Extended abstract


1. Introduction

In recent decades it has been observed the demolition of viaducts in areas that have suffered large depreciation of the urban space because of these buildings. This process, in addition to providing areas with better quality of life, brings up questions about the use of the car, so fashionable in recent times.

For years, urban mobility has developed in road mode. In other words, much of the transportation planning was - and still is - linked to passenger cars. Consequently, viaducts have become the best solution, from the road point of view, to connect quickly and safely two areas of a city.

This kind of planning is due to the concepts of modern urbanism, which allows even now to deploy large structures in consolidated residential areas, cutting the urban fabric and definitely impacting entire families that find themselves forced to leave their homes in favor of progress. So viaducts have been built around the world, including in Rio de Janeiro, in an imposing way and with the allegation that these works were for the well-being of the city, and thinking otherwise would “oppose progress, history and modernity itself” (BERMAN, 2007, p. 345).

As time passed and, because of the growing number of cars and frequent traffic jams, urban planners and experts in the transportation field began a questioning process on how to solve the problem of urban mobility.

One of the trends of today is to treat all in a sustainable way, and this also includes investments in public transport and non-motorized, valuing walking, hiking and cycling routes at the expense of passenger car.

It was at the center of this discussion – “the city that we have and the city that we want” - that this work emerged.
The above expression originates in the Statute of City, created by a Brazilian federal law in 2001 (Law No. 10,257), which determines that the management of cities must be democratic. From this concept, then, debates, hearings and public consultations are proposed, that is, it is understood that there should be popular participation in decisions. Thus, it follows that the participation of society in the definition of public spaces is closely related to quality of life.

Imbued with this idea and considering that Rio de Janeiro City is going through a historic urban landmark with the demolition of the Perimetral viaduct which aims to revitalize and modernize the port area of the city, two questions arise: what does the main by impacted population say about this type of structure? Is it possible to measure the impacts caused by a viaduct on a daily basis?

The method of this study was, therefore, the development of direct questions to the residents, the true users of these spaces.

To do this analysis we had to choose one of these structures to be used as a case study. At this point, the Paulo de Frontin viaduct in the neighborhood of Rio Comprido proved to be an ideal model.

The demolition of the Paulo de Frontin viaduct it would then be the best solution for the region? Or architectural and landscape solutions would be enough to improve the quality of space? What do the residents think in this regard? It is in seeking answers to these questions that this research is justified, i.e., the reading of reality implies knowing how to listen to people, as postulated by the Statute of City.

II. Viaducts and urban mobility

In general, it can be said that a viaduct causes impacts on the region where it is inserted. These impacts may be related to the environment, the visual, the quality of space, mobility and depreciation of real estate in the immediate surroundings. Because of this, more and more projects are done which aim to minimize the damage they may cause.

To understand what motivated the solutions adopted to reduce or eliminate the impacts of some viaducts around the world, we must first check the process of urban development of cities that have culminated in recent decades, with the gradual change of the concept of urban mobility.
The growth of large cities has generated the need for infrastructure networks to meet not only the local population needs, but also the regional ones and even those beyond the boundaries of a nation. And when it comes to infrastructure, we are talking about transport, telecommunications, energy, water, streets, etc.

To account for this intricate network, say Graham and Marvin (2001), the modern urbanism emerged. Emerging as an extraordinary social-technological process at the same time complex and dynamic, it would be able to solve these problems.

This means that distant cores should be connected to each other so that there would be homogeneous but independent areas in the same city. As a result, the same should take place between different cities.

What spurred this interconnection quickly and efficiently was the use of the automobile. That is, the origin of large-scale interventions in the modern urban space is directly related to the growth of the automobile industry.

This new concept of city besides not promoting the interaction between people and the urban spaces along these highways in areas of sprawling cities, generated losses to areas already consolidated.

The construction of expressways in consolidated districts already causes a sharp drop in real estate value of the surroundings. Existing constructions are confined and there is a significant loss of quality of the space. For many years, it is observed that the renewal of the area with new construction becomes impaired and the region will now be abandoned. Former residents leave their homes, which end up being empty or occupied by lower income invaders, or now have commercial activities and services, due to the low cost of real estate.

As for the users of these expressways, these structures are like tunnels in the open, where there is no relationship between the people who pass through them and the urban spaces beyond the low walls.

So what can be seen is that the car culture has had decisive influence on the planning and designing of cities for decades. Today we observe the result of this excessive recreational vehicles, combined with the poor quality of public transport and the growth of cities that favor cars.
This relationship of domination of infrastructure on the urban space can be observed more and more by the absence of functional open spaces and quality, and the presence of boundaries created by the road layout.

The modernist idea was spread in many countries of the world and, although there are trends against these lines of thought, the great planners believed they were doing the best for their cities. The consequences would only be seen with time. The wide avenues then designed became narrow for the number of cars and large traffic jams have become frequent.

In order to solve the problems of constant traffic jams, the time cutting-edge technology had even more innovative solutions such as the construction of viaducts everywhere in the big cities of the country. And the more solutions given to resolve the traffic issue, the worse it became.

However, in recent decades it has been possible to observe some changes. Some countries rethink their cities, the quality of life of their residents and seek sustainable alternatives to the excessive oil consumption. Also, they make massive investments in the improvement of public transport, thus attempting to reduce the number of cars in big cities. Another point to consider is the investment in education, which is key to public awareness.

III. Solutions adopted by the world

A. The demolition of viaducts as a solution

In some cities, it has been seen the practice of viaducts demolition, in order to improve the quality of space, revitalizing underutilized areas and consequently bringing benefits to the local economy.

One of the major interventions in urban centers was the demolition in 2003 of the Cheonggyecheon viaduct in Seoul, South Korea, which had been built in 1971. Its importance is also attested by the size of the work: the overthrow of an elevated highway 5.8 kilometers long, passing through the center of Seoul which occupied almost the entire bed of the river of the same name.

B. Other uses for a viaduct / requalification of public space

Another practice in vogue is to use change of a viaduct, which can occur either at the top or the bottom, or in both. This type of solution aims to breathe life into under-utilized and degraded areas, integrating that structure into the daily life
of the city, while minimizing its negative presence, and requalifying the public space.

An example of successful experience is an old viaduct in the west of Manhattan in New York (USA), which led to the so-called High Line Park.

Even still in viaducts in operation, alternatives are being adopted to take advantage of the space under them, which in most cases, are hostile, dark and unattractive environments. In many cases, they shelter the homeless and drug users, as well as serving as illegal garbage dumps. So some cities are giving another meaning to the under-the-bridge area.

IV. **Rio Comprido: the neighborhood and Paulo de Frontin viaduct**

The neighborhood of Rio Comprido in Rio de Janeiro is the place where our object of study is located: the Paulo de Frontin viaduct.

Rio Comprido is one of the oldest neighborhoods in the city of Rio de Janeiro: its official name dates back to 1875.

A. **The early twentieth century**

A series of actions was carried out: the early twentieth century was marked by great urban reforms and a hygienist policy in the municipality of Rio de Janeiro, during the administration of Mayor Pereira Passos, which also reached the neighborhood of Rio Comprido.

However, significant improvements only came to the neighborhood from the government of Mayor Paulo de Frontin, in 1919, who named the main avenue of the neighborhood. The neighborhood went through a period of recovery, with urban improvements, which made it a prime area of the city.

In addition, the Rio Comprido neighborhood has always had an excellent geographical location, since it is close to the city center and the northern and southern areas, and at the time it had a supply of tram lines, commerce, schools, etc. The poorest population was removed from the formal part of the neighborhood and finally settled on the nearly hills. Unfortunately, this golden period of the neighborhood lasted only until the 1960’s.

B. **The construction of the Rebouças tunnel and Paulo de Frontin viaduct**

Parallel to the growth of the Rio Comprido neighborhood, another area of Rio de Janeiro was also expanding: a coastal region located in the southern part of
the city, which began to gain prominence and became the preference of the high society.

With the growth of the southern area and intent on relieving the traffic in the downtown area, the main economic, commercial and industrial concentration, along with the need to facilitate access to the north and south zones, the City Hall and the State Government Guanabara began studying an alternative that connected these three areas. The best option was to build a tunnel, the Rebouças tunnel, which had its name given in honor of the brother engineers. Work began in April 1962 and the tunnel was opened on 3 October 1967, under the management of Francisco Negrão de Lima, governor of the former state of Guanabara.

After the inauguration of the new tunnel, which connected the neighborhood of Rio Comprido to the south of the city, the flow of vehicles has increased considerably, causing constant traffic jams in the new alternative for getting to and from the northern and southern zones, which avoided passing through the city center.

For this reason, another large project was being prepared to try to solve problems in traffic: the construction of the Eugène Freyssinet viaduct, also known as the Paulo de Frontin viaduct, opened in 1974.

After the implementation of the Paulo de Frontin viaduct, the main avenue of the neighborhood saw its daylighting impaired and increased noise, visual and air pollution, forcing the most affluent families to move to other areas, as one of the reasons for emptying the neighborhood.

It can also be said that there has been significant growth in irregular settlements in the Tijuca Massif slopes.

The various moments of the Rio Comprido neighborhood can be evaluated through population growth over the decades, as Tables I and II show:

### TABLE I. Resident population in the neighborhood of Rio Comprido region – 1940/1960[8]

<table>
<thead>
<tr>
<th>Year</th>
<th>Resident population</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>61,957</td>
<td>Rise period of the neighborhood</td>
</tr>
<tr>
<td>1950</td>
<td>70,979</td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>83,896</td>
<td></td>
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</tbody>
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Fonte: IBGE, 1940; IBGE, 1950; IBGE, 1960.

<table>
<thead>
<tr>
<th>Year</th>
<th>Resident population</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>97,270</td>
<td>Period after the construction of Rebouças tunnel</td>
</tr>
<tr>
<td>1980</td>
<td>93,933</td>
<td>Period after the construction of the Paulo de Frontin viaduct</td>
</tr>
<tr>
<td>1991</td>
<td>82,307</td>
<td>Neighborhood emptying period</td>
</tr>
<tr>
<td>2000</td>
<td>73,661</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>78,975</td>
<td>Period after the implementation of UPP and the start of construction for major events in the city</td>
</tr>
</tbody>
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C. Rio Comprido today

According to Table II, it shows that the last decade is marked by a new period of appreciation of the neighborhood. It is possible to assume that one of the reasons is due to the implementation of a UPP (Pacifying Police Unit) in the Complexo do Turano, in 2010, one of the sets of the Rio Comprido slums. Since 2008, the state government of Rio de Janeiro, through the Security State Department, has been implementing the UPPs with the objective of establishing community police in slums, in order to dismantle gangs.

Coupled with the safety factor, another reason for the recovery is the expectation generated by major events in the city such as the World Cup 2014 and the Olympics in 2016. These events caused a great valuation of real estate, not only in Rio Comprido, but all over Rio de Janeiro. The real estate in the neighborhood have become more popular mainly due to lower values and location, ie, there was a change in the pattern of the residents due to the gentrification of the south of the city, which has displaced middle-class people to this region.

Despite this new period of real estate valuation in the neighborhood, there is no project under consideration or implementation by the Municipality for the revitalization of Paulo de Frontin Avenue or for the improvement of the region.

V. Interviews

This part of the study was performed empirically, i.e., by a scientific method which is based on experiences. It can be said that starting from observation and experience you can get conclusions of common sense facts that had not been interpreted or organized rationally and methodologically.

Therefore, oral memory, even if selective and partial, contributes to the perception of a place. The rescue of individual and collective stories complements the one contained in books and documents. For this reason, several interviews
were conducted with a different audience, so that the most possible information would be gathered.

21 interviews with residents and former residents of Rio Comprido were carried out. The number of respondents in this sample is not significant in relation to the whole population of the neighborhood, but it covers different categories of residents. In this case in-depth, information quality had more relevance than the amount and applicability in statistical terms.

It was through interviews with former residents of the neighborhood, who had lived there before the opening of the Rebouças tunnel and the construction of the Paulo de Frontin viaduct, that it was possible to detect how these great works have impacted the local population and how the new residents handle the issue of the viaduct.

The interviews were administered throughout the year 2014, most of which were conducted in the first half.

In short, it can be said that families of higher income, who lived in the outskirts or on Paulo de Frontin Avenue, just out of the neighborhood, decided to live in other areas of the city for several reasons, not necessarily because of the viaduct.

Lower income and middle-class families remained in Rio Comprido, including residents of Paulo de Frontin Avenue. In many cases, because they did not leave the neighborhood that they cared so much for and in others, due to the depreciation of asset values, which would prevent them from moving to other parts of the city while maintaining the same residential status they had.

Over time, the viaduct was naturalized by the local population and issues such as noise, air pollution, low sun incidence, began to be understood as set out context. There was an adaptation to the new environment, transforming Paulo de Frontin Avenue, once residential, into a commercial area. Today, the viaduct is considered by many the landmark of the area.

The new generation of residents, although not appreciative of the new surroundings, tries to see what the neighborhood has to offer, such as location, more affordable property prices, commerce and the existence of bucolic and nice places which are still near Tijuca Massif, managing to find simplicity and closeness to the nerve center of the city nature.
Even the new residents who opted for apartments on Paulo de Frontin Avenue did not achieve these properties blindly, knowing too well what they were taking: noise, dust, pollution. The fact is that most of the new middle-class population that settled there only had the opportunity to buy apartments with a good square footage and in a good geographical location in the city because they came with these "freebies". That is, in a way, it was the viaduct which led to them to come to Rio Comprido.

When asked if the viaduct somehow is a nuisance, residents - old and new - before and after the viaduct construction, claim that there is some sort of discomfort about noise and dust. However, these were not the main drawbacks cited by residents.

The claim of all respondents was the lack of public power in the region. All concluded that the transformation of Rio Comprido, with the viaduct, into a “go-through neighborhood” just downrated the interest of public institutions and the real estate market. In addition, there was an uncontrolled growth of local slums, causing an increase in violence.

It can be said that almost 100% of respondents who live in Rio Comprido would like to see the Paulo de Frontin viaduct demolished, as it was the recent case with the Perimetral viaduct, in the port area of Rio de Janeiro. However, it can be seen that this desire is accompanied by fears about waste of public money that a work of this size is capable of generating, associated with the collective consciousness that this structure plays a key role in the issue of urban mobility in the city.

Due to the aforementioned, it can be said that the outcome of the interviews shows to be complementary to the historical background and the census data of the neighborhood of Rio Comprido, which demonstrates the real need to put into practice what the Statute of Cities proposes: popular participation in urban interventions in the city, thus meeting the real needs of users.

VI. Acknowledgment

For the survey, in addition to interviews that have been conducted in the neighborhood of Rio Comprido, it was concluded that the presence of a viaduct is not decisive, but rather an aggravating factor. It cannot be attributed to the
depreciation and degradation of a neighborhood to the presence of a viaduct itself, but mainly the lack of public power in the region where it is inserted.

It is true that the implementation of a viaduct significantly decreases the quality of urban space, increasing noise, visual and air pollution, damaging the environment and creating dark and barren spaces for local people. However, in the collective unconscious it is attributed also to the viaducts indirect losses such as the output of the population with greater purchasing power, the growth of the informal population and the increase in violence.

In contrast, for the residents who remained in the neighborhood even after the building of the viaduct as well as new residents, the viaduct is already naturalized as part of the landscape, not being considered the target of the main complaints, which shift to the absence of the state.

Therefore, the presence or absence of the viaduct becomes less relevant if compared to the basic needs of the population, such as public lighting, security, cleaning, transport, recreation areas, adequate infrastructure networks, etc.

Undoubtedly, an environment without viaducts offers a better quality of space. But we must remember that these structures can also be transformed into great works of art in the open or be integrated into the urban daily life, as it can be seen in some cities in the world.

Finally, we conclude that there are several solutions that can be adopted in areas impacted by the construction of a viaduct. The important thing is that the decision contemplates the participation of affected users and the economic condition of each place.

**Keywords**

Rio de Janeiro; Rio Comprido; viaduct; naturalization; quality of urban space.