

# Rethinking the Providence Hill Cable Car Transit, Equity, and Urban Design in Rio de Janeiro

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**ABSTRACT:** In July 2014, the oldest slum in Rio de Janeiro, Morro da Providência (Providence Hill), received a cable car meant to facilitate up- and down-hill commuting for residents of this hilltop community adjacent to downtown. Socioeconomic indicators suggest that this community was an ideal recipient of such a project, which facilitated mobility to center-city transit and potential employment. Yet the resulting impact on the adjacent built environment may have negatively impacted small-business vitality and development opportunities for residents of the community. Using the eTOD (Equitable Transit-Oriented Development) scoring system, this paper examines the distributional and design implications of these choices and proposes improvements.

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## INTRODUCTION

**M**orro da Providência is a hilltop slum adjacent to downtown Rio de Janeiro and was the first informal settlement of its kind (*favela*) built not only in the city but in all of Brazil (Rio Sempre Presente 2013). In 1897, veterans of the War of Canudos founded the community after returning from this conflict in northeastern Brazil where the early Republic, established 1888, fought against a fringe monarchical and religious group. During the war, the Republican troops successfully extinguished the Canudos settlement from their base on a hill named after the toxic favela plant, hence the origin of the Brazilian term for slums. Arriving in Rio with the promise of housing, soldiers and their families received building materials from authorities but no land, so they settled on Providência Hill, which already had formal settlements (Caruso 2009, 15; Matto 2004, cited *Ibid.*; *Jornal do Brasil*). As in any city, limited mobility, here due to topography, helped to facilitate social exclusion and access to municipal services (Pollack et al. 2013, 1).

In an effort to start undoing these effects, the city government in July 2014 introduced a three-station cable car to help resident descends into the city. The three stations cover the Art Deco historic Central Station of Brazil (*Estação Central do Brasil*) at the northern edge of downtown, the former site of the now-eliminated Américo Brum Plaza atop the hill, and a mixed health center and cable car station in Gamboa, the neighborhood in the port district on the other side of the hill. In spite of generally positive reception in the press, this pa-

per attempts to begin addressing two aspects of the project: (1) the degree to which the cable car system actually addresses income-segregated territoriality in Rio's urban space, and (2) missed opportunities in design and construction of the new station.

## BACKGROUND

The twentieth-century saw dual migratory trends that continue to generate spatial challenges regarding urban improvements in Rio: in-migration because of rapid industrialization and bifurcated internal migration: low-income away from the center into the North Zone; high-income away from the center into the South Zone (*Jornal do Brasil*). Downtown improvements have long pushed rents up (Meade 1997, 52), even though streetcars helped move the wealthy into the beachside South Zone suburbs or in the Greater Tijuca region, nestled in the embrace of the Tijuca Forest on three sides, while the poor settled near their places of employment, commonly in company-built housing, in the more industrially-driven North Zone suburbs (Fernandes 2011). Over time, the central city saw and was encouraged to receive increasing commercialization (Agache 1930), contributing to a significantly slower annual rate of population growth in the center accompanying a steady decline in population density (Meade 48). These trends continue to pose a challenge to contemporary calls for resettlement of the port district where Providência is located (Porto Maravilha 2009).

Transport insecurity and consistent fare-raising in particular have been long-standing policy problems from the turn of the century through the 2013 transit

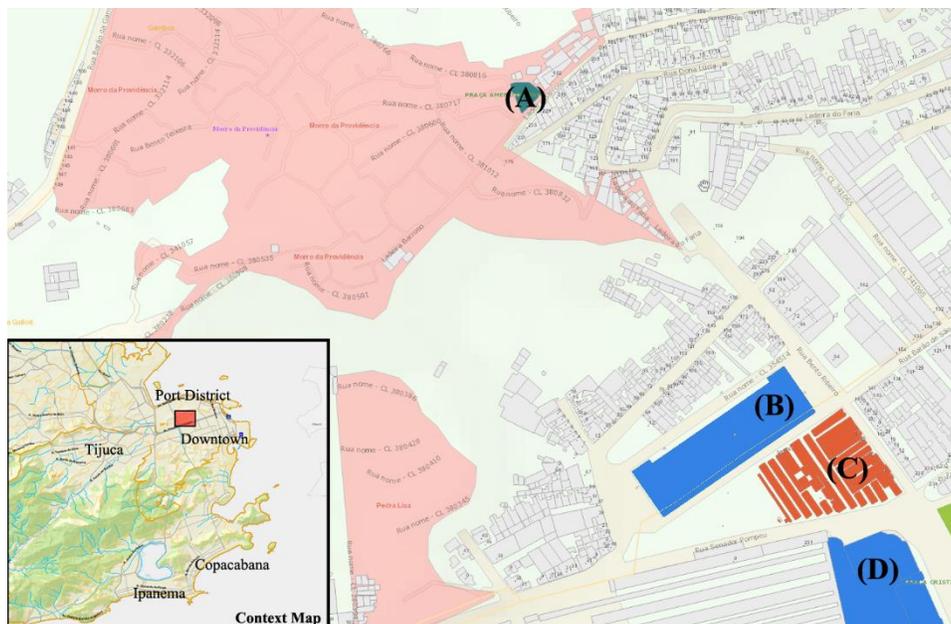


FIGURE 1. Map of site displaying A: Praça Américo Brum; B: Bus terminal; C: Demolished structures; D: Central Station. The light-red shape in the upper left is the slum on Providência Hill. (Basemap source: Prefeitura da Cidade do Rio de Janeiro - Instituto Pereira Passos.)

protests that challenged a nationwide fare increase. Despite protests and demonstrations across time (Meade 58-61), the struggle for equitable transportation still stands unresolved.

When the municipality inaugurated the cable car, some criticisms (Johnson 2014; Gurgel 2014) touched on the fact that the cable car system had been running in test mode without letting passengers on for longer than expected, and that Providência's oldest public space, Praça Américo Brum, was lost, in spite of a proposed 'reurbanization' plan for the site. Little mention was made of several small businesses that were displaced adjacent to Central Station: the construction of the station at the bottom of the hill came with the loss of at least thirty-one separate structures covering about 1.4 acres, including one traditional masonry building with Classical ornamentation. The street frontages of these previously housed a dense and active, if aesthetically cacophonous, bazaar (*camelódromo*) whose siting responded well to the large daily amounts of passengers arriving at and departing from the Central Station and adjacent bus terminal, and could have benefited further from resident and tourist traffic on the cable car. They were displaced by the new station and replaced with bus parking (see Figure 2) as a temporary replacement for the new expansion of the Américo Fontenelle bus terminal, announced in February 2015 and proposed to be completed before the 2016 Olympics (*O Globo* 2015).

## METHODOLOGY AND RESULTS

Martens (2006) argued for analyzing equity impacts of transport improvements by looking at improvements to accessibility to transit versus increased mobility, and the cable car does both. Murray (2003) explained that increasing route efficiency and non-redundant coverage is favorable for reaching more riders and competing with alternative modes, which the project also achieves. From an equity standpoint, though, both of these guidelines lack a description of impact on access to employment.

That is the strength of the eTOD (Equitable Transit-Oriented Development) Score, a "rating system for equitable transit-oriented development" created by the Dukakis Center for Urban and Regional Policy at Northeastern University (2012). I will try to corroborate this methodology by engaging it with the Morro da Providência cable car. A significant drawback with applying this system to this case study in particular is that diverse repositories of data, either from the Brazilian census or Rio's municipal datasets, make it difficult to obtain information at a single spatial scale. Unlike the American census, available data also did not seem available at the block level. These two points explain why, for certain measurements, data for the neighborhood (whose size and density suggest a greater degree of socioeconomic homogeneity than elsewhere in the city) is generalized for Providência. Measurements also assume that primary users of the cable car are slum residents.

	Metric	Measure
<b>Transit</b>	Distance	Transit Access Shed Index (TAS)
	Depth of Service	Transit Connectivity Index (TCI)
	Use	Percentage workers who use transit, bike, or walk to work (ABC)
<b>Orientation</b>	Transit Dependency	Percentage of 0-car households
	Lower income	Percentage of households with income <\$25,000
	Housing Ownership	Percentage renters
<b>Development</b>	Walkability	WalkScore®
	Residential density	Households per residential acre
	Employment gravity	Employment Gravity Measure
	Affordability	Percent of Income Spent on Transportation

TABLE 1. Required metrics to calculate an eTOD score (Dukakis Center 2012, 9).

See table 1 for metrics required. Computational procedures for specific measures are available in the original source.

Relevant geospatial data is difficult to retrieve for the transit category, which requires measurements for transit accessibility, connectivity, and transit use. Qualitatively, however, it suffices to say that proximity to downtown, future Bus Rapid Transit, and Central Station means that, once a resident descends from the hilltop on the free cable car, they can take urban rail to the North Zone, one of the many buses or future light rail crisscrossing downtown, or the Metro to the South Zone. Further, the high index of poverty combined with the physical design of the slum (so much of it is inaccessible by car) jointly suggest that free transit will be a competitive alternative to walking down the hill.

For the orientation category, there seemed to be no direct data on transit dependency and percent income

spent on transportation. The Lower Income metric in this context is better defined as the percent of population that makes up to twice the minimum wage (rather than the US\$25,000 original), since that is the metric used in Rio's municipal datasets. 89.90% of people in the slum earn less than this amount, compared to 60.26% for all of Gamboa, the neighborhood where the slum is located. Assuming this figure has remained relatively constant since the last census, we can use the 2014 minimum wages (*O Globo* 2014) to calculate this as approximately R\$1526 (R\$ being the symbol for reais, the Brazilian currency) a month, or about US\$575 a month (IPP tables 343, 2248). Compared to the 28.1% citywide rental rate in 2013, 35.12% of permanent households (defined as buildings constructed with the purpose of housing people, terminology which does not seem to ignore informal housing explicitly) were rentals in Gamboa in 2010 (Ibid. 3167; IPP 2013, 9).

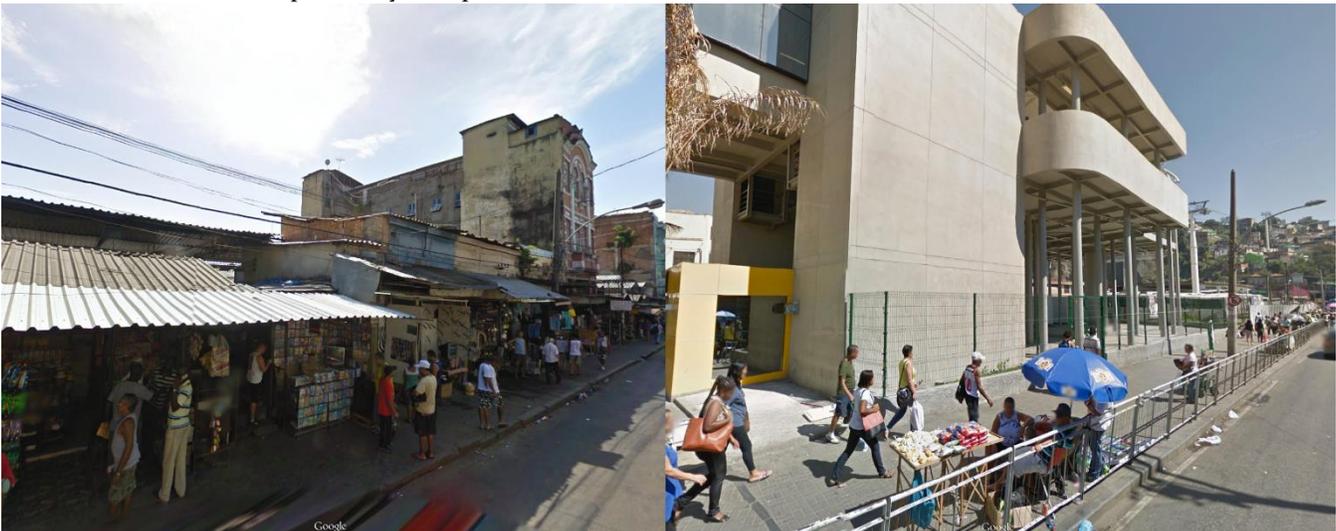


FIGURE 2. Same vantage point of Bento de Ribeiro Street, before the cable car station (January 2010) and after (August 2014). Images copyright Google, via Google Street View.

For the development category, the Walk Score (an algorithm which indexes the walkability of addresses by measuring distances to nearby amenities) of 91 was calculated using the address of Central Station. While Brazil is not considered a "supported country" on the Walk Score website, there exists sufficient business location data for the downtown and port district to make the score reliable; this is distinct from more informal settlements such as Providência, where business location data is likely to be spottier. Further, the vertical nature of the route makes the downhill Walk Score a suitable measure, since the time taken to walk to a destination from Central Station would only be slightly increased by the walking time from residents' homes on the hill to the Américo Brum cable car station.

Residential density in the port district is the lowest within city limits (Porto Maravilha), though according to the 2010 Census produced by the Brazilian Institute of Geography and Statistics, Gamboa has the highest population density out of any other neighborhood in the port district. The municipal datasets (Tables 2642, 2917) did have this data: Morro da Providência had an area of 102,088 square meters in 2010, with 3443 people in 930 households, yielding 36.87 households per acre. Also notable is that the people-per-household ratio (3.7 people per household) is higher compared to all of Gamboa (13108 people in 4626 households = 2.8 people per household), where just over 1 in 4 residents of Gamboa live in Providência.

Insufficient GIS-ready census data was available to measure employment gravity quantitatively, though the limited opportunity for commercial expansion since the demolitions would potentially lower this measure at a local scale.

TABLE 2. Summary of the available collected quantitative data.

Metric	Spatial Scale	Year	Value
Lower Income	Morro da Providência	2010	89.90%
Rental Housing	Gamboa	2010	35.12%
Walk Score	Cable car station	2014	91
Residential Density	Morro da Providência	2010	36.87 households per acre

## ANALYSIS AND IMPLICATIONS

Morro da Providência's quantitative and qualitative indicators, according to eTOD, make it a prime choice for implementing a new transit line with strong equity benefits, had it been a cable car, funicular, or simple elevator.

Another source of criticism, however, has been that the cable cars, while responding to mobility needs, do not address the transport of bulkier items or facilitate service delivery such as trash collection (Gurgel 2014). This complaint is similar to observations that downtown improvements in Rio have been long meant to impress foreign investors or appear more 'modern' rather than deliberately improve the lives of the non-elite (Meade 33), an argument which persists today through references of Brazil's incessant striving to achieve an image of urban modernity (Brandão 2006, 33-34; Lara 2011, 372, 378). These concerns could have been more adequately addressed with the likes of representative travel diary studies of residents in the community in order to develop a more all-encompassing transportation networking.

A further question to consider is the cultural implication of a single-use modernist approach to the built environment versus a mixed-use station as would be suggested by the New Urbanism or other foreign precedents. Brazilian intellectual culture has long seen strains that resent cultural borrowing as an impediment to developing a Brazilian culture. Nineteenth-century writer and engineer Euclides da Cunha (referenced in Meade 25-26) contrasted rural culture to that of the coastal cities, deriding the "urban elite [as] blind copyists" (26). The criticism of Brazilians copying Europe in particular also extends further in Rio's urban history, such as with the city hiring French urbanist Alfred Agache to devise the city's first internationally-commissioned plan (Moreira 3), though very little of its physical designs were implemented.

Nonetheless, the introduction of modernism in the country's architectural and urban history with Le Corbusier's 1929 visit (Brandão 41) seems to have undone some of these cultural qualms. The movement presents an ironic 'liberation' of sorts: on the one hand, it was meant as an emancipatory tool from European culture and an ideological response to claims that Rio de Janeiro was but a superficial, imitative simulacrum of European urbanism (Magaldi 2004; Jaguaribe 1999, 301). However, a reliance on foreign models established by those who have been 'modern' for the longest continues to exist, even if there also exists an iterative relationship between the recipient culture and the cultural diffuser. In Rio de Janeiro specifically, the subsequent proliferation of pilotis in high-rises around the city and demolition of classical business-houses downtown to make way for International Style skyscrapers suggest an increasing cultural acceptance, in a way epitomized by the modernist neighborhood of Barra da Tijuca (Herzog 2013), of globalized architecture and urbanism. In a similar vein, modern visions of light rail in the historic center is not unlike electric tram projects in European or Moroccan

cities, and the cable cars in hilltop slums strongly recall prevalent efforts in Colombian cities like Medellín.

This focus on impressing the world with modernity, including with the Providência cable car, misses out on the economic development potential that comes with pedestrian-oriented streets and greater residential density. According to Casanova (2014), nurturing small businesses is crucial for equitable growth. This is especially true given the high amount of entrepreneurship and street-level commercial activity, a quality that in general seems to distinguish low-income urban neighborhoods in Brazil from those in the United States. As a policy choice, then, the obliteration of commercial space where the cable car station currently stands follows the Kaldor-Hicks criterion – so long as someone benefits and the benefits exceed the costs, accept the policy – versus a Pareto improvement – one in which everyone benefits (Stokey and Zeckhauser 1978).

How could the displacements approach a Pareto improvement? The original street vendors and *camelódromo* were ironically similar to strategies which proponents of tactical urbanism have codified and encouraged (Lyndon et al. 2011) to provide low-cost space for business incubation. In spite of available space for these micro-businesses at the Leonel de Moura Brizola Popular Market just a few blocks down on the same street, shopping integrated into the station would have had helped business owners take advantage of the pedestrian traffic. A mixed-use station could accommodate businesses in an enclosed space for kiosks and small shopfronts with shallow setbacks on the ground floor in a typical manner for T-5 zones (SmartCode 2009, 36). Such a building could even incorporate mixed-income housing on top both for hilltop residents who were displaced (hopefully preventing ruptures in individuals' social networks) while increasing low-income housing supply while simultaneously meeting transport and housing equity goals. After all, the façades of the new station and the Brizola Market are both far more opaque than the permeable street frontage of the prior establishment, which at least facilitated the Jane Jacobs ideal of 'eyes on the street,' and the proposed designs for the bus terminal expansion provide little to indicate that pedestrian circulation and comfort at the threshold between it and the outdoor city were at all considered.

## CONCLUSION

This paper demonstrated how the Dukakis Center's eTOD scale can guide obtaining measures to evaluate the social impact of a transit project in the developing world. It also illustrated challenges in accessing statistical and geospatial data required for the scale's metrics, and it began a form-based analysis of the resulting built

environment. The Morro da Providência cable car case study embodies the importance of considering the potential economic impact of change in land use given favorable socioeconomic indicators. This is the case of the displaced businesses that could have been incubated in a mixed-use station, taking advantage of a favorable location and demographic context rather than in environments unfriendly to the street. Beyond quantitative metrics, then, the physical design associated with transit stations and new systems of mobility for the poor must engage closely and consciously with its intended impact on economic development.

## AUTHOR INFORMATION

Patrick Braga is an undergraduate student at Cornell University. He is pursuing degrees in the Department of City and Regional Planning and Department of Music.

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