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Walkability evaluation sourounding university campus: case study in Marília (SP)

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ABSTRACT

The pedestrian space should encourage walking and offer safety and comfort for all people. One of the most widely used modes of transportation to access a university campus is on foot. To identify the degree of safety and comfort offered by the infrastructure intended for pedestrians around three university campuses in Marilia (SP), to develop their daily activities such as study, research, work and medical care, performance indicators were used, developed by Cerna (2014), and a walkability index, developed by Pires et al. (2017), based on the method proposed by Cerna. The results show that among the evaluated themes, the indicators related to Traffic light, sidewalks, passenger shelters (bus stop), bus stops and sidewalks had the worst scores. These results point to the effectiveness of the method and thus, they can contribute so that managers and owners of buildings around these university campuses can improve the quality of the access infrastructure to the respective universities.

KEYWORDS: *Walkability. Performance indicators. University campus.*

INTRODUCTION

Walking is one of the simplest forms of traveling (CAMBRA, 2012) and is the most used mode of transport in any city in the world. However, the excessive use of individual motorized transport modes (cars and motorcycles) has contributed to many people not using walking as an option to make short trips in the city (CAO; MOKHTARIAN; HANDY, 2006; LITMAN, 2015).

A survey made available by ANTP 2020, about displacements in Brazilian cities, shows that in cities with 100 to 250,000 inhabitants, where our case study is located, 42% of trips are made on foot (ANTP, 2020).

Other factors can positively or negatively contribute more sustainable such as walking. Some research shows that the urban structure of the neighborhood and the city affects people's mobility and, in particular, travel on foot (CERVERO, 1996; CERVERO; RADISCH, 1996; CERVERO; DUNCAN, 2003; FRANK; PIVO, 1995; GREENWALD; BOARNET, 2001; HANDY; CLIFTON, 2001; HESS et al., 1999).

Factors related to the individual's characteristics (gender, age, income, etc.); the characteristics of the mode of transport and how the trip is carried out (availability, cost, time, reason, etc.); and even the characteristics of the urban space (land use, density, etc.) also interfere in the choice of walking mode (AMÂNCIO, 2005).

The quality of the infrastructure for walking is another factor that can encourage walking, whether to go to school, work, leisure, or shopping (SANCHES; ROSA; FERREIRA, 2010). In Brazil, many cities still do not have adequate infrastructure for pedestrians. Many sidewalks have a wide variety of floor types, sometimes slippery, widths below technical recommendations, a high number of obstacles (holes and steps), illegally constructed ramps for vehicle entry (PIRES, 2018; MAGAGNIN, 2009). In Brazil, these problems can be attributed to the municipal manager, due to the lack of verification of compliance with the execution rules of the sidewalks and to the owners of the lots, and not to the public administration, which generates public walkways in poor conditions (VASCONCELLOS, 2013; WRI BRASIL, 2017; PIRES, 2018; MAGAGNIN, 2009).

Studies developed by Park, Deakin and Lee (2014), Asadi-Shekari, Moeinaddini and Shah (2015) and Prado and Magagnin (2016) show that for people to adopt the walking mode

as an option for displacement, routes or paths chosen must be secure. When the city proposes adequate infrastructure for pedestrians, the number of displacements on foot increases (PIRES et al., 2017). Vargas and Netto (2017) state that a greater number of pedestrian displacements is linked to short trips, higher densities and well-connected road systems.

The walkability assessment aims to identify how much a space is walkable or assess the quality of an environment for walking (GRIECO; GUIMARAENS; AZEVEDO, 2020). Walkability assesses how much the built environment supports and encourages walking, providing safety and comfort. Highly walkable spaces connect people to various destinations within an acceptable period of time and effort. Among the factors that make a city walkable, we can list: street connectivity, interaction with other modes of transport, mixed use of land, safety and walking environment (GRIECO; GUIMARAENS; AZEVEDO, 2020).

To identify whether these spaces are walkable, and measure their quality, researchers have developed indexes and performance indicators that allow for the identification of negative and positive points related to the quality of urban spaces (PIRES; GEBARA; MAGAGNIN, 2016).

Pedestrian spaces around a university are an important component for the assessment of walkability, as these sidewalks must offer easy and safe access to all users, regardless of their mobility restriction.

The national and international literature offers a theoretical and methodological diversity that can contribute to this issue (AMÂNCIO, 2005; SANCHES; ROSA; FERREIRA, 2010; CAMBRA, 2012; CERNA, 2014; PARK; DEAKIN; LEE, 2014; ASADI-SHEKARI; MOEINADDINI; SHAH, 2015; PRADO; MAGAGNIN, 2016; PIRES et al., 2017; PIRES, 2018; SILVA, GOBBO, JÚNIOR, SANCHES, 2019).

From performance indicators, developed by Cerna (2014), and a walkability index, developed by Pires et al. (2017), based on the method proposed by Cerna, this paper aims to identify the degree of safety and comfort offered by the infrastructure for pedestrians around three university campuses in Marília (SP), to develop their daily activities such as study, research, work and medical care.

OBJECTIVE

This paper aims to present the results of the assessment of the quality of walking in the surroundings of three universities in the city of Marília/SP.

METODHOLOGY

To assess the factors that may harm people who use walking to access the university campus of three Higher Education Institutions in Marília, the indicators proposed by Cerna (2014) and Pires et al. (2017).

The hierarchical structure used comprises the definition of themes and indicators. A total of 54 indicators were used, grouped into 6 themes (Tables 1 to 6), distributed as follows: Sidewalk theme (16 indicators), Bus stop theme (14 indicators), Passenger shelter (Bus stop) theme (6 indicators), Sidewalk undercut theme (13 indicators), Crosswalk Theme (5 indicators), and Traffic light Theme (5 indicators). Each indicator can be scored by adopting a value of 0 or

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5, or 10, where 0 refers to the worst assessment and 10 to the best assessment. These results must be multiplied by their respective weights, which correspond to values 1, 2 and 3, whose scores are associated with the following definitions: indicators related to pedestrian safety (weight 3); indicators related to pedestrian comfort (weight 2) and for indicators that do not fit into safety or comfort, they receive weight 1. Tables 1 to 6 present the themes with their respective indicators, weights and evaluation criteria.

Table 1: Indicators related to the Sidewalk Theme.

Indicators	Weight	Evaluation Criteria
Minimum elements of the sidewalk	1	Service range and free range: 10 None: 0
Service lane location	1	Adjacent to curb: 10 Other: 0
Free range width (Lfl)	2	Lfl >= 1.50 m: 10; Lfl < 1.50 m: 0
Regular surface	2	Yes: 10; No: 0
Surface without unevenness	3	Yes: 10; No: 0
Stable firm surface	3	Yes: 10; No: 0
Non-slip surface	3	Yes: 10; No: 0
Easy to replace surface	1	Yes: 10; No: 0
Longitudinal slope (il)	2	il =< 5.00%: 10; il > 5.00%: 0
Cross slope (it)	3	it <= 2.00%: 10; it > 2.00%: 0
Obstacle-free height (alo)	2	alo >= 2.10m: 10; alo < 2.10m: 0
Clear and interference-free range	3	Yes: 10; No: 0
Afforestation in arterial routes	2	Yes: 10; No: 0
Curb height (hmf)	2	Hmf > 0.18 m: 0; Hmf < 0.18 m: 0 0,10 m <= Hmf <= 0,18 m: 10
Leveling with the sidewalk of the adjacent lot	3	Yes: 10; No: 0
Presence of lighting	3	Yes: 10; No: 0

Source: Pires et al., 2017 adapted from Cerna, 2014.

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Table 2: Bus stop indicators.

Indicators	Weight	Evaluation Criteria
Minimum sidewalk width (Lcpo)	2	Lcpo < 2.00: 0; Lcpo >= 2.00 m: 10
Minimum length of sidewalk (Ccpo)	2	Ccpo < 10.00 m: 0 Ccpo >= 10.00 m: 10
stall presence	3	Yes: 10; No: 0
Presence of public transport information panel	1	Yes: 10; No: 0
Warning tactile signaling along the curb	3	Yes: 10; No: 0
Presence of access ramp	2	Yes: 10; No: 0
Curb presence	3	Yes: 10; No: 0
Presence of a bus stop signpost	3	Yes: 10; No: 0
Presence of public lighting point	3	Yes: 10; No: 0
Trash can presence	1	Yes: 10; No: 0
Tree presence	2	Yes: 10; No: 0
Presence of delimiting markings on the roads	3	Yes: 10; No: 0
Directional tactile floor at the embark/disembark location.	3	Yes: 10; No: 0
Presence of indentation on sidewalks (Prc)	3	Prc >= 3.00m: 10; Prc < 3.00m: 0

Source: Pires et al., 2017 adapted from Cerna, 2014.

Table 3: Passenger shelter (Bus stop) indicators.

Indicator	Weight	Evaluation Criteria
Presence of fixed seats for rest	2	Yes: 10; No: 0
Space for people with wheelchairs	2	Yes: 10; No: 0
Space for people with wheelchairs near the seats	2	Yes: 10; No: 0
Width of space for people with wheelchairs (Lepcr)	2	Lepcr < 0.80 m: 0; Lepcr > 0.80 m: 5; Lepcr = 0.80 m: 10
Space compliance for people with wheelchairs (Cepcr)	2	Cepcr < 1.20 m: 0; Cepcr > 1.20 m: 5; Cepcr = 1.20 m: 10
Coverage presence	2	Sim: 10; Não: 0

Source: Pires et al., 2017 adapted from Cerna, 2014.

Table 4: Curb Ramp indicators.

Indicator	Weight	Evaluation Criteria
Located at Crosswalks	3	Yes: 10; No: 0
Unevenness between the bottom of the Curb ramp and the carriage bed (Hd)	2	Hd = 0: 10; Hd ≠ 0: 0
Built in the direction of pedestrian flow	1	Yes: 10; No: 0
The Curb ramps on opposite sides of the road must be aligned with each other	3	Yes: 10; No: 0
Presence of tactile floor alert	3	Yes: 10; No: 0
Curb ramp Alert Tactile Floor Width (Lptrc)	3	Lptrc < 0.25m: 0; Lptrc > 0.5m: 5 0.25m <= Lptrc <= 0.5m: 10
Width of the free lane in front of the Curb ramp (Lflrc)	3	Lflrc < 80 cm: 0; Lflrc >= 80 cm: 10
Minimum sidewalk width for Curb ramp (Lcrc)	2	Lcrc < 2.10 m: 0;

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Indicator	Weight	Evaluation Criteria
Curb ramp distance from corner curve points (Drce)	3	Lcrc >= 2.10 m: 10 Drce < 3.5 m: 0; Drce >= 3.5 m: 10
Curb Height (Hmf)	2	Hmf > 0.18 m: 0; Hmf < 0.10 m: 0 0.10 m <= Hmf <= 0.18 m: 10
Curb ramp floor surface with non-slip material	3	Yes: 10; No: 0
Longitudinal slope of the Curb ramp (Ilrc)	2	Ilrc > 8.33%: 0; Ilrc <= 8.33%: 10
Curb ramp transverse slope (Itrc)	2	Itrc > 3.0%: 0; Itrc <= 3.0%: 10

Source: Pires et al., 2017 adapted from Cerna, 2014.

Table 5: Crosswalk indicators.

Indicator	Weight	Evaluation Criteria
Minimum width of the pedestrian crossing (Lm)	3	Lm < 3.0 m: 0; Lm <=3.0 m: 10
Maintenance status	3	Bad: 0; Regular: 5; Good: 10
Signposted with painted banners	3	Yes: 10; No: 0
Band color	3	White: 10; Other color: 0
Presence of lighting	3	Yes: 10; No: 0

Source: Pires et al., 2017 adapted from Cerna, 2014.

Table 6: Traffic light indicators.

Indicator	Weight	Evaluation Criteria
Manual devices presence	2	Yes: 10; No: 0
Handset height (Adm)	2	Adm < 0.8 m: 0 Adm > 1.2 m: 0 0.8 m <= Adm <= 1.2 m: 10
Presence of beep	3	Yes: 10; No: 0
Location makes circulation difficult	2	Yes: 10; No: 0
Pedestrian movement attended	3	Yes: 10; No: 0

Source: Pires et al., 2017 adapted from Cerna, 2014.

Next, the indicators are calculated from the values obtained in the field on all sides of the block. This score is compared with the maximum score that each indicator could receive (Pires et al., 2017). This analysis enables the creation of a scale of values that allows the assessment of the degree to which each side of the block is walkable (PIRES et al., 2017).

The scale proposed by Pires et al. (2017), based on studies by Bradshaw, makes a comparison between the minimum scores that each indicator can reach (value 0) and the respective maximum score (value of the weight multiplied by the maximum score of the indicator). This procedure allows us to obtain a scale of values that allows us to assess whether the score found is adequate. After the results of the scores for each topic, they are classified into five ranges of values: very bad (0 - 25%), bad (26 - 50%), good (51 - 75%) or excellent (75 - 100%), Table 7.

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Table 7: Classification of scores by Theme.

Themes	Very Bad 0 - 25%	Bad 26 - 50%	Good 51 - 75%	Great 75 - 100%
Sidewalk	0-90	91-180	181-270	271-360
Bus stop	0-85	86-180	181-255	256-340
Passenger shelter (Bus stop)	0-30	31-60	61-90	91-120
Curb Ramp	0-80	81-160	161-240	241-320
Crosswalk	0-37	38-75	76-112	113-150
Traffic light	0-30	31-60	61-90	91-120

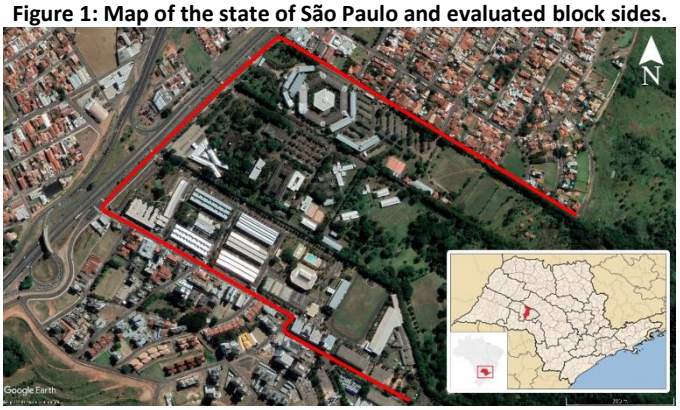
Source: Adapted from Pires et al., 2017.

CASE STUDY

The survey was conducted in the city of Marília, considered a medium-sized city, located in the mid-west region of the São Paulo state (Figure 1). The municipality has 14 Higher education institutions, with approximately 14,604 students enrolled.

The case study involves an area located in the western region of the city, where 03 Universities are located: Univem with 2,570 students, UNESP with 2,013 enrolled students and Unimar with 7,000 enrolled students, which corresponds to 79% of higher education students in the city, some Universities work full time, mainly courses in the health and agrarian area and other courses and several areas take place at night. In addition to this people, Universities offer some services to the community (especially in the health area) which increases the flow of people in this region. The analyzed area is shown in Figure 1 and involves 23 block sides. This location was selected for having a large flow of people during in-person classes and for having students and patients with physical disabilities, who need access to these universities to ensure full accessibility, as provided for in Federal Law 13.409 of December 28, 2016 (BRAZIL, 2016).

Figure 1: Map of the state of São Paulo and evaluated block sides.



Source: Wikipédia (2020) e Google Earth adaptado pelos autores (2020).

RESULTS AND DISCUSSIONS

The result of each theme, presented in Table 8, shows the maximum ideal score, score obtained in the field and result in percentage. The ideal maximum value is obtained by

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multiplying the maximum score shown in Table 8 by the number of block sides evaluated (23 block sides).

Table 8: Results of themes.

Theme	Optimal maximum value	Value obtained in the field	Results obtained in the field (%)
Sidewalks	8280	3130	37,8%
Bus stop	3740	1440	38,5%
Passenger shelter	840	280	33,3%
Curb ramp	1600	900	56,3%
Crosswalk	1350	1230	91,1%
Traffic light	240	60	25,0%

Source: The authors, 2020.

The result presented in Table 8 shows that only two themes had a percentage above 50%, Crosswalks and Curb ramps. The Crosswalk had the highest score (91.1%) and the traffic light theme had the worst score (25%), classified as very bad. Of the 6 themes evaluated, four themes were considered bad or very bad for walking around these universities.

Sidewalk theme – The analysis of the sidewalk theme indicators (Table 9) shows that the indicators that contributed to obtaining a final index of 37.8% are related to ease of surface replacement, obstacle-free height, unobstructed and interference-free strip, Height of the curb and Leveling with the sidewalk of the contiguous lot, considered poor for accessibility on the sides of the block evaluated.

Table 9: Results of indicators on the Sidewalk theme.

Indicators	Maximum value	Value obtained in the field	Result in percentage
Minimum elements of the sidewalk	230	230	100,0%
Service lane location	230	220	95,7%
Free Range Width (Lfl)	230	180	78,3%
Regular surface	460	180	39,1%
Surface without unevenness	690	180	26,1%
Stable firm surface	690	360	52,2%
Non-slip surface	690	300	43,5%
Easy to replace surface	230	30	13,0%
Longitudinal slope (il)	460	120	26,1%
Cross slope (it)	690	180	26,1%
Obstacle-free height (alo)	460	60	13,0%
Clear and interference-free range	690	240	34,8%
Afforestation in arterial routes	460	320	69,6%
Curb height (hmf)	460	100	21,7%
Leveling with the sidewalk of the adjacent lot	690	150	21,7%
Street lighting	460	460	100,0%

Source: The authors, 2020.

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Only two indicators obtained the ideal maximum value, minimum sidewalk elements and public lighting. Although the lighting item had a high score, it was observed that the lighting in the place seemed to be dim. As most of the activities on these campuses take place at night, due to the score obtained, it can be inferred that this indicator deserves an adjustment in its form of assessment. Other indicators also received high scores: location of the service lane, width of the free lane and afforestation on the roads. Some details observed in the defined stretch, which there are no indicators to assess, such as holes in the surface, lack of maintenance or cleaning (Figure 2). The indicators that received the classification considered "bad" were the longitudinal and transversal inclination as a function of the topography of the studied area. The best sidewalk face (12), in front of UNESP, is the only one that has a tactile floor throughout the entire lot, but it is the same color as the floor, so it is in disagreement with the recommendations of NBR9050/2020, which guides the use of contrasting colors.

Figure 2: Some problems related of the Sidewalk theme - faces 02 and 04.

Source: The authors, 2020.

Figure 3: Result of the Sidewalk theme.

Source: City Hall of Marília edited by the authors, 2020.

Bus stop theme - The bus stop theme obtained a score close to sidewalks, with 38.5%, considered as bad. In this item, the indicators for the presence of stall, trash tree, trash and lighting, presence of fixed seats were evaluated. An observation involving the themes sidewalk and bus stop, in one of the bus stops, considered number 7 (Figures 4 and 5) is located in an area where there is no sidewalk.

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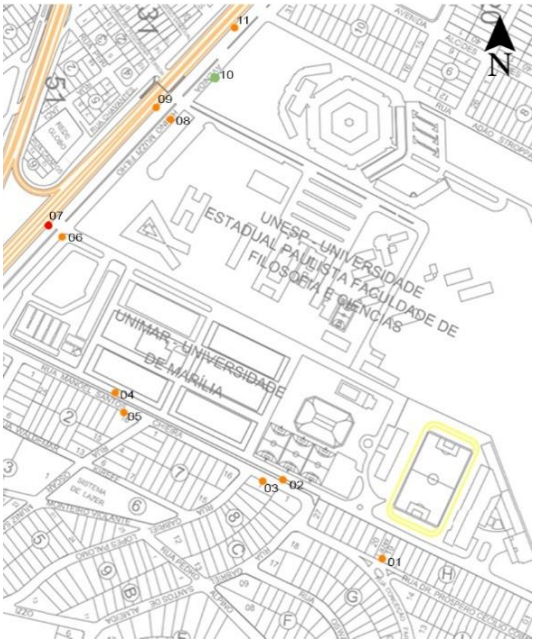
Table 10: Results of indicators on the Bus stop theme.

Indicators	Maximum value	Value obtained in the field	Result in percentage
Minimum sidewalk width (LCPO)	220	200	90,9%
Minimum length of sidewalk (Ccpo)	220	200	90,9%
Stall presence	330	0	0,0%
Presence of public transport information panel	110	0	0,0%
Warning tactile signaling along the curb	330	30	9,1%
Presence of access ramp	220	0	0,0%
Curb presence	330	330	100,0%
Presence of a bus stop signpost	330	60	18,2%
Presence of public lighting point	330	330	100,0%
Trash can presence	110	0	0,0%
Tree presence	220	20	9,1%
Presence of delimiting markings on the roads	330	330	100,0%
Directional tactile floor at the embark/disembark location	330	0	0,0%
Presence of indentation on sidewalks (Prc)	330	0	0,0%

Source: The authors, 2020.

Many indicators were not present at any of the 11 Bus stops evaluated, such as the presence of a stall, information panel, access ramp, garbage dump and all items associated with accessibility for people with wheelchairs. And the tactile warning signs along the curb (9.1%) and the presence of a bus stop signboard (18.2%) also need attention. The few positive points of this theme, classified as excellent, were minimum sidewalk length (90.9%), presence of curbs (81.8%), presence of public lighting (100%), presence of delimiting markings on roads (100%) and minimum sidewalk width (90.9%).

Figure 1: Result of the Bus stop theme.



Source: City Hall of Marília edited by the authors, 2020.

Figure 5: Some problems related of the Bus stops theme - points 01 and 07.

Source: The authors, 2020.

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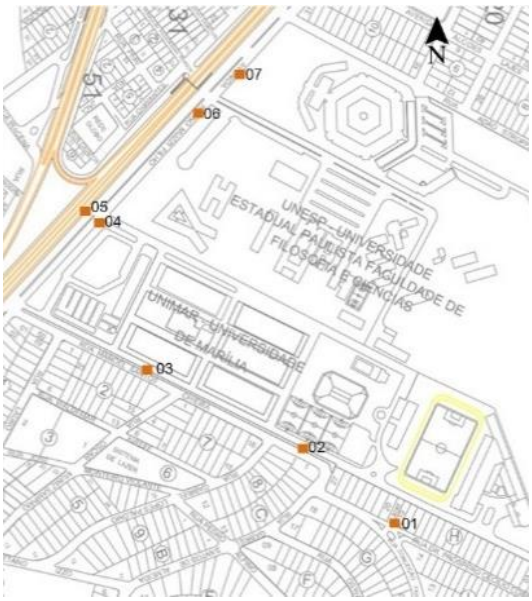
Passenger Shelter (Bus stop) Theme - is associated with the presence of a bus stop in the assessed area. It was observed that not all bus stops have shelter for passengers, only two of the indicators were considered in the evaluation of this item and received maximum score, presence of fixed seats for rest and presence of cover. And the other indicators did not score.

Table 11: Results of indicators on the passenger shelter (bus stop) theme.

Indicators	Maximum value	Value obtained in the field	Result in percentage
Presence of fixed seats for rest	140	140	100,0%
Space for people with wheelchairs	140	0	0,0%
Space for people with wheelchairs near the seats	140	0	0,0%
Width of space for people with wheelchairs (Lepcr)	140	0	0,0%
Space compliance for people with wheelchairs (Cepcr)	140	0	0,0%
Coverage presence	140	140	100,0%

Source: The authors, 2020.

Figure 6: Result of the passenger shelter (Bus stop) theme.



Source: City Hall of Marília edited by the authors, 2020.

Figure 7: Some problems related to the passenger shelter (Bus stop) theme– points 04 and 06.

Source: The authors, 2020.

Curb ramp Theme - As established by NBR 9050, most sidewalk lowerings were built in the direction of the pedestrian crossing flow (ABNT, 2020). Despite this theme having a score of 56.3%, classified as "Good", in the entire analyzed stretch, only 5 Curb ramps were identified, one of them located in front of the university hospital, it seems an "adaptation" (RC number 01), as the ramp is fitted to the curb (Figures 8 and 9). The other sidewalk lowerings (RC numbers 02, 03, 04 and 05) are all located on Avenida Higino Muzi Filho, just on the face of Unimar Campus. All Curb ramps lack a tactile warning floor, the curb height is irregular, sometimes lower or higher than indicated by technical standard NBR 9050. Another parameter in disagreement with

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NBR 9050 refers to the minimum distance that the sidewalk recesses must be from the vehicle curve points (CERNA, 2014; ABNT, 2020).

If we consider that the ideal would be 2 recesses per corner, as indicated in Pires et al. (2017), and one more at each bus stop, the area should have 66 Curb ramps, however, they were identified only 7.57% of the ideal total.

Table 12: Results of indicators on the Curb ramp theme.

Indicators	Valor máximo	Valor obtido em campo	Resultado em percentual
Located at Crosswalks	150	150	100,0%
Unevenness between the bottom of the Curb ramp and the carriage bed	100	100	100,0%
Built in the direction of pedestrian flow	50	50	100,0%
The Curb ramps on opposite sides of the road must be aligned with each other	150	120	80,0%
Presence of tactile floor alert	150	0	0,0%
Curb ramp Alert Tactile Floor Width (Lptrc)	150	0	0,0%
Width of the free lane in front of the Curb ramp (Lflrc)	150	150	100,0%
Minimum sidewalk width for Curb ramp (Lcrc)	100	100	100,0%
Curb ramp distance from corner curve points (Drce)	150	0	0,0%
Curb Height (Hmf)	100	0	0,0%
Curb ramp floor surface with non-slip material	150	120	80,0%
Longitudinal slope of the Curb ramp (Ilrc)	100	80	80,0%
Curb ramp transverse slope (Itrc)	100	100	100,0%

Source: The authors, 2020.

Figure 8: Result of the Curb ramp theme.

Source: City Hall of Marília edited by the authors, 2020.

Figure 9: Some problems related to the Curb ramp theme - RC 01 and 04.

Source: The authors, 2020.

Crosswalk Theme - Of the themes evaluated, the crosswalk obtained the best evaluation. It was observed that the existing crosswalks were within the minimum dimension

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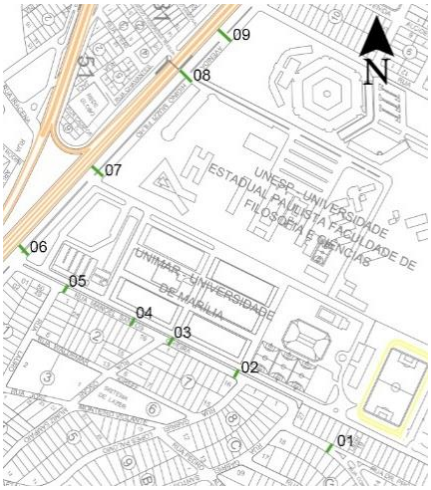
recommended by the technical standard, painted in white color, presence of public lighting, but not all are in a good state of maintenance. However, it was identified that many crossings located around the three university campuses do not have crosswalks, such as the one on Adão Stroppa Street (located on the side of Univem.

Table 13: Results of indicators for the Crosswalk theme.

Indicators	Maximum value	Value obtained in the field	Result in percentage
Minimum width of the Crosswalk (Lm)	270	240	88,9%
Maintenance status	270	180	66,7%
Signposted with painted banners	270	270	100,0%
Band color	270	270	100,0%
Presence of lighting	270	270	100,0%

Source: The Authors, 2020.

Figure 10: Result of the Crosswalk theme.



Source: City Hall of Marília edited by the authors, 2020.

Figure 11: Some problems related to crosswalks.

Source: The authors, 2020.

Traffic light Theme - The worst theme evaluated, Traffic light (25%), correspond to the evaluation of two traffic lights in the entire evaluated section, which are located on Higino Muzi Filho Avenue, in front of Unimar Campus, possibly because it receives a greater number of students. Its location does not make it difficult for pedestrians to circulate in the place, but at a traffic light (number 02) one side does not have a sidewalk face, but has a bus stop (number 07), a fact that negatively contributes to this assessment and impairs quality space of this location. The other indicators obtained the minimum score, as there is no manual device and sound signal in the evaluated area.

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Table 14: Results of indicators on the Traffic light theme.

Indicators	Maximum value	Value obtained and field	Result in percentage
Manual devices presence	40	0	0,0%
Handset height (Adm)	40	0	0,0%
Presence of beep	60	0	0,0%
Location makes circulation difficult	40	40	100,0%
Pedestrian movement attended	60	60	100,0%

Source: The authors, 2020.

Figure 12: Result of the Traffic light theme.

Source: City Hall of Marília edited by the authors, 2020.

Figure 13: Some problems related to the Traffic light theme – point 02.

Source: The authors, 2020.

CONCLUSION

The identification of the quality of walking around three universities in the city of Marília/SP showed that although the city and the country have legislation and technical recommendations to provide comfort and quality for all users, regardless of their disability or mobility restriction, this it does not occur around the three University Campus evaluated.

Problems related to sidewalk infrastructure such as traffic lights, whose score was very low for not presenting accessibility or safety items for crosswalk, as well as the passenger shelter (bus stop), which only scored for having fixed seats for rest and coverage contributed to the area obtained a poor rating. The sidewalk theme also obtained low scores due to the following indicators: curb height, obstacle-free height, easy-to-replace surface and regular surface. In summary, practically all topics need attention. These results point to the effectiveness of the method and, thus, can contribute to the managers of these University Campus and the owners to improve the quality of the infrastructure of access to the respective universities.

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