

## An evaluation model for accessibility conditions of salvador bus stops

Eduardo Manuel de Freitas Jorge

Gustavo Barreto Franco

Isabelle Paim das Virgens Moitinho

### Abstract

*This article aims to analyze the accessibility of people with disabilities and reduced mobility, running through urban mobility problems. The aim is to evidence the necessity of popular participation, through researches, in the development of public policies, in order to effect accessibility. This will provide an improvement in the general population mobility, making the city more inclusive for everyone, exerting the social function of the state. According to 2010 IBGE Census, almost forty-six million brazilians (about 24% of the population) declared they have some difficulty in, at least, one of the skills investigated (seeing, listening, walking or climbing steps), or that they have mental/intellectual disabilities, thus demonstrating the importance of the mattering subject. Therefore, in the present article, initially, is shown the concept of accessibility as a fundamental right, its normative evidence, and on urban mobility and its aspects in urban centers. In sequence, it is addressed the need to create a model to evaluate the accessibility conditions of urban facilities in the city of Salvador, using the "Map of Key Activities" (MKA) and georeferencing systems, also demonstrating the importance of georeferencing concepts and the analysis and developing of metadata based on the existing accessibility standards. Accordingly, it shows the need for this study to generate a change in specific public policies to ensure accessibility and universal access of the population to bus stops.*

**Keywords:** Accessibility. Bus stop Georeferencing. Model, Metadata. Verification.

### 1. Introduction

Accessibility is a deeply important subject that embraces various sectors of society. The Brazilian Association of Technical Standards - ABNT (2004) defines accessibility, through the NBR 9050 standard, as the possibility and condition of scope, perception and understanding for the safe and autonomous use of building, spaces, furniture, urban equipment and elements.

With the 1988 Constitution, Brazil began promoting a greater inclusion of people with disabilities or reduced mobility in the scope of public policies, generating legal protection of their rights and greater social visibility.

According to the 2010 IBGE Census, almost forty-six million brazilians (about 24% of the population) declared having some difficulty in at least one of the skills investigated (seeing, listening, walking or climbing steps), or that they have mental/intellectual disabilities (IBGE, 2020). Brazilian cities are not

An evaluation model for accessibility conditions of salvador bus stops

properly adapted in order to promote to the population with disabilities and/or reduced mobility enjoying their right to come and go, and, with that, exercising citizenship in its fullness.

In addition to people with disabilities, the individual ones with reduced mobility are included in this group, which contains the elderly (according to the world health organization - WHO, the elderly in every individual aged 60 years or older, and Brazil has more than 28 million people in this age group, accounting for 13% of the country's population), obese people (according to the ministry of health 55.7% of the population is overweight), people with newborns at one year age, and, in general, people with temporary disabilities who, in contact with barriers, express restriction of locomotion.

The most important accessibility laws to appear on Brazilian land were law n° 10.048, of November 8th, in 2000, which implements preference or priority for people with disabilities, the elderly aged sixty years or older, pregnant women, nursing mothers, people with newborn babies and overweight people in financial institutions and commercial establishments or similar where there are cashiers, counters and service desks (BRAZIL, 2000), the law n° 10.098 of December 19th, 2000, establishing the removal of barriers and obstacles in public roads and spaces, in urban furniture, in construction and amendment of buildings and also on transport and communication means (BRAZIL, 2000). Then, it was sanctioned the decree n° 5.296, of December 2nd, 2004, which regulated both laws. The person with disability statute emerged in 2015, by the law n° 13.146/2015, being the maximum document that determines people with disabilities conditions in Brazil.

Urban mobility it is not restricted to the simple quantity displacement of individuals or groups, otherwise includes qualitative characteristics of this movement, for the reason that there is a very intrinsic relationship between mobility and quality of life improvement, social inclusion, economic efficiency in urban centers, in addition to negative impacts on the environment.

Public policy creation should ensure accessibility by prioritizing universal design access, which is a concept developed by the University of North Carolina - USA architecture professionals. This concept aims to design products and environments for the use of all, to their full potential, without using adaptation or specialized projects for people with disabilities.

In civil engineering the use of the universal design possibilitates the development of constructions that can adapt to all kinds of users, with access ramps, tactile floors, necessary distances for the moving of wheel chairs, multifunction bathrooms, among other solutions, all which makes it not necessary to have future constructions to attend to the local's needs, as such, bringing respect to accessibility.

The choice of materials and finishing elements are essential for the construction of this universality, thinking of non-slippery floors, metal plate or central spider clamp and hinged doors that allows the setup and opening for the inside environment and for the outside one, walls that enable the installation of bars of support and transfer, among others. The work stations with room for circulation, with tables and computers that enable the use and some adequacy for anyone, with height adjustments or specific softwares for the reading of texts or sign languages, making it easier for people to use certain environments, therefore reducing the exclusion factors.

An evaluation model for accessibility conditions of salvador bus stops

In this case, the article worked on developing a model of evaluating the accessibility of the bus stops conditions in Salvador.

## **2. Materials and methods**

### **2.1. Accessibility: Concepts and Legislation**

The first step in understanding the requiring to create an evaluation model for bus stops accessibility inspections is to study the meaning and rules on accessibility. Thus, it is possible to visualize the importance of accessibility in Brazil and also what are the relevant points dealt with by the legislation. The concepts in here reported will be used as the basis for the research development.

The creation of brazilian legislation on accessibility had its milestone guided by international experiences, where the UN - United Nations - had a major influence on this decision. In 1948, the UN presented the Universal Declaration of Human Rights, which declared people as equal and highlighted that their fundamental needs should be respected. Then, in 1971, it presented the Declaration of the Rights of Persons with Disabilities, becoming a great advance for the defense of accessibility rights. The 1980s was decreed by the UN as the United Nations Decade for the People and that made accessibility debate more strength in the brazilian scenario.

In 1978, Brazil, the Constitution received the first amendment dealing with the rights of Persons with Disabilities, in which “the disabled are guaranteed the improvement of social and economic conditions, uniquely through special and free education” (GARCIA, 2004).

In the 1980s in Brazil, federal law n°7.405 was created, making it mandatory to place the “International Access Symbol”, this law defines the places and services that could be used by people with disabilities in addition to specifying the accessible dimensions for stairs, elevators, access ramps and parking spaces (BRAZIL, 1985).

The 1988 Constitution inserted in its text a few accessibility devices, to guarantee the insertion of people with disabilities and reduced mobility a social participation, promoting accessibility on buildings and transport services, ensuring all brazilians the right to come and go.

The principal accessibility laws instituted on brazilian land were law n°10.048, of november 8th, 2000, which ensures for people with disabilities, the elderly aged ones, pregnant women, lactating women, people with newborn children and obese people, the preference or priority in financial institutions and commercial establishments and similars where there are cashiers, counters or service desks (Brazil, 2000); law n° 10.098, of december 19th, 2000, establishing the removal of barriers and obstacles in public roads and spaces, in urban furniture, in construction and buildings renovation in the means of transport and communication (BRAZIL, 2000).

The brazilian association of technical standards - ABNT - in 1985, presented the first standard on accessibility: NBR 9050. This standard was updated in 2020 and aims to provide the autonomous, independent and safe use of the environment, buildings, furniture, urban equipment and elements to as many people as possible, regardless of age, height, and also mobility or perception limitation (ABNT, 2020).

An evaluation model for accessibility conditions of salvador bus stops

At local level, there is law n° 9069, of june 30th, 2016 - which provides for The Master Plan for Urban Development of the Municipality of Salvador - PDDU 2016 and provides other measures, disposing on criteria related to pedestrians, people with disabilities or reduced mobility displacement in Salvador, which is going to serve as basis for analysis on the study development in this project (SALVADOR, 2016).

Following Maior et al. (2005), Brazil was elected, in 2004, by the non-governmental organization International Disability Rights Monitor (IDRM), as one of the five most inclusive countries in the Americas, and one of the requirements for classification was the existence of a legal framework that would guarantee the adequate protection of people with disabilities. Although, for this author, even though Brazil has advanced, comprehensive and modern legislation on scientific-technological view, because it involves a great cultural change and ignorance about its obligation to be effective, a great resistance has been created in the implementation at the country.

Urban furniture is defined, according to Law No. 10,098 of December 19, 2000, as "the set of objects existing on public roads and spaces, superimposed or added to the elements of urbanization or edification [...]" (BRAZIL, 2000).

Urban furnitures are essential tools to ensure accessibility, and all equipment offers efficient circulation, adequate information and communication, leisure places, and well-being as a whole, providing quality of life to the local population, regardless of the existence of limitations. "Urban furniture can be considered an important complement in qualification of urban space, the proposal of a type of equipment more appropriate to the function and compatible with the formal characteristics of the space where it is intended to be inserted". (JÁUREGUI 2001, p.116-117)

Urban elements, when designed to attend their functions, interfere with individuals' perception of spaces and thus, show the importance of approaching this furniture considering environmental perception.

In a study made by Kilicaslan (2008), it is noted that the presence of adequate urban furniture influences the "life on the streets", when these elements are inadequate to people's expectations and, therefore, receive negative reviews.

According to Ribeiro et al (2008), the inadequate arrangement of urban furniture on the sidewalks is considered a barrier to the use of these public spaces, demonstrating the impact that urban equipment has on social life, since it must adapt to public spaces, so that it does not become a socio-spatial exclusion instrument. For Bins Ely et al (2006), urban furniture should be implemented in the public space with criteria that consider accessibility of people with disabilities, showing the role of social integration that these elements have.

## **2.2. Elements and criteria for creation of a model for evaluating urban furniture**

The data obtained through bibliographic research, based on laws, standards and regulations both nationally and locally, are combined with a methodology created by Hosking and Walker (2011), available on the University of Cambridge website, "Map of Key Activities" (MKA).

An evaluation model for accessibility conditions of salvador bus stops

The MKA It is a process of creating the inclusive design that containing phases of exploration, creation and evaluation, managed by management, through a feedback system, in other words, at any time, a previous stage can be reviewed and changed, until the end of the entire process.

The use of this tool, Accessibility Assessment Map, with a few adaptations, was an instrument that helped making an evaluation model for the bus stops in Salvador.

In the exploration phase, the steps of creating a stakeholder map (interested parts) were used to analyze the population that uses furniture, observe users and, thereby, perceive their needs; to describe the users journey observing how the furniture is used; and the capture of need would be replaced by a list of criteria to be evaluated. It is added to this, a literature review as a source of knowledge to be used. The character generation stage was not used, because this stage does not bring any use to the evaluation process.

In the creation phase, ideas were stimulated, thinking about the universal design of the bus stop. The evaluation phase, on the other hand, is the materialization of evaluation model in the field, studying the model applicability and generating final considerations about the evaluation performed.

The management was marked by coordinating the other phases, reviewing progress and planning the next steps, refining the objectives, thus ensuring a global understanding of the process, this whole process have as an aid the use of georeferencing systems.

### **2.3. Georeferencing systems**

In order to better delimit the term georeferencing, the metadata is defined which a structured information used to describe attributes of information resources for the purpose of identification, discovery and even administration. These elements are seen as fundamental for the representation and retrieval of information, and can be considered as an essential concept and area of study of Information Science.

Metadata is used to describe characteristics of informational resources for different purposes, such as: identification, management, discovery, retrieval, interoperability, description, among others. They can be classified into five types, namely: administrative, descriptive, preservation, technical and use, which are used for description of information resources in general.

In this study, data from accessibility standards were extracted to be transformed into metadata, and these data can be georeferenced in the QGIS, or in another similar program, developing, therefore, a model for accessibility management at bus stops. This model called SOLIS, was first carried out at a bus stop in the city of Salvador, but only after its validation by a specialist may it be extrapolated to other locations.

A georeferencing system aims to represent any type of information that may be associated with geographical space, being mainly focused on data signaling on a map. It is a technique that aims to assign certain geographical coordinates to points on geographical space, since it is a multidisciplinary area, because it includes knowledge of cartography, topography and geographic information systems.

Georeferencing, itself, consists of an activity of referencing data or objects based on their geographical location, a database is considered georeferenced when the data contained in it has a correspondence with the actual object represented. With this, the georeferenced database would be the principal component of

An evaluation model for accessibility conditions of salvador bus stops

SIG, and these systems were used to enable complex analysis of the information obtained about a particular location, enterprise, climate phenomenon, among other information.

Some tools are used in this georeferencing process, in the model proposed in this dissertation called the Solis Model, the data were inserted into JSON, being transformed into metadata and subsequently georeferenced in GEOJSON and QGIS, as examples of this application.

JSON is a textual representation defined by a set of rules in which data is structured, and this data can be structured in two ways:

- A collection of name/value pairs;
- An ordered list of values.

The use of JSON in the Solis model first consists of extracting data from accessibility standards related to bus stop, spaces and urban equipment, then these data are grouped into each category analyzed as: minimum dimensions of free lane, longitudinal slope of sidewalks, among others. After categorization, the data will be encoded in metadata in the JSON program, thus, obtaining a code with all the information necessary for the accessibility analysis of the studied point.

GEOJSON is the geographical context of the JSON format that supports data structures such as points, lines, polygons, among others. It is an open standard format system designed to represent simple geographical features, along with its non-spatial attributes.

Its utilization in Solis model depends on the metadata generated by JSON, which was inserted into the properties of the program along with the coordinates at the bus stop analyzed, so that, with this, the data could be viewed in its geographical location, facilitating the identification of the bus stop. The generated file was saved in other formats, such as Shapefile, and used by other programs taking the database with it. QGIS, on the other hand, is a free software with open source code, serving as a multiplatform geographic information system that allows visualization, editing and analysis of georeferenced data.

In the model studied here, QGIS emerges as an example of an application, where the files georeferenced in GEOJSON and saved in Shapefile are recognized by the platform and opened in the program taking with them the databases, and can be superimposed on the maps produced in QGIS.

### **3. Results**

After defining the problem faced, how the establishment of bus stops standardization helps in accessibility of people with disabilities and reduced mobility, and the research parameters, it became possible to list the requirements for the development of a model. The main objective of this model was to detail the urban furniture that appears at the bus stops studied, in order to make it possible to create a database that can be used by various areas of knowledge.

The dotted lines in the figure delimit the boundaries between the steps that form the body model. The upper border represents the input of data, which were collected from accessibility standards, especially NBR 9050 (Accessibility to buildings, furniture, spaces and urban equipment), and the lower border represents the exit of the model with its validation proposal.

An evaluation model for accessibility conditions of salvador bus stops

The operation flow of the model begins with the researcher's action of separating and cataloging the data extracted from accessibility standards, grouping the information of each urban furniture contained in the layout of the bus stop and their respective dimensions and inclinations when relevant.

After the expert creates a list of relevant terms and concepts, this data will be entered into the JSON program, which will encode this data in metadata, making the necessary information available in an organized way so that it could be read by other programs.

This metadata can be copied in GEOJSON along with the geographical coordinates of the analyzed bus stop, in order to create a georeferencing of the bus stop, serving as an example of model application. With that, georeferenced metadata is generated, which has the original data positioned in its geographical location, thus facilitating the user location and understanding.

This generated file can be saved in other formats to be used by various programs, and the example of use studied here is QGIS. The file saved in Shapefile is recognized by the platform and could be superimposed on the maps referenced there.

After all this procedure, the model was analyzed by a specialist so that it could validate the related data and the development of the model. At this stage there may be a feedback, that is, at any time, a previous stage can be reviewed and changed, until the end of the entire process for correction or adequacy according to the evaluator's criteria.

An evaluation model for accessibility conditions of salvador bus stops

Figure 01 shows the Solis Model in its layers.

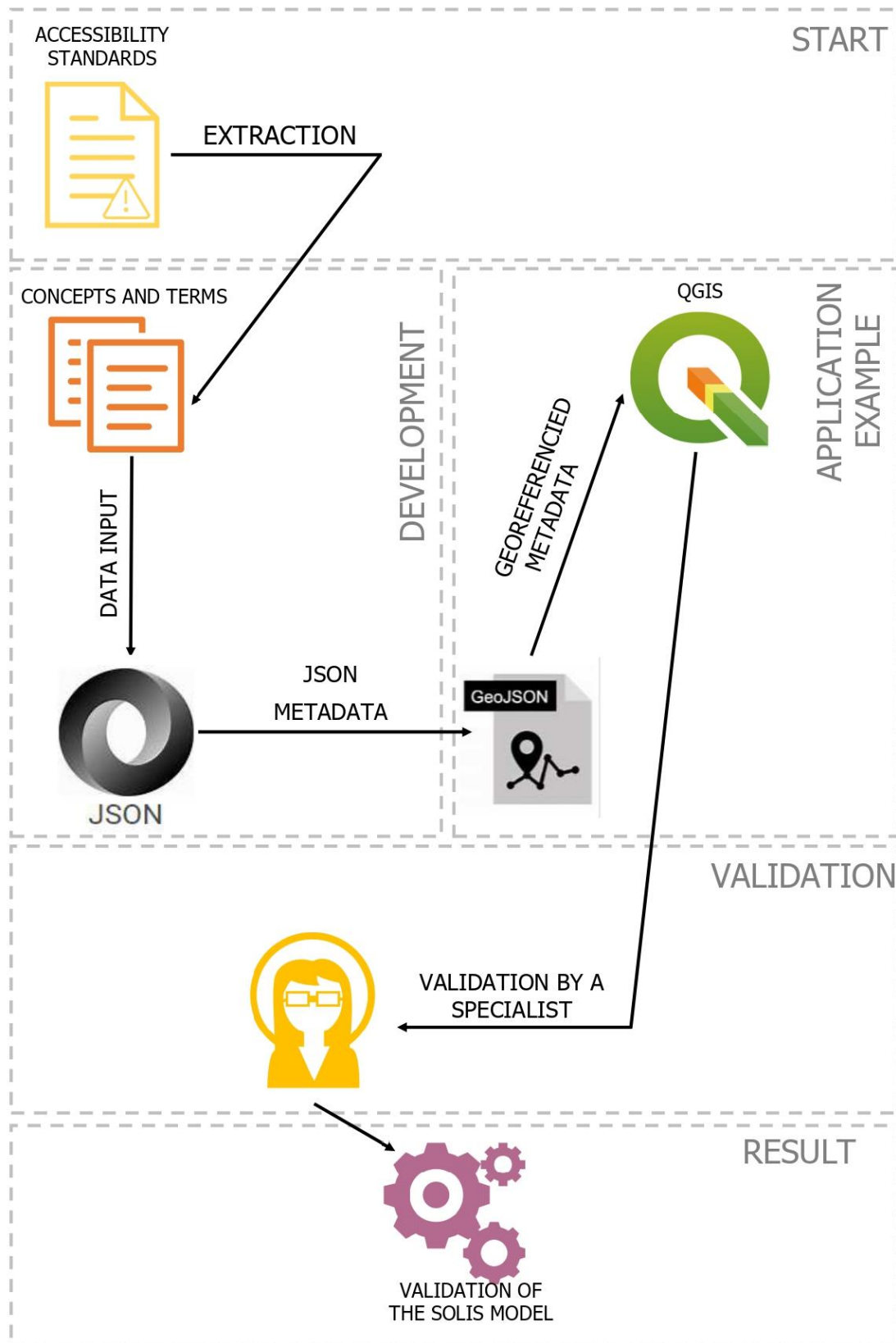


Figure 01: Solis model  
Source: prepared by the author



An evaluation model for accessibility conditions of salvador bus stops

Therefore, at the end of the process the Solis model is ready to be expanded for research, both from other bus stops and also for other urban mobility equipment.

In a practical application for an analysis of the Solis Model, it was necessary, at first, to separate data extracted from the accessibility standards for each urban furniture of the bus stop you want to study. By way of example, some data from NBR 9050 were cataloged, presented below.

- Ramp:

- Maximum Inclination: 8.33%
- Minimum Inclination: 6.25%

- Floor:

- Maximum Transverse Inclination: 3%
- Maximum Longitudinal Inclination: 5%
- Maximum Tactile Signaling: 0.75mm
- Minimum Tactile Signaling: 1.00mm

- Sidewalk:

- Maximum Transverse Inclination: 3.00%
- Maximum Longitudinal Inclination: 8.33%
- Free range dimension: 1.50m

- Reference Module:

- Free range dimension: 1.20m
- Width: 0.80m
- Length: 1.20m

In order to study accessibility, it was taken as reference for real data the bus stop located on Padre Cícero Avenue, on the sidewalk of the Multisport Gymnasium of Juazeiro do Norte, geographical location 7°13'28.5"S 39°19'34.7"W.

- Ramp:

The stopping point does not have access ramps for wheelchair users with adequate inclination, and there is no unevenness considered between the curb of the sidewalk and the street.

- Floor:

It has no tactile floor signs.

- Sidewalk:

Irregular sidewalk, poorly cared, with rugged floors.

- Reference Module:

An evaluation model for accessibility conditions of salvador bus stops

It does not have a reserved space for wheelchair users.

After the creation of this list of relevant terms and concepts, these data will be entered into the JSON program, presented in figures 4 and 5.

In the part called "Accessibility metadata" the information obtained in the accessibility standard was inserted, in a language that can be read and analyzed by the program and, with this, a new document is generated that organizes and separates the data by analyzed criteria.

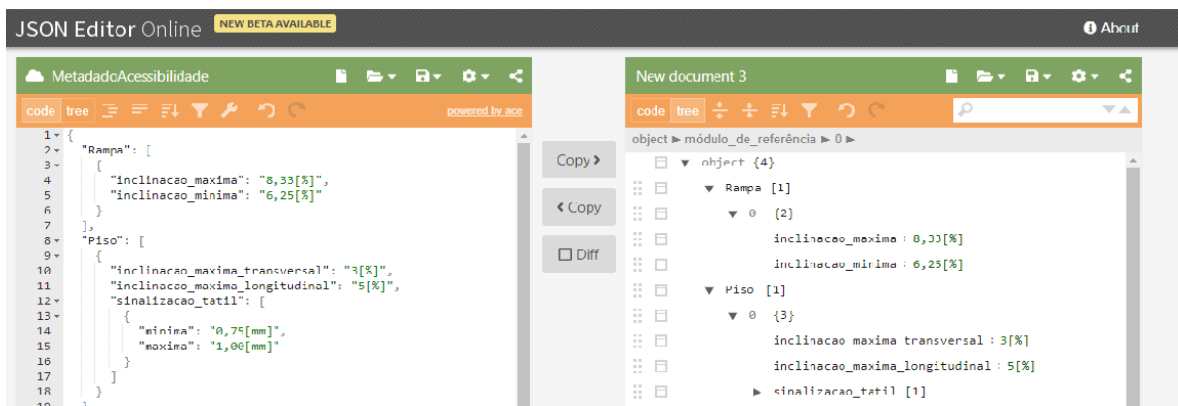


Figure 02: Data on JSON program

Source: JSON.



Figure 03: Data on JSON program

Source: JSON.

After this procedure, the data is represented in JSON format and, therefore, necessary information is available in an organized form and can be read and used by other programs.

As an application example, the transformed data into JSON format can be inserted on GEOJSON program, according to figures 6 and 7, thus inserting besides these information, the geographical coordinates of the studied bus stop. At this stage the generate metadata on JSON is inserted on GEOJSON properties containing all necessary information, posteriorly the bus stop geographical coordinates are inserted.

## An evaluation model for accessibility conditions of salvador bus stops

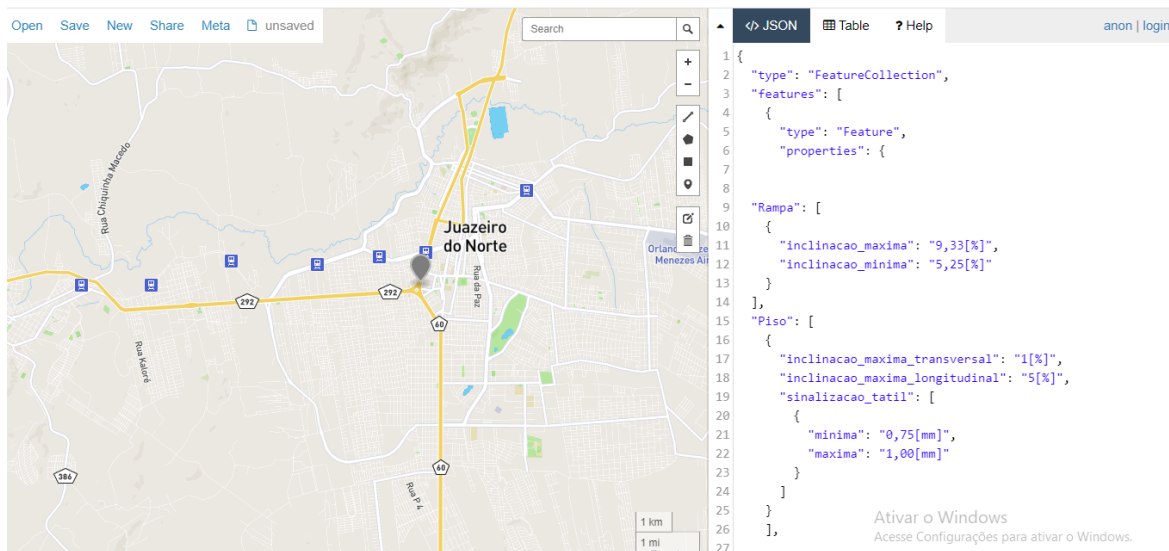


Figure 04: Data on GEOJSON program

Source: GEOJSON.

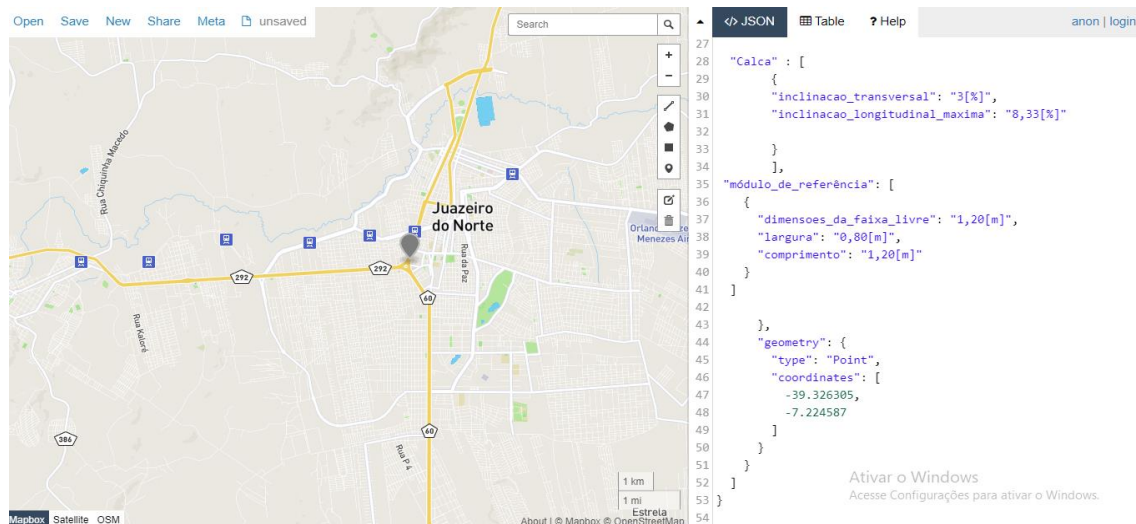


Figure 05: Data on GEOJSON program

Source: GEOJSON.

With this process conclusion, the data having georeferenced representation are generated based on concepts dictionary, aiming to facilitate bus stop location and also containing its characteristics related to the urban furniture found.

Due to data interoperability between programs, QGIS could be used as an application example, importing, therefore, the GEOJSON georeferenced data and saved on Shapefile, where they are recognized by the platform and opened in the program, being superimposed to the maps produced in it, as shown in figure 8.

## An evaluation model for accessibility conditions of salvador bus stops

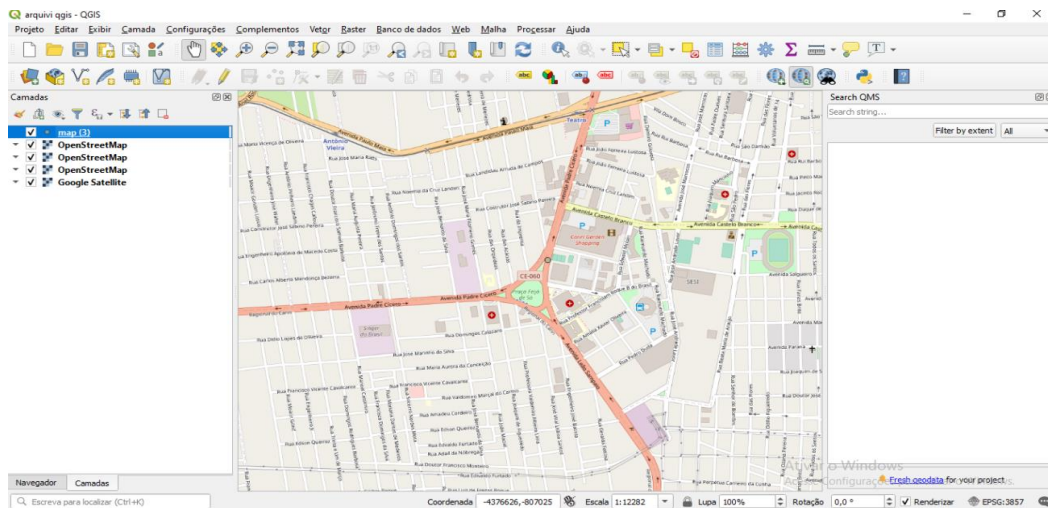


Figure 06: Data on QGIS program.

Source: QGIS.

In this figure can be visualized the study area with all its characteristics and properties, so layers can be superimposed increasing the bus stop under study detail level.

Thus, the generated metadata in this model may be used in other programs to, thus, assist in the bus stop mapping and improvement and subsequently be expanded to other urban equipment.

### 4. Discussions

Making a functional evaluation of the Solis Model considering the accessibility criteria, it is noted that the project seeks to create better conditions for more effective social participation of people with disabilities. First of all, this analysis begins with the legislation turned to people with disabilities, which should adapt the accessible transport definition to a wider view, not only accessible vehicle vision, but also encompass the necessary road infrastructure to improve accessibility.

After the separation of rules and laws, these layouts data of the bus stops are transformed into metadata to feed the model and allow it to be compared with the data seen in the field and thus determine the real accessibility situation of the place studied. Geographic coordinates create a greater map location ease, leading to the project practicality.

From the results, it is possible to propose necessary adaptations at bus stops, adapting them to criteria already established by law and which are often neglected.

The expert evaluation was planned to analyze the presented data generating a validation of the development model. With it, the process becomes more fluid and with better response to the appearance of errors and problem solutions.

After the study and development of the project, it is clearly seen the urgent need of actions that aims minimizing physical and social barriers for people with disabilities, whom, from there, can also enjoy an attractive and so important social life for the generation of opportunities, since the living space of construction of social networks and social capital as well as differentiated access to equipment, services, information and opportunities could bring a series of difficulties and/or facilities to the citizens daily lives..

## 5. Conclusion

The study reveals that the implementation of a model for evaluation of bus stops in the city of Salvador has great potential of producing a database for various areas of knowledge, with wide possibilities of practical application, including in public policies, favoring development of new tools.

## 6. References

- ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS - ABNT. **NBR 9050: Acessibilidade a edificações, mobiliário, espaços e equipamentos urbanos**. Rio de Janeiro, 2020.
- BRASIL. Decreto nº 5.296, de 2 de dezembro de 2004. Regulamenta as Leis nos 10.048, de 8 de novembro de 2000, que dá prioridade de atendimento às pessoas que especifica, e 10.098, de 19 de dezembro de 2000, que estabelece normas gerais e critérios básicos para a promoção da acessibilidade das pessoas portadoras de deficiência ou com mobilidade reduzida, e dá outras providências. **Diário Oficial da União**, Brasília, DF, 3 de dez. de 2004.
- BINS ELY, V. H. M.; TURKIENICZ, B. **Método da grade de atributos**: avaliando a relação entre usuário e ambiente. *Ambiente Construído*, 2005. Disponível em: <<http://www.seer.ufrgs.br/index.php/ambienteconstruido/issue/view/283>>. Acesso em: 20/06/2020.
- BRASIL, Ministério (1988). **Constituição da República Federativa do Brasil**, Brasília; Senado, 1988.
- BRASIL. Lei nº. 10.048, de 08 de Novembro de 2000. Dá prioridade de atendimento às pessoas que especifica, e dá outras providências. **Diário Oficial da União**, Brasília, DF, 08 de Nov. de 2000.
- BRASIL. Lei nº. 10.098, de 19 de Dezembro de 2000. Estabelece normas gerais e critérios básicos para a promoção da acessibilidade das pessoas portadoras de deficiência ou com mobilidade reduzida, e dá outras providências. **Diário Oficial da União**, Brasília, DF, 20 de Dez. de 2000.
- BRASIL. Lei nº. 13.146, de 06 de Julho de 2015. Institui a Lei Brasileira de Inclusão da Pessoa com Deficiência (Estatuto da Pessoa com Deficiência). **Diário Oficial da União**, Brasília, DF, 06 de Jul. de 2015.
- BRASIL. Lei nº. 7.405, de 12 de Novembro de 1985. Torna obrigatória a colocação do "Símbolo Internacional de Acesso" em todos os locais e serviços que permitam sua utilização por pessoas portadoras de deficiência e dá outras providências. **Diário Oficial da União**, Brasília, DF, 12 de Nov. de 1985.
- GARCIA, C. A. **Sub Programa Nacional para Trabalhadores Portadores de Deficiência**. São Paulo: FUNDACENTRO, 2004.
- HOSKINGI.; WALKER, S. **Howtogetstarted?** University of Cambridge, 2011, Disponível em <<http://www.inclusivedesign toolkit.com/betterdesign2/gettingstarted/gettingstarted.html>>. Acesso em: 09/06/2020.
- IBGE – INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. **Censo Brasileiro de 2010**. Rio de Janeiro: IBGE, 2020.
- ORGANIZAÇÃO MUNDIAL DA SAÚDE. **Classificação Internacional da Funcionalidade, Incapacidade e Saúde**. Versão Portuguesa. Lisboa, 2004.

An evaluation model for accessibility conditions of salvador bus stops

JÁUREGUI, J. M. **Recife: Utopia Viva** - Workshop de Desenho Urbano. Recife: omFAUPE,2001, 117p.

KILICASLAN, C.; MALKOC, E.; TUREL, H. **Comparative Analysis of Traditional, Modern, and Renovated Streets in Physical, Visual, and Life Aspects: A Case Study on Buca District Izmir.** Turkey: Indoor and Built Environment,2008. 403p.

MAIOR, I. M. M. de L. *et al.* **Acessibilidade no Brasil: uma visão histórica.** Escola Digital, 2005. Disponível em: <<https://escoladigital.org.br/odas/acessibilidade-no-brasil-uma-visao-historica-46331>>. Acesso em: 20/06/2020.

RIBEIRO, G. S.; MARTINS, L.; MONTEIRO, C. G. Acessibilidade em Olinda-PE: és para quem Oh linda cidade? In: **ENTAC-Encontro Nacional de Tecnologia do Ambiente Construído**, XII, 2008, Fortaleza. Anais do ENTA C 2008. Fortaleza: ANTAC, 2008.

SALVADOR. Lei nº. 9.069, de 30 de JUNHO de 2016. Dispõe sobre o Plano Diretor de Desenvolvimento Urbano do Município de Salvador – PDDU 2016 e dá outras providências. **Diário Oficial do Município de Salvador**, Bahia. de 30 de JUNHO de 2016.

SIMÕES, J.F.; BISPO, R. **Design Inclusivo: Acessibilidade e Usabilidade em Produtos, Serviços e Ambientes.** 2ªed. Lisboa: Centro Português de Design, 2006. 79p.