig. 33 – Context map of the Arada Street. Source: Google Earth (accessed on April 30th, 2024), edited by the author.

Situated near in the Campanhã parish, a neighbourhood that is currently in the phase of urban redevelopment, the Arada street is one of the streets in this area chosen for the rehabilitation lead by the *Rua Direita* project. The majority of the typology is residential houses and one building in the end of the street. The connecting role of the street serves only for pedestrians, whereas for the vehicles, this street ends as a *cul-de-sac*.

Tab. 26 – Arada Street Basic Information.

City Area (Parish)	Campanhã
Approximate Length	195m
Number of Turns/Curves	1 (2 parts)
Slope	The street has a slight slope.
Connectivity	This street is a <i>cul-de-sac</i> with no crossroads, coming from Rua S.ra de Campanhã.
Investment	€277,233.00 + VAT
Deadline	240 days
Starting Date	06-12-2021
Street typology	This is a residential street. After the first 50m, it faces a big private green field property. The end of the street has a enlargement in a form of a small square with concrete bench and a common space for hanging laundry. This part is also connected to the upper parallel street, Rua Beata Dona Mafalda with a staircase. The street still seems rural and unsafe. Only the beginning of the street is renewed in a characteristic way with concrete and cobblestone combination. The rest (majority) of the

	street is just covered in cobblestone which gives the impression that the reconstruction hasn't been done on this part.
Surroundings	This part of the city has quite a rural character, the majority of the surroundings are houses. Still, nearby there are quite frequent roads and numerous public institutions.
Nearby Public Institutions	- Primary School "Sra. de Campanhã" - Social Association - Supermarket "Mercadona" - Primary School : São Roque da Lameira" - Primary and Secondary School "Cерco"
Public Transport Connection	Metro station: Contumil Bus stations: 1. Beata Mafalda (402); 2. Ilhéu (7m,9m,401,700,800,801,806)

• INTERVENTION DESCRIPTION

The rehabilitation work on Rua da Arada, worth 277,000 euros, included paving the street and improving accessibility by implementing sections of shared lane. In addition to these works, there was also the refurbishment of the water supply and rainwater infrastructures, as well as telecommunications and public lighting. The execution of the work started in the beginning of 2022. It lasted for 7 months.

The specific case of this street is a drastic change in pavement; concrete stops and cobblestone pavement continues. This gives the impression that the street rehabilitation is not finished. In the detailed plan the complete infrastructure rehabilitation was completed: pavement, water network, draining systems, telecommunication and gas networks, illumination system and water supply.



Fig. 34 – Segment drawing of the Arada structure plan with a legend. Source: CMP.

Tab 27 - Timeline of the program implementation on the Arada Street. Source: CMP.

RUA DA ARADA				2018	2019	2020	2021	2022	2023
	Início	Prazo	Final						
Project contracting	23/11/2018	112	15/03/2019						
Project development	26/06/2019	617	04/03/2021						
Work contracting	30/04/2021	140	17/09/2021						
Work execution	06/12/2021	220	14/07/2022						

An important thing that can be noticed in the work done in the case of Arada Street is, as it can be seen in the detailed plan drawing, the material planned for covering the street was concrete along the whole street. Although, by paying the visit to the street, it can be noticed that the paving with concrete was done only in the beginning of the street, approximately first 30 meters. The circumstances that lead to this decision could be related to the lack of financial resources, or the current situation of the street where it is facing a vast field that is planned to become a construction site in the near future. Whether the plan is to leave the street as it is today or finish the rehabilitation in the future to complement the new structures built, the current outcome gives an impression of the street not being fully finished, where with examining the detailed plan for execution, this impression can be confirmed.

• COMPARISON THROUGH THE PICTURES: BEFORE AND AFTER THE REHABILITATION

In this comparison, most noticeable change is the pavement materialization of the street, although this concrete surface is covering a small part of the street, approximately 30m. The rest of the street is covered with cobblestone, as it has been before refurbishment. Addition of the “slow traffic” sign as well as elements for litter disposal can be seen. Differing from the detailed execution plan, materialization of the street stayed the same in the majority of the street, apart from the first 30 meters that are covered in concrete.



Fig. 35.1 – Arada Street before/after comparison.



Fig. 35.2 – Arada Street before/after comparison.

Tab. 28 – Evaluation of Arada Street through indicators.

<i>Indicator</i>	<i>Evaluation (1 to 5, from least favourable to most)</i>					<i>Description</i>
1. Community engagement and satisfaction	1	2	3	4	5	Residential community is not very satisfied with forms of communication with the authorities. The consulting could have been more direct and open for opinions.
2. Preservation of historical identity	1	2	3	4	5	Materials used are characteristic for the city identity. The metal construction meant for laundry hanging is kept and refurbished.
3. Environmental sustainability	1	2	3	4	5	Sustainable materials, lack of vegetation; Lack of permeability of the new pavement (in the first 30m of the street).
4. Quality of public space	1	2	3	4	5	The street gives an impression of not being finished. Residents stated that improvement was not felt, the quality of the day-to-day life stayed the same.
5. Social and cultural impact	1	2	3	4	5	Passing the street is safer today, although the main answer from the residents is that everyday life is the same, without major improvements.
6. Economic Sustainability	1	2	3	4	5	The street is residential, there are no businesses. The street is a cul-de-sac, intended mainly to be used by its residents, therefore there is no specific economic importance.
7. Accessibility and Mobility	1	2	3	4	5	Absence of sidewalks, low accessibility for users with challenged mobility.

Arada Street, situated in Campanhã, a part of the city that is in the urban redevelopment phase, consisting of multiple ambitious projects, starting with construction of TIC (Campanhã Intermodal Terminal), followed by the rehabilitation of the “Matadouro” complex, and many more interventions. Regarding this long-term plan for the area of Campanhã, development of the surroundings of the Arada street is expected, especially because the majority of one of the streets is currently a brownfield waiting for the beginning of construction. In the PDM, this lot is marked as a “Free implementation isolated block area”.

4.2. ASSESSMENT RESULTS

The fact that many aspects depend on the environment and context is crucial to consider in our case. Moreover, the public space and its quality can also vary depending on whether the rehabilitation was carried out in order to complement the existing condition, as well as to please the users and overall raise the level of quality of life in the neighbourhood. The streets, in most cases, undoubtedly made visible as well as functional improvements. One of the most reliable indicators that will show how well the recently rehabilitated streets perform is time.

As a summary of this multifaceted quality assessment, one can note that the streets that went through the process of rehabilitation under the *Rua Direita* project carry a certain universal character, however, by analysing the case of each street, there is a presence adaptation that may be applied only to specific cases. Variety of pavement solutions, implementation of natural elements, ways of designing the street to enhance the soft mode transport and walkability are some of very present ethical procedures that were involved in each street.

A significant part of the outcome depends on the strategies made by the contractors: companies in charge of the design and execution of the project. Regarding the community engagement, as the only case where residents were consulted about the plan for rehabilitation was the case of Granja de Lordelo Street, one can conclude that this part was left to the contractor to decide whether this was an important thing to consider. Since the Municipality didn't pose this as a requirement, the recommendation for the future development of such projects would be to enhance the community engagement before the start of the rehabilitation process along with informing during and after the rehabilitation work.

5

DISCUSSION

Besides the results of evaluation through criteria, some additional noticeable improvements are worth mentioning:

- Infrastructure network improvements (water supply, sewage systems, telecommunication and electricity networks, gas networks);
- A thoughtful use of materials, with paying attention to the narrowness of the street and making decision which material use will be most favourable for which case.

While doing the analysis and assessment of each street, the information that could be collected was varying in each case, whereas data that was collected by site visits is providing the same type of experience for the evaluator. This largely depended on the information that was available by the CMP and the drawings provided by the contractors, if we exclude the site visit as a form of direct contact with the study case. As an example, in the detailed plan for execution, additional documents included a detailed analysis of the surroundings in terms of soil, typology, land-use, natural and cultural patrimonies, transportation among others.

Actors considered to be involved in *Rua Direita* program, besides the CMP are also contractors and public institutions like "Águas do Porto" and "GO - Porto". These actors play important roles in the project development and its execution as well.

5.1. CRITERIA FULFILMENT

After the assessment of the streets, obtained results and outcomes can now serve as help for creating an evaluation of the *Rua Direita* program. This part is considered as the final step of carrying out the evaluation system developed in the methodology section of the paper. Seeing whether the criteria set in the beginning of the process was met will serve as a result of the evaluation. After doing the study case with the renewed streets, collected and analysed data from this chapter should serve as a guide for defining whether the criteria are met and to what extent.

As one of most obvious goals of the program, the **condition improvement** criteria is not only fulfilled, but a thoughtful use of materials and the incorporation with the character of the street may be considered as an attribute applicable to this program so far. The elements in the street are put together in a way to make sense and create a comfortable ambient for everyday use, as a resident or just a passer-by.

Considering that this program is an initiative led by the municipality, **compliance with standards and regulations** presents a default point of this program. In 2020, The Municipality of Porto created a document "Environment Quick Guide 2020", where presenting the initiatives towards a greener, more sustainable and resilient urban environment, they brought the ordinary citizen closer to the

Municipality's future goals. *Rua Direita* program standards align with these goals; therefore, it is contributing to the innovation and development of urban spaces.

Besides aiming to follow the set goals for urban development of the city, the *Rua Direita* program, as obliged, made sure to follow the regulations set by the PDM (Porto Municipal Master Plan) and Detailed Regulation Plans.

Safety enhancement through making the streets more visible, slowing down and limiting the vehicle traffic, as well as promoting soft mobility. All these listed intentions are proved through the work done in the rehabilitated streets. Measures such as improved lighting, opening up the space, reducing car flow, putting barriers in order to slow down traffic are implemented in majority of streets.

As a trait that drastically varies in each street, **compatibility with future needs** is an important yet complicated aspect to attribute to a program such as *Rua Direita*. Since many actors are influencing what will happen in the future, especially in the field of urban planning, putting effort in making the street as resilient yet adaptable is challenging. For the future circumstances, what can surely be said is that the program made an effort to create more sustainable and durable streets. Whether in a neighbourhood that is yet going to be developed or in the urban tissue from the 19th century, renewal of each street sought to make sure to improve the infrastructure, therefore providing uninterrupted and improved day-to-day functioning to residents until further notice.

In terms of **environmental impact**, the major thing that should be mentioned is the intention of the program to promote walking and soft-mode transportation in the renewed streets. Limiting the use of cars and making streets car free with the exception of residents' vehicles and urgent cases may not be the favourite change among the citizens, though by changes like this, people are encouraged to make healthier choices. Besides this important initiative, implementation of natural elements where possible has been done, which contributes to developing a better impact on the surroundings of the streets.

In terms of **minimization of disruption**, as some surveyed residents mentioned that the rehabilitation process took more time than it was planned, it caused some discomfort among residents of the street. Besides the durability of refurbishment, there were no other complaints related to disruption of everyday life in these streets.

Having in mind that the streets which were chosen for the rehabilitation haven't had any refurbishment work done for decades, this program has put effort to ensure **durability and longevity** now that the rehabilitation has been done. This can be confirmed by the choice of materials and their resistance to various circumstances. Moreover, the best indicator for defining whether this criterion was met is time. In the future years one will be able to see whether the methods of this municipality initiative withstand the effects caused by time.

Meeting the needs and aspirations of the local community is the goal of the **social considerations** criterion. Reflecting to the *Rua Direita*, crucial requirements were certainly fulfilled, and crucial shortcomings were faced in a way to improve the everyday life functions of the neighbourhood. Enhancing the attractiveness of the streets also contributed in a way that an individual user is more likely to choose the street that feels safer, more accessible and presents a comfortable environment.

5.2. STRENGTHS AND LIMITATIONS

During the development and future implementation evaluation of the methodology, various challenges and barriers may arise. Administratively, effective coordination and communication across various institutions and stakeholders are essential but challenging, and navigating regulatory and policy landscapes to ensure compliance and alignment with broader goals adds another layer of complexity. Socially, gaining public support and involvement is crucial, yet difficult, especially when rehabilitation projects cause disruptions. Ensuring transparency and addressing equity concerns across different neighbourhoods are also significant hurdles.

The main limitation of this work, which can also be considered a weakness, is the lack of objectiveness of the work. The main tool for collecting the results and assessing the quality of the streets in the study case was the candidate, which poses a problem of subjectiveness. Even though this was not the only stakeholder involved in the quality assessment process, the whole process, including completing the tables of indicators as well, has been led and done by one individual. Therefore, a proposition for further improvement of this work is that it could aim towards more even involvement of multiple stakeholders, as well as developing a stricter system that can better develop the objective character of the work. Other element that can contribute to receiving a more reliable result would be time. By carrying out the evaluation process through different time periods and conditions throughout the whole year, one can significantly have a more profound information and result collection.

6

CONCLUSION

The task to develop a relevant, comprehensive and reliable system for evaluating the *Rua Direita* program for street rehabilitation, created by the Porto City Municipality, is a complex process which brings many challenges along the way. Many aspects must be considered, both quantitative and qualitative.

Firstly, there are some objective aspects that are important to highlight. *Rua Direita* is a project which is included in a large long-term initiative of the Municipality of Porto whose main goal is urban redevelopment and rehabilitation of neglected parts of the city. This way the city of Porto puts effort to maintain the relation with its citizens, spreading the focus outside the city centre. This ambitious aim is a process that involves many stakeholders and institutions, as well as many crucial steps that depend on various aspects, therefore the management of such ventures is usually very time consuming.

Furthermore, when evaluating a specific street, each one will have common traits with others as well as specific attributes. After summarizing the work of evaluation, both assessment of the quality of the post-rehabilitated streets and evaluation the program itself, this work also tried to conjure up the complexity of such venture.

The *Rua Direita* program is a complex initiative that carried out essential changes after which the streets received an innovative character, though still maintaining the recognizable nature of the streets of Porto with the use of certain materials and implementation methods. This gives a distinct identity to the program itself along with the developed visual identity through characteristic colour palette in the elements made to communicate through media and street signs. In practice, one can easily recognize the street that has gone through the *Rua Direita* program because of its physical elements as well as the signs that notify passengers more directly.

The outcomes of the evaluation system of the *Rua Direita* program, as described more detailed in the "Discussion" chapter, present an overview of the program through concluding whether the previously posed criteria have been met. These criteria, shaped by the principle of collecting important aspects from the relevant literature and criteria set by the municipality of the city, ought to cover all the important aspects for having reliable results.

Regarding the actual results, it can be said that each criterion was assigned a set of comments explaining the aspects that contributed to its fulfilment, as well as some aspects that referred to imperfections and limitations. Moreover, stakeholders that were involved in the decision-making process for these comments included residents of the street, people from the Municipality of Porto, besides the candidate, who undertook the role of the evaluator.

Major improvements, according to the mentioned stakeholders, include:

- Overall Infrastructure and condition improvements
- Improved accessibility and mobility of the pedestrians
- Improved appearance of the street
- Introduction to more vegetation and urban furniture
- Active communication with the citizens through internet and transparency of the investments (media platforms, website of the Municipality)

In terms of whether the listed criteria have been met, the answer to this question is rather a complex one, having in mind that each street presents a case on its own, therefore objective comments that can be attributed to the program itself can contribute to this question. Overall, what can easily be stated is that it seems like these criteria were considered during the process of developing the plans for refurbishment of the streets in the *Rua Direita* program.

A key factor to be considered for the future projects of the same nature is public participation from the beginning of the process. Considering opinions of the residents is of a crucial importance for having success in planning out a comfortable, inclusive and responsible urban environment. Problems which residents of the street can face may not be obvious for actors in charge of the rehabilitation project.

It is important to mention that the beginning of this program should be considered at the point of making the decision which streets had to be redeveloped. Regarding this, it represents a process on its own, since a street had to meet certain number of criteria in order to be chosen for the program. Degradation and poor accessibility (narrowness) were main problems that the chosen streets had to have in order to be included. With an aim to decentralise the focus of this program location-wise, the choice of streets also had to include the wider municipal area.

Regarding the satisfaction of the residents, through carrying out the survey and having conversations with the residents of the streets of our study case, the candidate was able to collect positive comments and opinions on what should be done different/better. This process, besides its purpose to bring feedback from the citizens, also acts as an important point of reference of how important the public participation in spatial planning is, and therefore in the processes of urban rehabilitation.

With time, flaws, as well as good aspects will appear, showing more outcomes of the rehabilitation than we have today. This can be addressed to durability, sustainability, functionality and adaptiveness to the changing environment. Although, in the case of a public space, a constant adaptation, improvements according to the new trends and laws are a never-ending process, and even though these streets have gone under a recent renewal, their redevelopment will not stop at the moment the renewal process comes to an end. There is a constant need for a change in the urban environment.

Lastly, despite the complexity of our evaluation system and its components, answering the question whether the program *Rua Direita* manages to improve the overall quality of public spaces comes to an utterly clear answer. In fact, this program is making sure to fundamentally analyse the problematic points of the city of Porto and focus to bring improvements to these neighbourhoods. Accessibility, legibility, sustainability and inclusiveness of the rehabilitated streets, although varying in each case, are improved, according to our evaluation system. Major suggestion for further progress of the *Rua Direita* program is putting more effort in participative planning, including as many stakeholders as possible, of which the citizens must be considered as the main one.

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Um questionário sobre o programa "Rua Direita" de Camara Municipal do Porto

Este inquérito está a ser realizado para fins de investigação de dissertação, liderada pela Faculdade de Engenharia em conjunto com a Câmara Municipal do Porto.



Nome da Rua:

Informações Demográficas (circule a resposta):

Idade:	0 - 18	18 - 25	25 - 35	35 - 45	45 - 55	55 - 65	>65
Genero:	F	M	Outro				
Tempo de residencia na area:	< 2 anos		2 - 5 anos		5 - 10 anos		>10 anos
Tipo de resiedncia:	Proprietario		Inquilino		Trabalhador		Outro

Conscientização e Participação no Planeamento:

Você está satisfeito com a forma como foi informado sobre a reforma da rua antes de ela começar?
(1 - não satisfeito, 5- muito satisfeito)

1 2 3 4 5

Você foi consultado ou questionado sobre uma opinião sobre a reforma da rua?

Sim Não

Se sim, numa escala de 1 a 5, quão satisfeito(a) você ficou com a oportunidade que o município deu às pessoas de participarem na decisão?

1 2 3 4 5

Qualidade da Reconstrução:

Numa escala de 1 a 5, como você avaliaria a qualidade geral da rua reformada?

1 2 3 4 5

Quais partes específicas você acha que melhoraram mais a rua?

Há alguma coisa que você acha que poderia ter sido feita melhor?

Impacto na Vida Diária:

Numa escala de 1 a 5, como a nova rua afetou o seu dia a dia? 1 sendo significativamente pior, 5 sendo significativamente melhor)

1 2 3 4 5

Você notou alguma mudança no trânsito, na segurança dos pedestres ou no funcionamento diário desde a reconstrução?

Envolvimento e Engajamento Comunitário

Numa escala de 1 a 5, você acha que a comunidade esteve adequadamente envolvida na tomada de decisões sobre a renovação das ruas? (1 - não envolvido de forma alguma, 5 - altamente envolvido)

1 2 3 4 5

Quão satisfeito você está com o nível de comunicação entre as autoridades responsáveis pela reconstrução e a comunidade local?(1 sendo menos satisfeito, 5 sendo mais satisfeito)

1 2 3 4 5

Satisfação Geral e Percepção:

Em uma escala de 1 a 5, quão satisfeito está com as mudanças feitas na rua em geral?(1 - menos satisfeito, 5 - mais satisfeito)

1 2 3 4 5

Acredita que a rua reconstruída melhorou a qualidade de vida geral no bairro?

Sim Não

Você recomendaria um envolvimento comunitário semelhante para futuros projetos de renovação deste tipo?

Sim Não

Sugestões para Melhoria:

Existem outras características ou melhorias que gostaria de ver na rua reconstruída?

Como acha que a comunidade poderia ser mais envolvida na manutenção contínua e nos futuros desenvolvimento?

Comentários Adicionais:

Por favor, use este espaço para fornecer quaisquer outros comentários ou feedback sobre a rua reconstruída ou o processo de envolvimento comunitário.

A survey about the program "Rua Direita" from the Porto City Council

*This survey is being carried out for research purposes
dissertation, led by the Faculty of Engineering
in conjunction with Porto City Council.*



Street name:

Demographic Information (circle the answer):

Age: 0 - 18 18 - 25 25 - 35 35 - 45 45 - 55 55 - 65 >65

Gender: F M Outro

Length of residence in the area: < years 2 - 5 years 5 - 10 years >10 years

Type of residence: Owner Tenant Worker Other

Awareness and Participation in Planning:

Are you satisfied with how you were informed about the street renovation before it began? (1 - not satisfied, 5 - very satisfied)

1 2 3 4 5

Have you been consulted or asked for an opinion on the street renovation?

Yes No

If so, on a scale of 1 to 5, how satisfied were you with the opportunity that the municipality gave people to participate in the decision?

1 2 3 4 5

Reconstruction Quality:

On a scale of 1 to 5, how would you rate the overall quality of the renovated street?

1 2 3 4 5

What specific parts do you think have improved the street the most?

Is there anything you think could have been done better?

Impact on Daily Life:

On a scale of 1 to 5, how has the new street affected your daily life? 1 being significantly worse, 5 being significantly better)

1 2 3 4 5

Have you noticed any changes to traffic, pedestrian safety or daily operations since the reconstruction?

Community Involvement and Engagement:

On a scale of 1 to 5, do you think the community was adequately involved in making decisions about street renovation? (1 - not involved at all, 5 - highly involved)

1 2 3 4 5

How satisfied are you with the level of communication between the authorities responsible for reconstruction and the local community? (1 being least satisfied, 5 being most satisfied)

1 2 3 4 5

General Satisfaction and Perception:

On a scale of 1 to 5, how satisfied are you with the changes made to the street in general? (1 - least satisfied, 5 - most satisfied)

1 2 3 4 5

Do you believe that the rebuilt street improved the general quality of life in the neighborhood?

Yes No

Would you recommend similar community involvement for future renovation projects of this type?

Yes No

Suggestions for Improvement:

Are there any other features or improvements you would like to see on the rebuilt street?

How do you think the community could be more involved in ongoing maintenance and future developments?

Additional comments:

Please use this space to provide any other comments or feedback regarding the rebuilt street or the community engagement process.