

# ACCESSIBILITY IN METRÔ RIO PRIOR TO THE 2016 OLYMPIC AND PARALYMPIC GAMES

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## Acessibilidade no Metrô Rio antes dos Jogos Olímpicos e Paraolímpicos

### ABSTRACT

The city of Rio de Janeiro, Brazil hosted the 2016 Olympic and Paralympic Games which brought forth an enormous influx of tourists to a large populated city. This study analyzed accessibility of the Metrô Line 1 of the subway system in preparation for the games. Photo-based research was used to investigate the Metrô Rio services. Findings suggest that the subway system in the city of Rio de Janeiro is accessible; however, improvement is needed in the areas of communication, through standardization of language used to describe equipment and accommodations, the standardization of signage and equipment, standardization of navigational logic patterns, and predictability of barriers and services for patrons. A tension was also identified between services provided with assistance and services that promote independence for users with disabilities. Results will help transit agencies to consider accessibility features for all patrons.

**Keywords:** Subway; Rio de Janeiro; Human Rights; Disability; Society

### Resumo

O Rio de Janeiro foi cidade-sede dos Jogos Olímpicos e Paraolímpicos de 2016, evento que gerou um enorme fluxo de turistas em uma cidade bastante populosa. O presente estudo analisou a acessibilidade do Metrô Linha 1 do sistema metroferroviário em preparação para os jogos. A investigação utilizou-se do registro fotográfico para averiguar os serviços do Metrô Rio. Os resultados sugerem que o sistema

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Recebido: novembro 2,  
2016

Aceito: março 17, 2017

de metrô do Rio de Janeiro é acessível; porém, são necessárias melhorias nas áreas de comunicação por meio da padronização da linguagem utilizada para descrever os equipamentos e espaços, da padronização da sinalização e dos equipamentos oferecidos, da uniformização dos modelos de locomoção e do aumento de previsibilidade dos obstáculos e dos serviços oferecidos aos usuários. Também foi identificada uma tensão entre os serviços que se apoiam na assistência e serviços que promovem a independência para os usuários portadores de deficiência. Os resultados auxiliarão agências de transporte a considerar características de acessibilidade para todos os usuários.

**Palavras-chave:** Metrô; Rio de Janeiro; Direitos Humanos; Portadores de Deficiência; Sociedade

## 1. INTRODUCTION

When a proposal is submitted to host the Olympic Games, often there is a marketing aspect included in the proposal used to excite citizens and gain local support; a popular focus is a platform that “would help attract tourists and generate income” for the local economy<sup>1</sup>. As Sant and Mason<sup>2</sup> observed, two other popular options include framing the story as either one of creating “capital projects” and/or “human interest”. Thus, a combination of focuses frequently co-exist as promises of various improvements are made and potentially fulfilled as the host nations prepare for the international event.

Rio de Janeiro hosted the finals of the 2014 FIFA World Cup and hosted the 2016 Olympic and Paralympic Games. In addition to the prestige and recognition the city received prior to and during the hosting of these events, that which was left behind after all the matches have been completed and the competitors have left is another way to measure the success of these endeavors. The International Olympic Committee (IOC) includes in its mission statement of the need for a “positive legacy from the Olympic Games to the host cities and the host countries” as being a requisite outcome<sup>3</sup>.

Essentially, this means that the IOC desires to benefit the quality of life for the residents of the host city and host country. Often the construction of a new stadium or athletic venue is the primary legacy

<sup>1</sup> KASIMATI, 2003, p. 433.

<sup>2</sup> SANT; MASON, 2015, p. 46 and p. 50.

<sup>3</sup> INTERNATIONAL OLYMPIC COMMITTEE, n.d.a., p. 17.

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to the host city. Part of the problem, however, with funding new stadiums and facilities for the Olympic Games is that “the lifespan of stadiums has grown shorter while the price tag has grown larger”<sup>4</sup>.

Unfortunately, “there is little consideration of legacies related to accessible infrastructure, attitudinal change, and opportunities for people with disabilities”<sup>5</sup>. The International Olympic Committee stated that the bid for the games from Rio de Janeiro had the potential to “transform a city, a region and a country” as the Brazilian government’s vision focused on sports “as a catalyst for social integration”<sup>6</sup>.

The path to social integration for individuals with disabilities usually starts with a fixed point related to the creation of laws that protect or expand the rights of those individuals. Brazil has had a very progressive legislative policy related to equitable education as noted clearly in the Constitution of the Federal Republic of Brazil, Article 166, adopted in 1946: “All persons shall be entitled to education, which shall be given in the home and in schools, and shall be based upon the principles of freedom and the ideal of the brotherhood of man”<sup>7</sup>. At this point education in Brazil became a *universal right* protected by the Constitution. The social inclusion of individuals with disabilities was written into the Brazilian constitution of 1988. This legislation, Lei N<sup>o</sup> 7.853/1989, called for social integration and ensured the exercise of individual and social rights of people with disabilities.

The current legislation regarding the inclusion of people with disabilities (Estatuto da Pessoa com Deficiência), law 13.146 of July 6, 2015, was written to ensure and promote equality and fundamental freedoms for individuals with disabilities in society. In particular, this legislation outlines that it is the right of individuals with disabilities to have access (with security and autonomy) to transportation, information, and means of communications. There is also a specific reference to the utilization of universal design and assistive technologies. Given that the legislation went into effect in 2015 it was hoped that one of the legacies of hosting the 2016

<sup>4</sup> DELANEY; ECKSTEIN, 2003, p. 190.

<sup>5</sup> DICKSON; BENSON; BLACKMAN, 2011, p. 286.

<sup>6</sup> INTERNATIONAL OLYMPIC COMITEE, n.d.b., p. 46.

<sup>7</sup> HAVIGHURST; MOREIRA, 1965, p. 137.

Olympic and Paralympic games would be improved accessibility for all in the city of Rio de Janeiro.

Historically, among the legacies of a host city are the accessibility programs that were either instituted or enhanced because of the Olympic Games. Kaplanidou and Karadakis observed the following regarding the Vancouver Winter Olympics of 2010: “Community projects related to accessibility issues for people with disabilities were designed and implemented across the province in the period leading up to the Games but also were designed to be sustained after the event”<sup>8</sup>. Adaptations to modes of public transportation that facilitate its use for the largest possible segment of users are of primary importance as both a legacy and testament to sustainable design. Kasimati listed transportation as one of four main areas of economic effects, along with food, accommodations, and games tickets that were outcomes, which a city gains by hosting the Olympic Games<sup>9</sup>. Thus, transportation serves as both an economic and ethical avenue for creating a positive and lasting legacy for Rio de Janeiro.

This paper is an investigation of accessibility as it relates to Line 1 of the public Metrô (urban subway) transportation system, for “traditional urban public transportation systems ... rarely take into account the needs of people with disabilities”<sup>10</sup>; however, because Rio hosted both the 2016 Olympic and Paralympic Games, it was hypothesized that organizers of these events in Rio addressed the transportation needs for both participants and spectators with disabilities.

## 2. REVIEW OF THE LITERATURE

According to Church and Marston “public policy on access for people with disabilities boils down to: it is either provided within an absolute sense or it is not”<sup>11</sup>. Church and Marston further stated “An accessible route is supposed to coincide, when feasible, with the route for the general public. In many cases it is either not possible or cost prohibitive to make the route used by the general public

<sup>8</sup> KAPLANIDOU; KARADAKIS 2010, p. 114.

<sup>9</sup> KASIMATI, 2003.

<sup>10</sup> ZHOU; HOU; ZUO; LI, 2012, p. 10679.

<sup>11</sup> CHURCH; MARSTON, 2003, p. 84.

**In terms of a legacy, “the urban public transportation accessibilities for people with disabilities are important factors in reducing poverty and can facilitate the participation of people with disabilities in economic, social, and political processes”**

entirely accessible to all people”<sup>12</sup>. Steinfeld et al. have determined that “the slow adoption rate of best practices has a more significant impact on people with disabilities”<sup>13</sup>. For example, “A ramp at the rear of a structure may provide absolute access, but it may make all people who need such a ramp to go out of their way as compared to a typical user”<sup>14</sup>.

The changes and improvements made to the Metrô system, in the city of Rio de Janeiro, in preparation for the 2014 World Cup and 2016 Olympic, and Paralympic games could have lasting impact, not only on Rio’s post-event legacy, but in the lives of its citizens. Keeling discussed the importance of “the critical connections between personal mobility and sustainable, manageable transport systems,” and also claimed “transportation remains probably the most difficult challenge for global sustainable development over the coming decades”<sup>15</sup>.

This research investigated practices that were implemented in Rio de Janeiro, in line with Church and Marston’s notion that, “As money is spent on renovation, remodeling, and removing barriers across the urban landscape, attention should be directed towards making cost effective decisions, decisions that will help make the greatest improvement in overall accessibility”<sup>16</sup>. As Dickson, Benson, and Blackman concluded, “It is imperative for the integrity of all mega sporting events that seek to justify the public expense on the basis of a diverse range of legacies for host communities that these legacies be evaluated over a prolonged period”<sup>17</sup>. Ideally, improved accessibility in the Metrô for individuals with disabilities will remain long after the Olympic torch has left Rio. In terms of a legacy, “the urban public transportation accessibilities for people with disabilities are important factors in reducing poverty and can facilitate the participation of people with disabilities in economic, social, and political processes”<sup>18</sup>.

<sup>12</sup> Ibid. 2003, p. 94.

<sup>13</sup> STEINFELD ET AL., 2010, p. 73.

<sup>14</sup> CHURCH; MARSTON, 2003, p. 88.

<sup>15</sup> KEELING, 2009, p. 522.

<sup>16</sup> CHURCH; MARSTON, 2003, p. 95.

<sup>17</sup> DICKSON; BENSON; BLACKMAN, 2011, p. 299.

<sup>18</sup> ZHOU; HOU; ZUO; LI, 2012, p. 10679.

### 3. METHODOLOGY

This research was grounded in naturalistic inquiry based on real-world situations in which researchers did not “attempt to manipulate the phenomenon of interest”<sup>19</sup>. Further, “qualitative inquiry means going into the field – into the real world of programs, organizations, neighborhoods, street corners – and getting close enough to the people and circumstances there to capture what is happening”<sup>20</sup>. Authors of this study spent a month in the city of Rio de Janeiro doing field-work on accessibility, as the result of a federally funded group project abroad program grant. Data was collected through document revision, such as the Metrô Rio’s website, and field observations. A journal log was used to keep data collected from the field as well as for reflection. According to Patton critical reflection and self-reflection are essential elements of qualitative inquiry. Further, he stated that:

Self-reflection and self-knowledge, and willingness to consider how who one is affects what one is able to observe, hear, and understand in the field and as an observer and analyst. The observer, therefore, during fieldwork, must observe self as well as others, and interactions of self and others<sup>21</sup>.

Berg observed that the use and analysis of photographs offers an “interesting avenue for unobtrusive research”<sup>22</sup>. Photographs were used to tell the story in this research project. Wang and Redwood-Jones noted that “Photovoice” is a powerful qualitative research technique that:

Enables people to assess the strengths and concerns of their community and communicate their views to policy makers. By providing people in the community with cameras, photovoice makes it possible for them to (1) record and reflect their community’s assets and concerns, (2) discuss issues of importance to the community in large and small groups to promote critical dialogue and produce shared knowledge, and (3) reach policy makers<sup>23</sup>.

<sup>19</sup> PATTON, 2002, p. 39.

<sup>20</sup> Ibid., p. 48.

<sup>21</sup> Ibid., p. 299.

<sup>22</sup> BERG, 2004, p. 219.

<sup>23</sup> WANG; REDWOOD-JONES, 2001, p. 560.

The focus of this research was Line 1 of Metrô Rio. At the time of this research, the line ran from Uruguai station to General Osório station, (see Figure 1) and served as the entry points to the Metrô Rio for tourists staying in the hotels in the traditional tourist areas of Ipanema, Leblon, and Copacabana<sup>24</sup>. Line 1 was found to be key in the transportation system surrounding the Olympic venues.

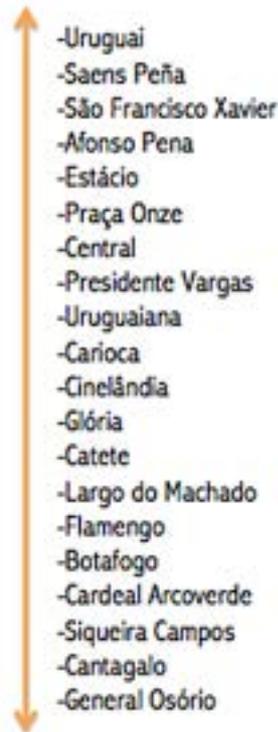


Figure 1: *Line 1 Metrô Rio stations*

The photographs in this document served as springboards to discussion, as well as evidence, because “visual representations ... speak directly to the research question”<sup>25</sup>. As the result of this study, the researchers were able to frame the story of the accessibility of Line 1 of Metrô Rio. “By framing an issue or event in a particular manner, newsmakers are able to highlight some ideas rather than others, thereby making these ideas more salient in the article”<sup>26</sup>. A frame provides a context and helps create meaning, and the photo-

<sup>24</sup> CONCESSIONÁRIA RIO BARRA S. A., 2016.

<sup>25</sup> MCRAE; ELLIS, 2012, p. 25.

<sup>26</sup> SANT; MASON, 2015, p. 43.

**In analyzing the data, the researchers found that Rio de Janeiro has made many attempts at accessibility when it comes to its Metrô transportation system; however, equality and independence does not truly exist for all people with disabilities when using the system.**

study both celebrates and critiques the response Rio de Janeiro has demonstrated to people with disabilities in regards to accessibility issues with Metrô Rio.

#### 4. RESULTS

In analyzing the data, the researchers found that Rio de Janeiro has made many attempts at accessibility when it comes to its Metrô transportation system; however, equality and independence does not truly exist for all people with disabilities when using the system. From a cultural perspective, accessibility appears to have a different contextual meaning. Many employees at the Metrô Rio system emphatically emphasized that they were there to assist anyone who needed it, and the attitudes toward accessibility with autonomy versus accessibility with assistance was evident in this research study.

Overall, the researchers discovered that Line 1 of the public subway transportation in Rio de Janeiro, Brazil, is, for the most part, accessible for people with disabilities. That is not to say that opportunities for improvement do not exist, but rather, to reiterate the fact that Line 1 of Metrô Rio appears to be a work in progress.

##### 4.1 Types of Accessibility

As indicated in Table 1, Metrô Rio has multiple supports for people with disabilities. The information in this table was constructed from information found on the Metrô Rio website.

Table 1: Accessibility of Line 1 Metrô Rio Stations

Station Name	Ramp	Lift	Vertical Platform	Tactile Floor	Braille Markings on Handrails	Braille Maps	Wheelchair Marking	SOS Totem Phone	Vertical Plate Signaling	Inclined Platform
Afonso Pena		X	X	X	X	X	X	X	X	
Botafogo		X		X	X	X	X	X	X	X
Cantagalo		X	X	X	X	X	X	X	X	
Cardeal Arcoverde		X	X	X	X	X	X	X	X	X
Carioca				X	X	X	X	X	X	X
Catete		X	X	X	X	X	X	X	X	
Central				X	X	X	X	X	X	X
Cinelândia		X		X	X	X	X	X	X	
Estácio				X	X	X	X	X	X	X
Flamengo	X		X	X	X	X	X	X	X	
General Osório		X		X	X	X	X	X	X	
Glória		X		X	X	X	X	X	X	
Largo do Machado		X	X	X	X	X	X	X	X	
Paraça Onze	X		X	X	X	X	X	X	X	
Presidente Vargas		X	X	X	X	X	X	X	X	
Saens Peña				X	X	X	X	X	X	X
Siqueira Campos		X		X	X	X	X	X	X	
São Francisco Xavier		X	X	X	X	X	X	X	X	
Uruguai				X	X	X	X	X	X	
Uruguaiana		X	X	X	X	X	X	X	X	

Data Source: Metrô Rio (2014)

Table 1 shows what accommodations each Metrô Rio station on Line 1 has in regard to accessibility for all patrons. A *ramp* is used to initially access the Metrô Rio station from the street and/or is used to connect the street level to the mezzanine (ticketing) level. Like ramps, *inclined platforms* are used to overcome a small level difference and are normally small removable platforms that can be put in place temporarily if needed.

A *lift* is defined as anything that overcomes a level difference of four meters or greater<sup>27</sup>. The research team determined that the term *lift* (for Metrô Rio) applies to an elevator and/or a mechanical device that is attached to the handrail that follows alongside the path of

<sup>27</sup> METRÔ RIO, 2014.

the steps. The two types of *lifts* are extremely different and require different degrees of effort and time to use. The first type of *lift* is an elevator, which can be operated by the individual without assistance (see Figure 2). The other type of *lift* is a mechanical device that is attached to the steps and needs to be lowered for the user (see Figure 3); it is more cumbersome and time-intensive than an elevator.



Figure 2: *Elevator*

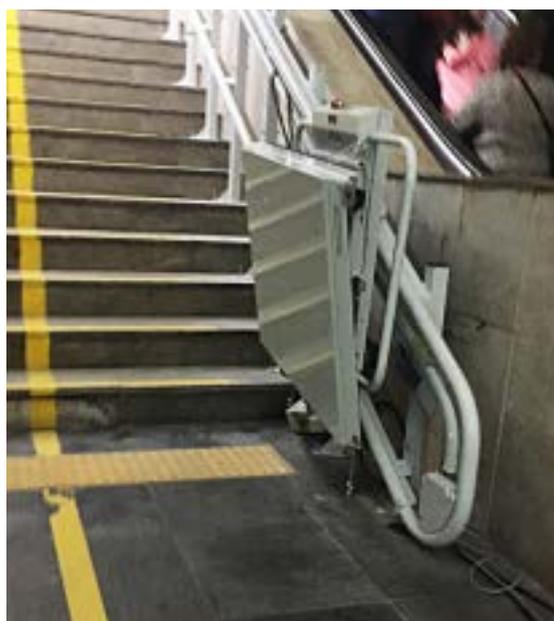


Figure 3: *Stair lift*

Functioning in a manner that is similar to *lifts*, a *vertical platform* is a device that enables a person who uses a wheelchair to overcome level differences less than four meters, connecting the mezzanine level to the platform level and/or the mezzanine to the street level. The researchers' observations found that a *vertical lift* likely requires assistance from a Metrô worker (see Figure 4). The *vertical platform* is similar to both lifts, but the users ride straight up or down after the platform is brought to the needed level.



Figure 4: *Vertical platform*

In addition to *lifts* and *platforms*, all stations have tactile flooring (see Figure 5), which enables patrons, especially those who are blind or have low vision, to follow a path to the cars. There are also changes in the tactile flooring patterns to indicate when a change in level is approaching, the edge of the platform is close, or when an intersection with another path is near. Other accommodations for all riders, particularly those with visual impairments, are braille maps (see Figure 6), which provide information about the location of all of the features at the particular Metrô station, and braille writing on the handrails (see Figure 7).

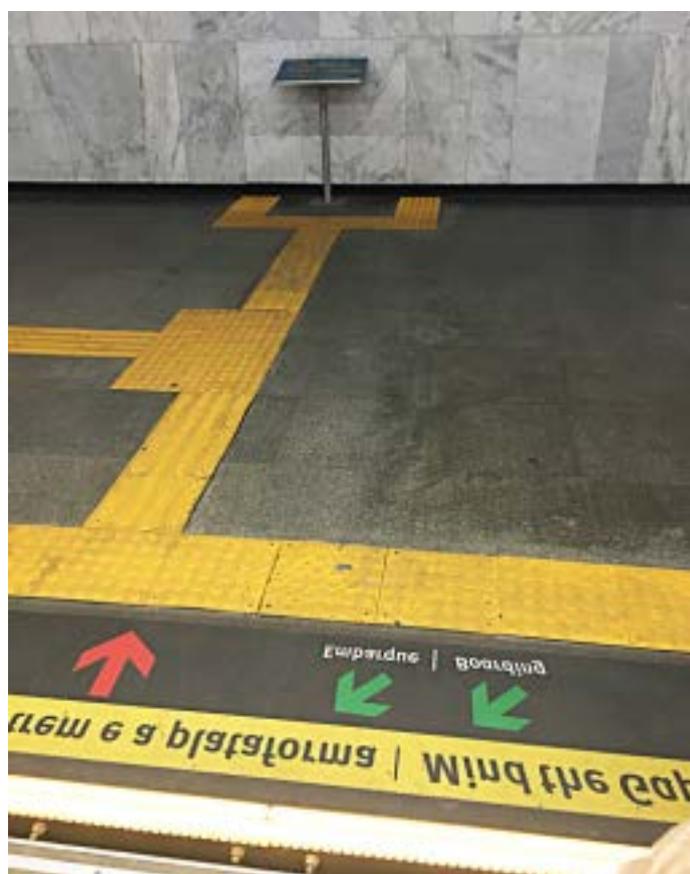


Figure 5: Tactile flooring



Figure 6: Braille map



Figure 7: Braille on Handrails

Wheelchair indicators placed on the platform floor are used to identify the ideal location for wheelchair users to enter the Metrô cars, which are located on the platform at the first car/first door and last car/last door of the train. The SOS Totem phone (see Figure 8) is for individuals who use a wheelchair and others needing assistance to call to the surveillance room, where the Metrô Rio employees are located, from the platform.



Figure 8: SOS Totem phone

A cursory glance at Table 1 may seem to indicate that the Metrô Rio is quite accessible. However, the research team investigated the validity and accuracy of the claims through first hand observation. Line 1 of Metrô Rio has 20 stations, and the research team investigated the accuracy of the website claims in all of them. It was found that the stated accommodations were present at the stations and, in some instances, stations actually had additional accommodations that were not listed on the website.

During the course of this research, numerous important similarities among the Metrô Rio stations were identified. All stations were equipped with a braille map and an SOS phone. While riding the Metrô, the research group found the following pattern: in the first car (located directly in front of the wheelchair accessible indicator on the platform) the first set of doors always opens in front of an SOS

phone; the last car of the Metrô also always stops in front of an SOS phone. In the first car, the second set of doors always opens in front of the tactile flooring that will lead people who are blind directly to a braille map to help them, if necessary, to navigate the Metrô station. Because of these patterns, the researchers concluded that for a person who uses a wheelchair, the first or last car of the Metrô is the best option. Riders who have any form of visual impairments should ride in the first car, entering and exiting through the second set of doors.

In addition to the aforementioned accommodations at different stations, Metrô Rio also has new trains that have additional accessibility features. These new trains are equipped with a light-up map that blinks to indicate the direction in which the train is moving and which station is next in sequence on the line (see Figure 9). Green and red lights above the doors indicate which side of the train to exit. The lights also coordinate with which line patrons are currently traveling on, the green line (Line 2) or the orange line (Line 1).



Figure 9: Map with lights denoting stations

In addition to the map, there is a screen that projects announcements, such as the next stop and on which side of the car the doors will be opening. This process of announcing the next stop and exit side of the train is replicated as an audio announcement as well (on both the older trains and new trains). The entire train itself is also completely open and allows passengers to walk or wheel through the train from car to car (see Figure 10). The amenities on the new trains demonstrate the idea of universal design, for even though they have been designed and implemented for people with auditory and/or visual disabilities, all passengers are able to benefit from them.



Figure 10: *New subway cars*

Overall, the Metrô Rio is fairly accessible for individuals with disabilities. The biggest difficulty is the differences that exist from station to station and train to train. Amenities that are beneficial at one station may not exist at the station in which a person with a disability is traveling. Likewise, passengers may ride an older train which lacks the modern amenities.

#### **4.1.1. Barriers and Access**

Even though a station may be accessible it does not necessarily mean that it is convenient to use the accommodations. For example, the Metrô station at Botafogo has six entrances, seemingly very convenient for passengers, unless the passenger requires use of the elevator. As indicated on the map, the elevator is near entrance “A” and is directly next to a one-way street, so patrons need to navigate traffic patterns around the station in order to access the elevator (see Figure 11). The elevator, at Botafogo station, transports patrons from the street level to the mezzanine level, but although the sign indicates that patrons may take the elevator from the mezzanine level to the platform, this research team was unable to determine the ease of access to the platform from the elevator.

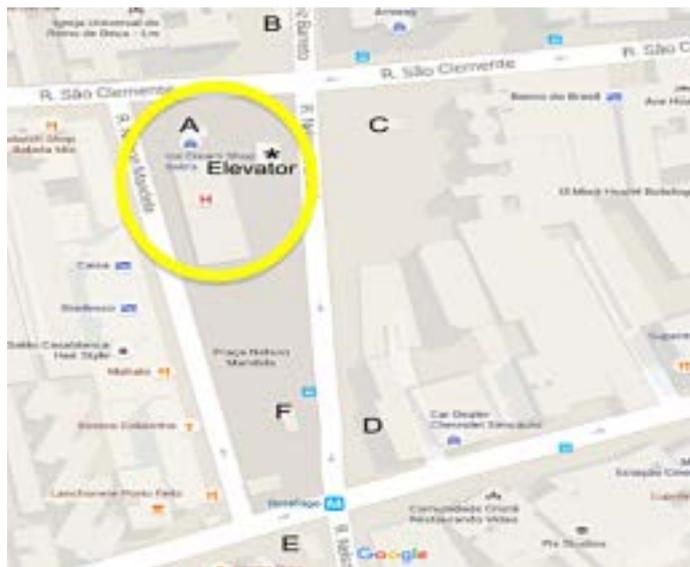


Figure 11: Entrances of Botafogo Station

Additionally, patrons using a wheelchair must exit the elevator area (a side corridor) in order to purchase a ticket at the mezzanine level and then return to the elevator in order to take it to the platform level. In Botafogo, the elevator appears to provide access to only one direction of one line, running from Botafogo to General Osório station. Patrons who wish to take a train in the other direction must use the vertical platform lift instead.

As illustrated in the example with the Botafogo station, Metrô Rio lists the accessibility features that each station has<sup>28</sup>; however, it does not give all the information that someone requiring these accommodations would need in order to successfully navigate the facilities. For example, the website does not inform patrons what entrance is equipped with a ramp or lift. Some stations, like Botafogo, have up to six different entrances, but only one of these entrances has the ramp or lift. Researchers, in this study, found that when there are multiple entrances to the station, the elevator is most commonly located at entrance “A.” Unfortunately, outside the Metrô station, entrance “A” is not always clearly indicated and is not present on the online Metrô Rio map. Conversely, the entrances and exits are clearly labeled from the inside at the platform and mezzanine levels.

<sup>28</sup> METRÔ RIO, 2014.

Metrô Rio provides a definition of each type of accommodation, some of the definitions and terms are confusing<sup>29</sup>. Patrons can find out which stations have a lift, for example, but they have no way to determine what type of lift is at the station. The two very different types of lifts require different amounts of time to use; thus, users do not know how much time they need to budget. Additionally, although a vertical platform functions in a manner that is very similar to a lift, Metrô Rio refers to it as a different type of accommodation<sup>30</sup>; yet, the research group discovered vertical platforms that were labeled as elevators (see Figure 12). This inter-mixing of terminology and accommodations serve as confounding information for potential users to process and understand. This could be avoided by giving accurate and updated information on the Metrô Rio website or making all the lifts the same at every station. Depending on the specific type of accommodation, users may not be in a position to operate the lift or inclined platform on their own. This takes away their independence and requires additional time while patrons await assistance.



Figure 12: Vertical Platform

<sup>29</sup> Ibid.

<sup>30</sup> METRO RIO, 2014.

Another barrier at the Metrô Rio stations is the gap that exists between the car and the platform. Although there are signs and announcements that tell people to “mind the gap” (see Figure 13), the gap is clearly a risk for all patrons, especially those with disabilities. The researchers found that the gap ranged from three to five inches, depending at which Metrô station the train stopped. Riders who use a wheelchair may have a hard time boarding the train because they do not know what to expect, due to the inconsistency of the gap, until the train arrives.



Figure 13: Gap between platform and Metrô car

The gap is a further challenge in that there was also a vertical lip ranging from one to two inches from the platform to the car entrance. The gaps and lips make it difficult for riders with a wheelchair to board by themselves, and often need assistance from either a personal assistant, a stranger, or an employee of the Metrô Rio station. This may take away independence from the individual who is using a wheelchair while navigating the Metrô in Rio de Janeiro.

#### 4.1.2. Inadequacies of Current Systems

Although beneficial accommodations in the form of equipment exist at all the Metrô Rio stations, the current system also has many inadequacies. The biggest problem is broken equipment. The lift at the Carioca station was broken (see Figure 14) and the research team observed an individual having to take his wheelchair up an escalator. It was observed, at the Praça Onze station, that the lift was either broken or closed for repairs, and the construction around it blocked the tactile flooring (see Figure 15).



Figure 14: Image of a broken stair lift at Carioca Station



Figure 15: Blocked tactile Flooring

It was also observed a few different times, and in different cars, that the lighted map on the new cars was not working possible causing confusion to riders. A common issue across different stations was damage to the tactile flooring (see Figure 16). When accommodations are broken or inaccessible they benefit no one, especially those who require them, and become potential barriers.



Figure 16: Broken tactile flooring

The lack of clarity about the accommodations at each station is also problematic. For example, there are three stations that serve the Copacabana area; Cardeal Arcoverde, Siqueira Campos, and Cantagalo. According to Metrô Rio, all three have lifts<sup>31</sup>. Seemingly, this would indicate equivalent accessibility across stations; however, at the Cardeal Arcoverde station, instead of an elevator, there was a mechanic lift attached to the handrail that followed alongside the path of the steps. This leads to an increase in the amount of time it takes a person using a wheelchair to navigate the station and also constitutes a loss of independence. Depending on the desired location in Copacabana, patrons may actually prefer to exit at the Siqueira Campos station, which has an elevator, saving time and maintaining autonomy.

## 5. DISCUSSION

The Metrô Rio has made significant attempts at making the Metrô Line 1 accessible; however, there are a number of persistent barriers and opportunities for improvement. Over a decade ago, the types of problems that currently exist were identified as important issues in

<sup>31</sup> METRÔ RIO, 2014.

**From the results of this research, four themes emerged: standardization of language used to describe equipment and accommodations; standardization of signage and equipment; standardization of navigational logic patterns; and predictability of barriers and services.**

Brazil. Mattevi, Bredemeier, Fam, and Fleck following guidelines from the World Health Organization, performed focus group interview with individuals living with disabilities in order to ascertain their attitudes and perceptions regarding the most important themes and concerns. Within the large group topic of transportation, all five focus groups identified the following sub-theme topics:

Universal accessibility (ramps, grab bars, seats for the obese); audio recording support services for the visually impaired; public areas suitable for the blind (no holes, rubber floors, protections in public telephones, wide sidewalks); improved access to the Internet for the visually impaired; adapted means of transportation; [and] widespread use of sign language<sup>32</sup>.

Even though these participants were from the city of Porto Alegre and not Rio de Janeiro, the proximity and similarity to Rio, along with the same legislation governing accessibility and the fact that they raised similar issues, implies that the concerns of the individuals in the focus groups parallel the concerns of people with disabilities living in Rio de Janeiro.

From the results of this research, four themes emerged: standardization of language used to describe equipment and accommodations; standardization of signage and equipment; standardization of navigational logic patterns; and predictability of barriers and services. In the case discussed in which vertical platforms have been labeled as elevators, this causes a barrier as to what patrons can expect as accommodations when arriving to the station. As noted, different types of lifts require different amounts of time to use; thus, users do not know how much time they need to budget nor do they know how congruent the equipment they personally use will be compatible with the adaptation created by Metrô Rio. The intermixing of terminology and accommodations serve as confounding information for potential users to process and understand.

This example has much to do about the normalization of language being used. To draw lines to American legislation, the U.S. Department of Justice's Americans with Disabilities Act guidelines note that terms not defined in section 106.5 or in regulations issued by the Department of Transportation or Department of Justice "to

<sup>32</sup> MATTEVI; BREDEMEIER; FAM; FLECK, 2012, p. 192.

implement the Americans with Disabilities Act, but specifically defined in a referenced standard, shall have the specified meaning from the referenced standard unless otherwise stated”<sup>33</sup>. Subsequently, the terms lift, elevator, and standard platform lift are not defined in the list of definitions in section 106.5. As such, the terms become ambiguous to the potential reader.

The Brazilian Association of Technical Norms, Accessibility on Urban or Metropolitan Train Systems defines each type of lifting equipment: an *Inclined Elevator* moves up to an angle of 70 degrees in relation to horizontal [grade level]; a *Vertical Elevator* moves up to an angle of greater than 70 degrees in relation to horizontal [grade level]; a *Vertical or Inclined Platform* is equipment with a movable platform which moves in a vertical or inclined manner, and is commonly an adaptation to [pre-existing] construction<sup>34</sup>.

Problems arise for users when they plan on being able to use one form of accommodation only to find it is substituted with another when arriving at the station. As findings suggest, this causes a barrier in terms of time, as some equipment like vertical or inclined platform lifts require additional assistance and thus are not autonomous as well as issues of non-standard equipment like motorized wheelchairs or scooters perhaps not fitting on the platform type lift itself.

In fact, because of this factor of non-autonomous use of equipment, the Brazilian Association of Technical Norms delineates what equipment may be used autonomously, assisted, or accompanied<sup>35</sup>. Under the regulations, a person may use a vertical or inclined elevator autonomously, whereas they must be assisted when using a vertical platform lift and accompanied when using an inclined platform lift for those with reduced mobility or when using a wheelchair.

The guidelines also state that when the equipment is out of service, qualified personnel must have a procedure in place to assist the individual. This denotes a social aspect to accessibility. This too is clarified by expectations laid out in the definitions set forth by the Brazilian Association of Technical Norms: *accompanied* means that the individual is required to use the equipment in the presence of

<sup>33</sup> UNITED STATES, 2010.

<sup>34</sup> ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS, 2005.

<sup>35</sup> ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS, 2005.

qualified personnel (e.g. on the lift standing behind the wheelchair); *assisted* means the individual user with a disability uses the equipment, but is monitored by a qualified assistant (rather than being accompanied by another person on the equipment)<sup>36</sup>.

Using elements of Universal Design is one way of implementing changes to make the Metrô Rio accessible for those with physical impairments, as well as those who experience trouble navigating the Metrô using the stairs. “Universal design not only provides a higher level of access for the general transit user but also for those patrons with disabilities”<sup>37</sup>, thus creating access for the general public broadly and people with disabilities specifically. For the Metrô Rio to be accessible for all patrons with physical impairments, lifts need to be installed to give access to the ticket booths on the mezzanine levels and platforms to be compliant with the theory of Universal Design. Wu, Gan, Cevallos, and Hadi noted that “inaccessible transit stops prevent people with disabilities from using fixed-route transit services, thereby limiting their mobility”<sup>38</sup>.

Similarly, if stations have multiple entrances, the entrance that is most accessible has to be clearly labeled with how to access that accommodation (e.g. where the lift is and whom to contact to operate the machine). All entrances of stations that are not accessible for those with physical impairments need to give directions or the location to the most accessible entrance, rather than making the user go through a trial-and-error method to locate the accessible entrance. If the station does not offer any modes of accessibility for an individual with a physical impairment, it should be labeled clearly and the user provided with directions to the nearest accessible station.

The Brazilian Association of Technical Norms mandates that the exterior of stations have visual and tactile information that contains the name of the station, subway lines, hours of operation of the station, and identification of the entrance by a letter, number, or name designation<sup>39</sup>. Also, for people with disabilities or reduced mobility, signage should be present at the entrance where those services are present with the universal sign of accessibility. All other

<sup>36</sup> Ibid.

<sup>37</sup> WU; GAN; CEVALLOS; HADI, 2011, p. 580.

<sup>38</sup> Ibid.

<sup>39</sup> ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS, 2005.

entrances to the same station should clearly direct individuals to the accessible entrance.

Figure 17 provides an illustration of the absence of signage to the accessible entrance, incongruent with the norms laid out by the Brazilian Association of Technical Norms. The written description is missing from the signage posted at the Botafogo station because half of the sign is missing, coincidentally the portion that would describe the accessible entrance A to the station. Because the written description was missing, it caused confusion to not only those who needed to use the accessible entrance, but patrons who were trying to navigate the station. Written description helps people to be able to put words to the pictures they are seeing and allow another mode of explanation that helps all people who need the assistance.



Figure 16: Broken tactile flooring

Standardizing signage is important to a broad range of users with disabilities to remove the barrier of the potential misinterpretation of abstract images<sup>40</sup>. Standardizing signage across Metrô Rio stations was an initiative that took place twelve days prior to the opening ceremonies of the 2016 Olympic Games, when many athletes began to arrive in Rio. Metrô Rio made additional changes including signage indicating where to enter and exit the Metrô, signs in front of elevators, as well as additional signs indicating where the elevators were located.

These signs follow the green color scheme of the Olympic games with the Rio 2016 logo on them. Not only were there an abundance of these signs, the conspicuous color made navigating the Metrô Rio much easier. The addition of these new markings achieved two

<sup>40</sup> Ibid.

immediate functions: they provided clear visual navigation cues and also a uniform logic and signage system across Metrô Rio stations.

Teaching users the logic system to navigate modes of transportation is of utmost importance<sup>41</sup>. As Strickfaden and Devlieger observed “designing to educate people is a natural phase in the development in a highly usable product”<sup>42</sup>. For instance, the results of this study indicated that elevators taking individuals from street level to the mezzanine level were most likely to be at entrance “A” of any given Metrô station, yet this information is not present on Metrô Rio or on any signage present at entrances to the stations<sup>43</sup>. By publicizing the fact that entrance “A” is the accessible entrance to any station through media, the logic system to navigating the Metrô system becomes transparent. The issue of tactile flooring and SOS phone placement within the stations on the platforms can use the same logic. Wheelchair signage consistently leads passengers to the first car/first door and last car/last door at any given station and the placement of the SOS phones also follow this pattern so wheelchair users can likely call for help to use the lift to exit the station. The tactile flooring leads to the first car/second door and last car/second last door and in front of these doors is positioned a Braille map of the station. Again, by simply publicizing and making the information available on the website, for orientation mobility prior to arrival at the station<sup>44</sup>, and having exterior signage at all station entrances and recurring audio messages over the Metrô Rio announcement system, the logic system would be transparent information to all potential and current users, thus making navigation easier.

Lack of predictability poses a threat to autonomy for individuals with disabilities when navigating public transportation. For example, in this study, the gap between train and platform ranged from 0.025 to 0.05 meters. According to the Brazilian Association of Technical Norms, if the gap is larger than 0.1 meters or the level change is greater than 0.8 meters there should be both a permanent visual warning and auditory warning<sup>45</sup>. While both warnings, visual and auditory, were present in the Metrô Rio system and the range that the

<sup>41</sup> BESDEN, 2009.

<sup>42</sup> STRICKFADEN; DEVLIEGER, 2011, p. 643.

<sup>43</sup> METRÔ RIO, 2014.

<sup>44</sup> BESDEN, 2009.

<sup>45</sup> ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS, 2005.

**The research team found that the subway system is accessible. However, there are still social and physical barriers that can be remedied. The social barriers include the dilemma between accessibility with assistance versus independence.**

research group found in the gapping is well within the parameters of the norms laid out, an individual who is blind cannot gauge the gap if they cannot see it and the potential wheelchair user, depending on their physical prowess may have a difficult time getting off or on a train when there is a gap of 0.05 meters let alone a potential maximum of 0.1 meters without assistance.

This notion of assistance leads to the idea of the construct of aided accessibility. That is, accessibility where there is both operator responsibility and a social aspect where individual citizens are expected to make up for the lack of autonomous use posed by the system. Other urban subway systems have tried to implement a social assistance model of accessibility. For instance, in Brussels, a public campaign was put in place, with information panels presenting tactile ground plans (map) of the stations to assist individuals with visual impairments in navigating the stations, but also included “a message aimed at sighted people that indicated ‘Help them,’ with the symbol of a blind person with a cane”<sup>46</sup>. Whereas the American concept of access is synonymous with autonomy, the Brazilian perspective seems to be one of shared civil responsibility.

## 6. CONCLUSION

This paper is a result of a field study of the Metrô transportation system in the city of Rio de Janeiro, Brazil. The research team found that the subway system is accessible. However, there are still social and physical barriers that can be remedied. The social barriers include the dilemma between accessibility with assistance versus independence. This tension can be further confounded by cultural norms and expectations.

As for physical barriers, the concept of Universal Design can serve as the basis for full inclusion of individuals with disabilities by providing them with full access to the transportation system. This would be achieved by sharing clear and accurate information of the types of accessibility features available at each station, ensuring that equipment and other accommodations are in good repair, and clear directions to accessible entrances to better serve patrons.

<sup>46</sup> STRICKFADEN; DEVLIEGER, 2011, p. 641.

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