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# Factors that may impair the walkability of students on the route between the Alencastro urban public transport station and the Federal Institute of Mato Grosso (Cuiabá Campus)

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**ABSTRACT**

Currently, a large number of people move around cities on foot. But few municipalities have a detailed diagnosis of this infrastructure quality, especially around school areas. Given this reality, this article aims to present the results of a study that evaluated the factors that affect the walkability of students on the route between the Alencastro Urban Public Transportation Station to the Federal Institute of Mato Grosso (Cuiabá Campus). The methodology consisted of applying the walkability index (ICam) developed by the Institute for Transportation and Development Policies (ITDP Brazil) in 2018, which allows the following themes to be evaluated: sidewalk, mobility, attractiveness, public safety, road safety, and environment. The results show that the evaluated path needs some priority interventions related mainly to the themes Public Safety and Attractiveness, with short-term actions that should be implemented by the local public authorities. And the results show that the methodology used is easy to use and thus can contribute to the development of similar studies.

**KEYWORDS:** Walkability. Pedestrian. ICam 2.0.

## INTRODUCTION

The individual's freedom to move around in space is a necessity, for the act of walking is in people's daily lives is available to us and allows greater interaction with the urban space. "Walking is the most fundamental, sustainable, and democratic means of transportation for people in the city" (ITDP Brazil, 2018, p. 05).

The National Policy for Urban Mobility, Federal Law No. 12,587 of January 3, 2012, mentions that municipalities should prioritize public and non-motorized transport over individual motorized modes, to mitigate damage to the environment and facilitate movement (BRAZIL, 2012). In this context, the walking mode should be encouraged, as it is non-polluting.

After the industrial era, with the introduction of the automobile and incentives in road infrastructure, the possibility of traveling long distances in less time was seen as synonymous with evolution in the urban mobility system of cities (CORBUSIER, 1993). The priority given to meeting the mobility needs of motorized vehicles impacted the urban planning of several cities, causing damage, since it neglected the implementation and maintenance of the quality of urban structures directed mainly to the "healthier and more natural" way of moving around in the cities, walking (CORBUSIER, 1993).

Currently, cities still suffer the impacts of urban planning and transportation focused primarily on the implementation of infrastructure to meet the demand for the massive use of individual motorized means of transportation (MAGAGNIN, 2008).

Walking contributes to the improvement of health, reduces transportation costs, contributes to the reduction of environmental impacts and offers greater equity of access to urban activities (HANDY, 2002). Speck (2013) adds that for this to occur, the walking space must provide the user with a safe, comfortable, and interesting environment.

Several factors can interfere in the choice of transport mode for students to school; among them, we highlight the presence of infrastructure for active modes; the presence of safe crossings and paths; the existence of urban barriers, such as major road or rail crossings on the route; connectivity of local street network, route choice, such as blind alleys; presence of mixed use - residential versus industrial, parks, vacant land; the existence of residential density that provides an increased number of people - "eyes on the street"; and presence of elements that

contribute to walkability, such as aesthetic elements (vegetation, trees, etc.) (STEWART, 2011 apud EASTON; FERRARI, 2015).

Other reasons, directly associated with the supply and quality of infrastructure for pedestrians, interfere with the choice of walking. Magagnin (2009) highlights the presence of ramps with a slope greater than 8%; existence of sharp unevenness in the lowering of the guides; no area for pedestrian crossing in the central worksite; deployment location of street furniture; ramp positioned out of the pedestrian flow direction; obstruction of the pedestrian circulation lane on the sidewalks by urban furniture; absence of tree planting; absence of tactile flooring for the guidance of the visually impaired; problems in the conduction and maintenance of the tree species planted on the sidewalk; floor irregularities (lack of maintenance); among other problems.

Several researchers have developed methods to evaluate the infrastructure intended for walkability by assessing the pedestrian path using technical audit (DIXON, 1996; FERREIRA; SANCHES, 2001; GALLIN, 2001; HALL, 2010; SANCHES; ROSA; FERREIRA, 2010; ASADI-SHEKARI; MOEINADDINI; SHAH, 2012; CAMBRA, 2012; PRADO; MAGAGNIN, 2016). The Institute for Transportation and Development Policy (ITDP) developed the Walkability Index (iCam), a tool that allows the evaluation of urban space conditions and monitoring of the impact of public space qualification actions, indicating to what extent they favor or do not favor travel on foot. Its goal is to promote a new look at the urban environment from the pedestrian perspective (ITDP Brazil, 2018).

Given the diversity of methodologies already consolidated, this article sought to use the methodology developed by ITDP Brazil, to assess walkability by incorporating other aspects, such as: attractiveness and environment; identifying positive and negative aspects that may interfere with the walkability of students on the route between the Alencastro urban public transport station to the Federal Institute of Mato Grosso (Cuiabá Campus).

## OBJECTIVE

This paper aims to present the results of a research that evaluated the factors that interfere with students' walkability on the route between the Alencastro urban public transportation terminal and the Federal Institute of Mato Grosso (Cuiabá Campus).

## METHODOLOGY

The case study was carried out in 2021, in the city of Cuiabá, Mato Grosso. The spatial clipping is composed of a path of approximately 750 meters, located in the region of the Historical Center. A total of 16 block faces were evaluated (Figure 1). The route starts at the Alencastro urban public transport terminal - which receives about 30,000 passengers per day, and ends at the main access to the Federal Institute of Education, Science and Technology of Mato Grosso - IFMT (Cuiabá Campus Octayde Jorge da Silva).

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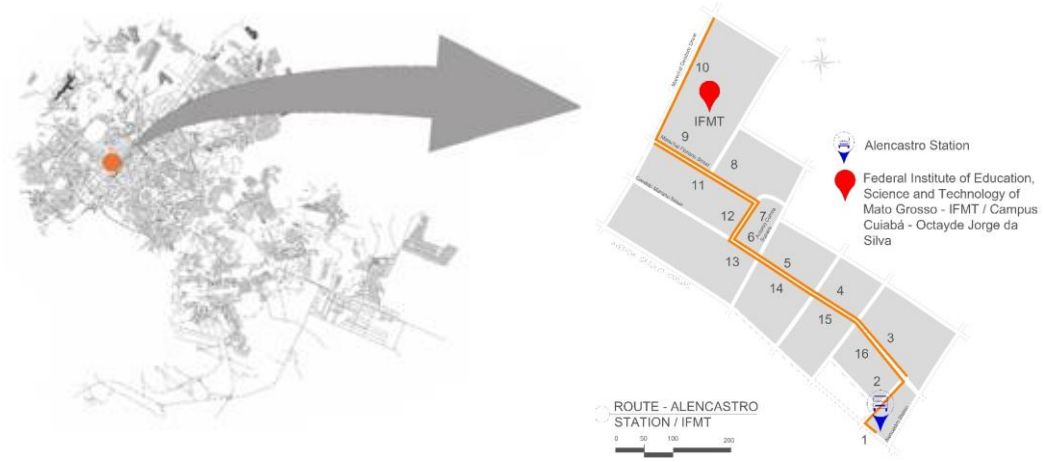
**Figure 1: Location of the spatial clipping in the city of Cuiabá - MT**




Source: CUIABÁ CITY HALL, 2018 adapted by AUTHORS, 2022.

The urban mesh in this region is in a checkered shape, with orthogonal blocks, whose dimensions vary from 19.00 m to 197.00 m. This route was selected because it represents the route most used daily by students who use public transportation by bus, and walking, as means of transportation to go to the IFMT.

According to the Campus Board of Directors, the school offers the following levels of education: Integrated High School, Sub-Secondary Education, Higher Education, Continuing Education (FIC), and Post-Graduation. The school operates full time: morning, afternoon, and evening. This educational institution has 3,229 students enrolled and about 520 technical administrative and teaching staff.

The data survey took place on two days in November 2021 and at two times (12:00 am and 7:00 pm ), which allowed us to identify the pedestrian flow on the route and the main problems that may affect walkability on this stretch. The pedestrian counts lasted 2 hours/day. The times and periods of analysis were defined according to the class schedules of the IFMT Cuiabá Campus, which are taught in three shifts (morning, afternoon and evening).

In the evaluation of the factors that could interfere with the walkability of students on the route between the Alencastro urban public transportation terminal to the Federal Institute of Mato Grosso (Cuiabá Campus) the tool iCam 2.0 - Walkability Index (ITDP, 2018), made it possible to analyze different characteristics of the walking space.

This tool aims to evaluate the conditions of urban space, identifying elements that favor pedestrian movement. This evaluation allows defining which measure the public manager should adopt in the short, medium, and long term to improve walkability in the evaluated area.

The walkability analysis was carried out adopting the following steps: i) identification of the Analysis Unit; ii) definition of the Categories and Indicators and respective scoring system; iii) data collection through technical audit, and iv) calculation of the Walkability Index (iCam).

**Identification of the analysis unit** - the first step of this method is to define the form of analysis of the spatial clipping. In this paper, we adopted the analysis by sidewalk segment and by block face. The first one evaluates the sidewalk and crossings from the analysis of most indicators, taking into account only one side of the sidewalk. And the second analyzes the

indicators related to Physically Permeable Facades and Visually Active Facades - elements of the vertical two-dimensional space that surrounds the pedestrian and that can impact walkability (ITDP, 2018).

**Definition of Categories and Indicators and scoring system** - version 2.0 of ICam, is composed of a hierarchical structure that contains 15 indicators grouped into 6 categories: Sidewalk, Mobility, Attractiveness, Road Safety, Public Safety and Environment. In this tool, the evaluation of each indicator is done by assigning a score ranging from 0 points (insufficient) to 3 points (excellent), divided into four levels (0, 1, 2 or 3), Table 1.

**Table 1: Criteria for ICam 2.0 assessments**

| Category | Indicator | Assessment Criteria | Parameters and Score |
|---|---|---|---|
| Sidewalk | Paving | Existence of paving on the sidewalk and its conditions of implantation and maintenance. | 3 points - The whole stretch is paved, there are no holes or slopes.<br>2 points - The entire stretch is paved; ≤ 5 holes or slopes every 100 m of extension.<br>1 point - The whole stretch is paved; ≤ 10 holes or slopes every 100 m of extension.<br>0 point - No paving in any stretch or > 10 holes or slopes every 100 m of extension. |
| | Width | Width of the sidewalk circulation strip and suitability for existing pedestrian flow. | 3 points - Minimum width ≥ 2 m, and supports pedestrian flow or is a pedestrian-only lane (boardwalk).<br>2 points - Minimum width ≥ 1.5 m and supports pedestrian flow, or is a shared road and supports pedestrian flow.<br>1 point - Minimum width ≥ 1,5 m and does not support pedestrian flow, or is a shared road and does not support pedestrian flow.<br>0 point — Minimum width < 1,5 m. |
| Mobility | Blocks' Size | The lateral extension of the block (equivalent to the sidewalk segment). | 3 points - Side of the block ≤ 110 m in length.<br>2 points - Side of the block ≤ 150 m in length.<br>1 point - Side of block ≤ 190 m length.<br>0 point - Side of the block > 190 m in length. |
| | Distance to Transportation | Distance traveled on foot (in meters) to the nearest station for medium or high-capacity transport or other public transport systems. | 3 points - Maximum walking distance to a transport station of high or medium capacity ≤ 500 m.<br>2 points - Maximum walking distance to a transport station of high or medium capacity ≤ 750 m.<br>1 point - Maximum walking distance to a transport station of high or medium capacity ≤ 1 km.<br>0 point - Maximum walking distance to a high or medium capacity transport station > 1 km. |
| Attractiveness | Physically Permeable Facades | Average number of pedestrian entrances and accesses per 100 m of block face. | 3 points - ≥ 5 entries per 100 m length of block surface.<br>2 points - ≥ 3 entries per 100 m length of block surface.<br>1 point - ≥ 1 entry per 100 m length of block surface.<br>0 point - < 1 entry per 100 m length of block surface. |

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| Category | Indicator | Assessment Criteria | Parameters and Score |
|---|---|---|---|
| | Visually Active Facades | Percentage of the length of block surface with visual connection to the activities inside the buildings. | 3 points - ≥ 60% of the length of the block face is visually active.<br>2 points - ≥ 40% of the length of the block face is visually active.<br>1 point - ≥ 20% of the length of the block face is visually active.<br>0 point - < 20% of the length of the block face is visually active. |
| | Daytime and Nighttime Public Use | Average number of establishments and public areas with day and night public use per 100 m square face. | 3 points - ≥ 3 establishments in public use per 100 m of block length for each period of the day.<br>2 points - ≥ 2 establishments in public use per 100 m of block length for each period of the day.<br>1 point - ≥ 1 establishment with public use per 100 m length of block face at night.<br>0 point - < 1 establishment with public use per 100 m length of block face at night. |
| | Mixed Uses | Percentage of the total of floors predominantly used in buildings facing the sidewalk segment. | 3 points - ≤ 50% of the total flooring is occupied by the predominant use.<br>2 points - ≤ 70% of the total flooring is occupied by the predominant use.<br>1 point - ≤ 85% of the total flooring is occupied by the predominant use.<br>0 point - > 85% of the total flooring is occupied by the predominant use or the segment does not meet two requirements. |
| Road Safety | Street Typology | Evaluation of the typology of the street in relation to the environment of pedestrian circulation. | 3 points - Exclusive pedestrian paths (boardwalks).<br>2 points - Shared routes between transport modes Regulated speed ≤ 20 km/h Road with segregated sidewalks and motor vehicle traffic Regulated speed ≤ 30 km/h.<br>1 point - Shared roads between transport modes Regulated speed ≤ 30 km/h Road with segregated sidewalks and motor vehicle traffic Regulated speed ≤ 50 km/h.<br>0 point - Shared routes between transport modes Regulated speed > 30 km/h Road with segregated sidewalks and motor vehicle traffic Regulated speed > 50 km/h. |
| | Crossings | Percentage of safe and accessible crossings for people with disabilities in all directions from the sidewalk segment. | 3 points - 100% of crossings from the sidewalk segment meet the quality requirements.<br>2 points - ≥ 75% of crossings from the sidewalk segment meet the quality requirements.<br>1 point - ≥ 50% of crossings from the sidewalk segment meet the quality requirements.<br>0 point - < 50% of crossings from the sidewalk segment meet the quality requirements. |
| Public Safety | Lighting | Evaluation of the quality of night lighting in the pedestrian circulation environment. | 3 points - Illuminance ≥ 20 Lux Illuminance.<br>2 points - ≥ 15 Lux Illuminance.<br>1 point - ≥ 10 Lux Illuminance.<br>0 point - < 10 Lux Illuminance. |

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| Category | Indicator | Assessment Criteria | Parameters and Score |
|---|---|---|---|
| Environment | Daytime and Nighttime Pedestrian Flow | Flow of pedestrians circulating at different times. | 3 points - Pedestrian flow ≥ 10 pedestrians/minute ≤ 30 pedestrians/minute.<br>2 points - Pedestrian flow ≥ 5 pedestrians/minute.<br>1 point - Pedestrian flow ≥ 2 pedestrians/minute.<br>0 point - Pedestrian flow < 2 pedestrians/minute > 30 pedestrians/minute. |
| | Shadow and Shelter | Percentage of the sidewalk segment that has adequate shade or shelter elements. | 3 points - ≥ 75% of the length of the sidewalk segment has adequate shade/shelter elements.<br>2 points - ≥ 50% of the length of the sidewalk segment has adequate shade/shelter elements.<br>1 point - ≥ 25% of the length of the sidewalk segment has adequate shade/shelter elements.<br>0 point - < 25% of the length of the sidewalk segment has adequate shade/shelter elements. |
| | Noise | Sound intensity level in the streets. | 3 points - ≤ 55 dB(A) ambient noise level in the sidewalk segment.<br>2 points - ≤ 70 dB(A) ambient noise level in the sidewalk segment.<br>1 point - ≤ 80 dB(A) ambient noise level in the sidewalk segment.<br>0 point - > 80 dB(A) ambient noise level in the sidewalk segment. |
| | Garbage Removal | Evaluation of the urban cleansing perception indicator in the pedestrian circulation environment. | 3 points - Evaluation result = 100 or urban cleaning is suitable for the pedestrian.<br>2 points - Outcome of the evaluation = 90.<br>1 point - Outcome of the evaluation = 80.<br>0 point - Evaluation result < 80 or urban cleaning is inadequate for the pedestrian. |

NOTE: Value 3 is excellent; value 2 is good; value 1 is sufficient; and value 0 is insufficient.

Source: ADAPTED FROM ITDP, 2018.

**Data collection** - this step was carried out in a hybrid way. Most of the data were collected through technical audits, obtained directly in the field. Online tools such as Google Earth's Street View were used to collect information about some characteristics of the path and its surroundings. Due to Covid 19's situation, it was not possible to apply questionnaires to users. Secondary data were collected from pre-existing documentation made available by the City Hall, such as the Road Hierarchy Map and the City Map.

**Calculation of the Walkability index (iCam**) - the fourth step refers to the calculation of the index. From the individual score of each indicator per block face, this result is weighted according to the size of the blocks evaluated (Equation 1).

$$Pi1 = \frac{(e1*100)*i1}{\sum (e1; e2; e3;...)} \qquad RI1 = \frac{i1 \sum (Pi1; Pi2; ...)}{100} \qquad \text{Equation 1}$$

Where:

Pi1 = weighted sidewalk segment score for each indicator.

e1; e2; e3; ... = length of each sidewalk segment.

i1 = segment score assigned for each indicator (0-1-2-3).

RI1 = result of each indicator.

Next, the calculation of the Categories is performed for each sidewalk segment. This calculation consists of the arithmetic mean between the weighted scores of the indicators, to obtain the weighted score of the sidewalk segment for each category. The category result is obtained through the sum of the weighted scores of each sidewalk segment, divided by 100 (Equation 2):

$$Ci1 = \frac{(Pi1; Pi2; ...)}{ni} \qquad RC1 = \frac{\sum (Ci1; Ci2)}{100} \qquad \text{Equation 2}$$

Where:
Ci1; Ci2; ... = weighted sidewalk segment score for each category.
Pi1; Pi2; ... = weighted sidewalk segment score for each indicator.
ni = number of indicators belonging to the category.
RC1 = result of each category.

The index final score is obtained by the simple arithmetic mean of the weighted result of the evaluated categories. This value should be compared with the data presented in Table 2, which presents the degrees of adequacy/intervention in the space regarding walkability by score ranges.

$$RI = \frac{\sum (RCi1; RCi2; ...)}{nc} \qquad \text{Equation 3}$$

Where:
RI = iCam 2.0 result.
RC1; RC2; ... = result of each category.
nc = number of iCam 2.0 categories.

**Table 2: Walkability Index score ranges**

| Scoring Range | Assessment | Representation | Prioritization of Interventions |
|---|---|---|---|
| 3 | *Excellent* | | Maintenance and improvement |
| Between 2 - 3 | *Good* | | Desirable intervention, medium-term action |
| Between 1 - 2 | *Enough* | | Priority intervention, short-term action |
| <1 | *Insufficient* | | Priority intervention, immediate action |

Source: ADAPTED FROM ITDP, 2018.

## RESULTS

The data presented in Table 3 show the scores of the categories and respective indicators, and the final score of iCam. The evaluation of the route between the Alencastro urban public transportation terminal and the Federal Institute of Education, Science and Technology of Mato Grosso - IFMT (Cuiabá Campus Octayde Jorge da Silva) revealed that walkability is considered "Sufficient", with an overall score of 1.63, i.e, which means that there

is a need for priority intervention with short-term actions that should be implemented by the local government.

**Table 3: Result of the evaluations of the Categories and Indicators of Walkability**

| Category | Indicators | Score | Rating |
|---|---|---|---|
| | Paving | 1.94 | Enough |
| **Sidewalk** | Width | 2.31 | Good |
| | **TOTAL** | **1.88** | **Enough** |
| | Blocks Size | 2.56 | Good |
| **Mobility** | Distance to Transportation | 3.00 | Great |
| | **TOTAL** | **2.63** | **Good** |
| | Physically Permeable Facades | 2.19 | Good |
| | Visually Active Facades | 1.94 | Enough |
| **Attractiveness** | Daytime and Nighttime Public Use | 0.88 | Insufficient |
| | Mixed Uses | 0.75 | Insufficient |
| | **TOTAL** | **1.13** | **Insufficient** |
| | Street Typology | 1.94 | Enough |
| **Road Safety** | Crossings | 1.06 | Enough |
| | **TOTAL** | **1.44** | **Enough** |
| | Lighting | 0.25 | Insufficient |
| **Public Safety** | Daytime and Nighttime Pedestrian Flow | 0.06 | Insufficient |
| | **TOTAL** | **0.13** | **Insufficient** |
| | Shadow and Shelter | 0.88 | Insufficient |
| **Environment** | Noise | 3.00 | Great |
| | Garbage Removal | 1.88 | Enough |
| | **TOTAL** | **1.50** | **Enough** |
| **iCam** | **TOTAL** | **1.63** | **SUFFICIENT** |

Source: AUTHORS, 2022.

The data shows that the themes that present the worst evaluation correspond to i) Public Safety, because the indicators Lighting and Daytime and Nighttime Pedestrian Flow do not meet the minimum parameters established by the ITDP methodology and ii) Attractiveness, whose indicators Daytime and Nighttime Public Use and Mixed Uses have low scores, classified as insufficient. The theme that presents the best score is Mobility, considered good for walkability; this evaluation indicates that the parameters Block Size and Distance to Bus Stop can positively influence pedestrians' choice of this area.

The analysis of the Sidewalk Category reveals that on the evaluated stretch the walkability is considered sufficient, with a total score of 1.88, that is, it needs some priority Interventions, with short-term action. The indicator that gets the highest score is the Width (2.31 points) considered good, followed by the indicator "Pavement" (1.94 points) considered sufficient (Table 3 and Figure 2).

In most of the segments analyzed near the public transportation station, the sidewalks are in good condition, the floor is non-slip, and the materials used for the sidewalk are concrete and hydraulic tile. The width in these stretches is also good, with dimensions between 2.5 m and 3.0 m. On the other hand, because it is a region belonging to the historic center of the city, some sidewalks do not have adequate width, with dimensions around 1.40 meters, considered

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insufficient in the evaluation of the index. Some stretches have unevenness and holes, and even the inexistence of sidewalks, for example stretch 7, an area of unevenness between the street and Antônio Correa Square. The city has legislation on sidewalks, however, there is a lack of inspection by the municipal administrators to charge the owners for this proper maintenance in the area.

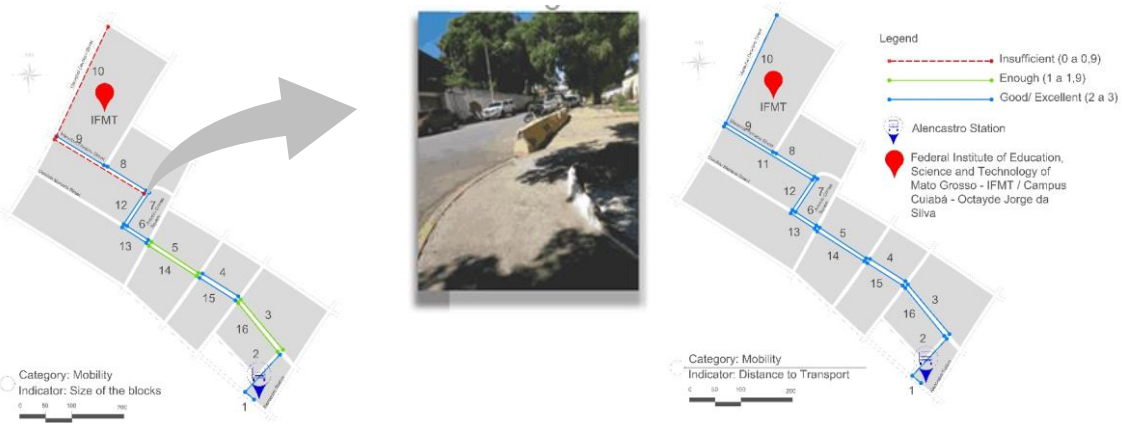
**Figure 2: Assessment of the 'Sidewalk' Category**


Source: AUTHORS, 2022.

The evaluation of the Mobility Category shows that the area is favorable to walkability, since its score is considered good (2.63 points), with the indication of desirable Intervention and actions in the medium term. The indicator "Block dimension" is evaluated as good (2.56 points), and the indicator "Walking distance to transportation" is considered great (3.00 points), Table 2 and Figure 3.

The distance to be walked by pedestrians to the Alencastro bus station does not exceed 750 meters, a distance recommended by the ITDP. However, it can be seen that some block faces are extensive, measuring up to 197.00 m, a value above the recommended by ITDP, which is up to 110.00 m.

**Figure 3 - Assessment of the Mobility Category**




Source: AUTHORS, 2022.

The Attractiveness Category is evaluated as sufficient, with a score of 1.13. The

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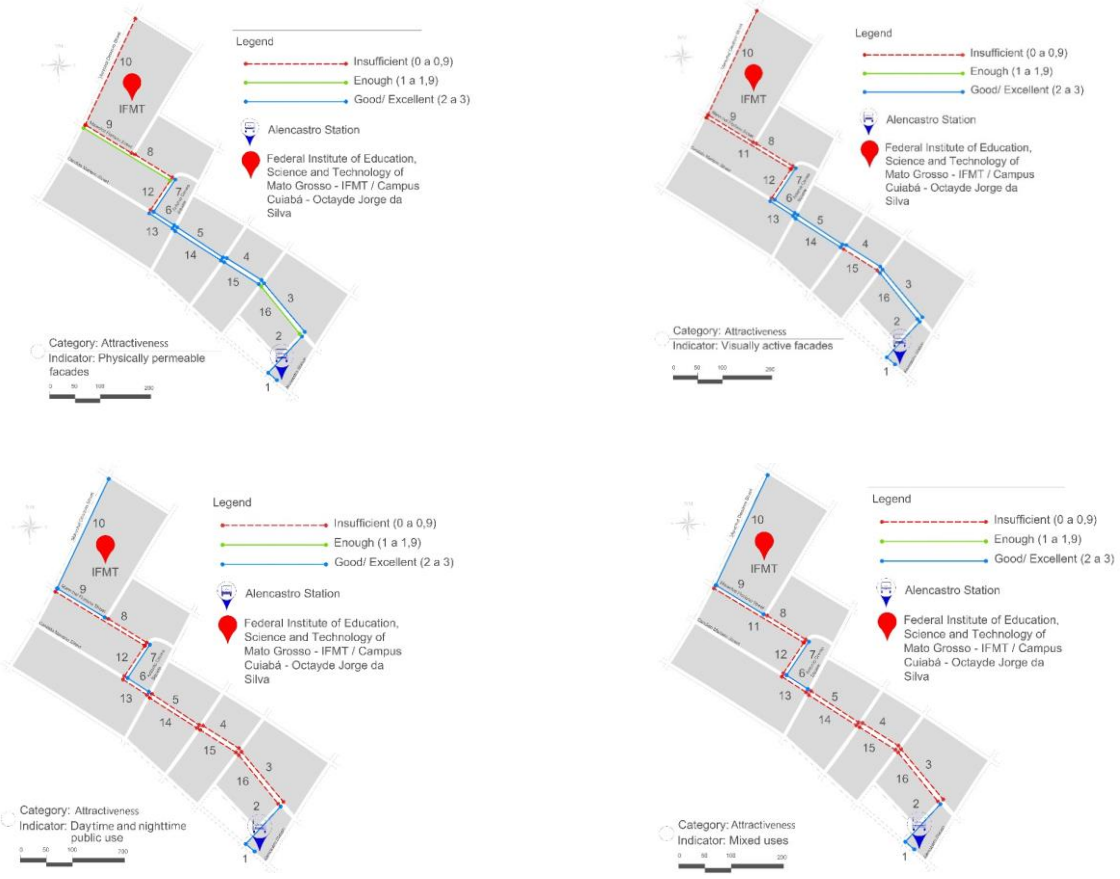
evaluation of the indicators "physically permeable facades" (considered good, 2.19 points); "Visually active facades" (considered sufficient, 1.94 points); "Daytime and nighttime public use" (evaluated as sufficient, 0.88 points); "Mixed uses" (analyzed as insufficient, 0.75 points) contribute to this score, Table 2 and Figure 4.

The analysis of the indicators physically permeable and visually active facades reveals that, in the regions closest to Alencastro Station, due to its location as a predominantly commercial area, and for having a square and the City Hall nearby, there are more visually active and permeable areas. However, in the vicinity of the IFMT - Cuiabá Campus, the use is different; there is the presence of mixed-use of commerce and services, often with high walls that prevent visual permeability. A hostile architecture is observed, composed of walls, railings, and concertinas. The use of spaces at night is considerably reduced compared to the morning/evening period, and the flow of people at night is reduced.

**Figure 4 - Evaluation of the "Attractiveness" Category**




Source: AUTHORS, 2022.

The evaluation of the Road Safety Category shows that the evaluated section (sufficient, 1.44 points) needs a Priority Intervention, with short-term action. The indicators "Street Typology" (considered good, 2.00 points) and "Crossings" (considered sufficient, 1.06 points) contribute to this evaluation (Table 2 and Figure 5).

In general, the roads are local, except for the road in Section 01, which is a collector.

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All sections have their uses well defined, sidewalks for pedestrians and streets for vehicles; there are no bike lanes or other exclusive access for other means of transportation. The sidewalks near the Alencastro public transportation station are well structured, with accessibility, identified by the presence of tactile flooring and ramps for people with disabilities, and there is a signalized crosswalk. However, in the other sections, there is little or no concern with these aspects, for example, section 07, which has no sidewalk.

**Figure 5 - Assessment of the Road Safety Category**


Source: AUTHORS, 2022.

The low score obtained in the Public Safety Category (insufficient, 0.13 points) is associated with the evaluation of the indicators "Daytime and Nighttime Pedestrian Flow" (considered insufficient, 0.06 points) and "Lighting" (considered insufficient, 0.25 points), as shown in Table 2 and Figure 6. In this category, the interventions should be a priority, with immediate actions.

One of the problems refers to lighting, which is considered bad in most of the evaluated areas, with the exception of Alencastro Square where the Urban Terminal is located. In some points, there are also light obstructions due to the presence of large trees. The Antônio Correa Square, between sections 06 and 07, is the most critical place because the treetops prevent lighting of the pedestrian space. There is a frequent presence of drug users here, requiring the presence of police monitoring and improvement of lighting.

The pedestrian flow during the day is intense, up to 10 people/minute; however, at night, this number drops sharply, with almost no pedestrian movement.

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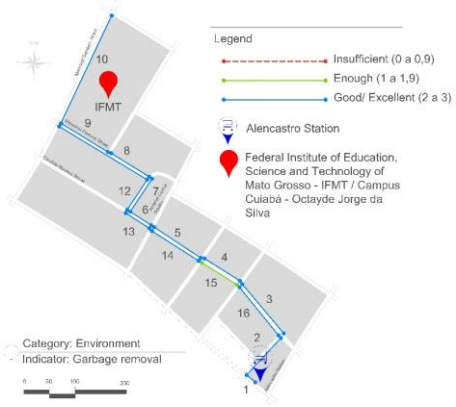
**Figure 6 - Evaluation of the "Public Security" Category**


Source: AUTHORS, 2022.

The analysis of the Environment Category shows that the evaluated stretch has a score considered sufficient by ICAM (1.50 points); that is, it needs priority intervention, with short-term action. Contributing to this score are the results of the indicators "Shade and Shelter", with an evaluation considered insufficient (0.88 points); "Noise Pollution" with a score of "excellent" (3.00 points) and "Garbage Removal and Cleanliness" with a score considered sufficient (1.88 points), (Table 2 and Figure 7).

Despite the presence of a large flow of vehicles (cars and buses) and the existence of commerce on the site, the area remains within the parameters of noise comfort. With respect to shading, there is little presence of trees along the entire path. In some stretches, due to the width of the sidewalk, the planting of trees is not possible. Some buildings are on the front of the lot, which prevents the planting of trees. The analysis of the indicator for garbage removal and cleanliness reveals that the analyzed area, in great part, is kept clean, with proper places for the deposit of garbage, there is no occurrence of toxic waste and debris without the correct destination.

**Figure 7 - Assessment of the 'Environment' Category**




Source: AUTHORS, 2022.

## CONCLUSIONS

Providing quality pedestrian infrastructure should encourage more people to opt for more sustainable modes of urban travel. In order to identify the degree of walkability on the route taken by students between the Alencastro urban public transport terminal and the Federal Institute of Mato Grosso (Cuiabá Campus), this paper uses the methodology developed by the Institute for Transportation and Development Policy (ITDP Brazil) to assess the infrastructure for pedestrians.

The method reveals that the global result of the Walkability Index is considered "Sufficient", and some priority interventions are needed, with short-term actions to be implemented by the local government.

The factors that contribute negatively to this evaluation are associated with the themes Public Safety and Attractiveness. Meanwhile, the theme Mobility presents a better score, considered good for walkability, and can positively influence the choice of this route by the student who goes to school (IFMT) on foot.

Regarding the use of the ICam 2.0 tool, the results indicate that it allows the identification of factors that contribute positively or negatively to the transportation of IFMT students in the evaluated stretch, using the walking mode. However, when comparing this method with other methodologies about walkability, it is verified that it can be improved and incorporate, for example, other indicators and improve the scoring system.

It is expected that the results of this work can serve as a reference for the analysis of other spaces of public use for pedestrians, in order to seek solutions/adjustments that can be implemented in the short and medium term, and thus ensure accessible environments for everyone.

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