

The Evaluation of Pedestrian Lane Infrastructure in Residential Complex (A Case Study: BTP Residential Complex in Makassar city)

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Abstract: BTP (Bumi Tamalanrea Permai) residential complex is one of the densest settlements in Makassar City and is in a strategic area. Residential buildings along the main road of BTP residential complex has now been converted into commercial buildings such as culinary or restaurants, shops, educational institutions in the form of kindergarten and tutoring school, even health services such as clinics and hospitals. The building owner is building in the setback area for commercial activities. This then causes the unavailability of parking lots for vehicles. Visitors who have a vehicle will use the sidewalk, roadside and even a portion of the traffic lane as a parking lot so that the pedestrian lane in the form of sidewalks becomes unsafe and uncomfortable. The study was conducted on the sidewalk on the main road of BTP residential complex, Tamalanrea District, Makassar City. The 25-kilometer axle road is divided into 6 segments to facilitate observation. This study aims to evaluate the use and availability of sidewalk support facilities and the level of pedestrian satisfaction with the sidewalks on the main road of BTP residential complex. The method used is a descriptive analysis method to describe the results of observations of the use and availability of sidewalk support facilities; CSI analysis (Customer Satisfaction Index Analysis) is used to determine the level of pedestrian satisfaction with the sidewalk; and IPA (Importance Performance Analysis) analysis to find out the level of performance and importance of each the supporting facility in order to make recommendations for the direction of the pedestrian improvement plan.

Keywords: Pedestrian Lane, Sidewalks, Residential Complex

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I. Introduction

The main road of BTP (Bumi Tamalanrea Permai) residential has a fairly dense activity level. This density is caused by people who often use the main road of BTP residential complex as an alternative route connecting Maros Regency and Gowa Regency with faster travel times. This then makes BTP residential complex a very strategic area so that the surrounding community uses this opportunity to carry out economic activities of buying and selling. Residential buildings along the main road of BTP residential complex has now been converted into commercial buildings such as culinary or restaurants, shops, educational institutions in the form of kindergarten and tutoring school, even health services such as clinics and hospitals. The owner of the building is building on the border area of the building for commercial activities so that there is no available parking space for vehicles. Visitors who have a vehicle will use the sidewalk, shoulder of the road and even a portion of the road as a vehicle parking lot so that the pedestrian path in the form of a sidewalk becomes unsafe and comfortable.

One of the factors causing deviations from the sidewalk function is the absence of a clear the function of compatibility between pedestrian paths, bicycle lanes, and motor vehicles and other sidewalk support facilities. This is reinforced by Law Number 22 the year 2009 concerning Road Traffic and Transport, Article 13 that pedestrians are entitled to the availability of supporting facilities in the form of sidewalks, crossings, and other facilities. Based on the Circular Letter of the Minister of PUPR Number: 02/SE/M/2018 concerning Technical Planning of Pedestrian Facilities, pedestrian facilities at least meet the aspects of integrating environmental management systems, transportation systems and accessibility between regions, meet aspects of continuity, namely connecting between the place of origin to the destination and vice versa and meeting aspects of safety, security, and comfort. The circular also explained that pedestrian facilities must be accessible to all users, including users with various physical limitations.

In connection with the above explanation, it is deemed necessary to conduct an assessment of the use and availability of supporting facilities on the sidewalks in the main road of BTP residential complex. The assessment was carried out through field observations and an assessment of the level of pedestrian satisfaction with the sidewalk. The results obtained will be used in preparing recommendations for pedestrian-friendly sidewalk planning.

II. Materials And Methods

Location and Research Design

The study was conducted along the main road of BTP residential complex, Tamalanrea Village, Tamalanrea District, Makassar City. This research uses descriptive qualitative and quantitative analysis methods. Qualitative descriptive analysis is used to determine the physical condition of the sidewalk, the purpose, and intensity of the use of the sidewalk and the availability of supporting facilities for the sidewalk. The quantitative descriptive analysis method is used to analyze the level of sidewalk service to pedestrians.

Population and Sample

In this study, the number of samples used was 30 respondents in each segment so that the total number of respondents in the 6 segments of the study location was 180 respondents. By using the formula below, where the value of σ is unknown (population number of visitors is unclear in number), so the value of n can be used $n \geq 30$.

$$n = \frac{\sigma^2 z_{\alpha/2}^2}{e^2} \quad (1)$$

Where:

n : Number of samples

z : alleged confidence level ($1-\alpha$)

σ : Proportion of sample

e : alleged error (sampling error).

Method of collecting data

Secondary data obtained directly from the object of research by using measurement tools, recording and data collection through methods of field observation and interview methods. Field observations were carried out to gather data on the physical condition, purpose and intensity of using the sidewalk, and the availability of supporting facilities for the sidewalk, while the questionnaire method was conducted to capture data in the form of opinions and expectations of pedestrians. Secondary data can be in the form of administrative and demographic data of Makassar City and BTP residential complex. Literature data in the form of books, documents, and journals as well as previous research related to the research conducted.

Data analysis method

A qualitative descriptive method was used to describe and identify the physical condition and supporting facilities as well as the use of existing sidewalks at the study site. The data obtained is then processed by comparison with applicable rules. Quantitative descriptive methods are used to calculate the satisfaction of pedestrian users of the sidewalk. Customer Satisfaction Index (CSI) analysis is used to determine the level of overall user satisfaction and Importance Performance Analysis (IPA) analysis is used to measure the attribute dimension of importance with the level of performance expected by pedestrians. Spatial analysis is a process of activities to produce a map. The analysis is used to describe the characteristics of sidewalks and supporting facilities along the main road of BTP residential complex.

III. Result And Discussion

The main road of BTP residential complex sections consist of road lane, road median and roadside lane. The condition of the sidewalks is inadequate because some of the important elements of the pedestrian have unsuitable conditions. Pedestrians do not get comfort because along the edge of the residential axis the road is used as a trading area and a vehicle parking area so pedestrians must use the shoulder of the road as walking space.

Analysis of Sidewalk Utilization

1. Circulation of the Main Road User Movement

To identify the circulation movement of users of the main road of BTP residential complex section, observations are made through video and photo recording from above using a drone aircraft. Observations are made when the circulation of vehicle and pedestrian movements will be congested ie Monday at the specified times ie morning 07:00 am, noon at 12.00 pm, and afternoon at 17.00 pm.

a. Morning

Pedestrians use the sidewalk as a place to wait for public transportation. The problem that arises when a public vehicle (*pete-pete*) stops on the road is the slowing of the vehicles behind it, making the road jam. The sidewalks are also filled with street vendor stalls selling food for breakfast such as chicken porridge, yellow rice, wet / traditional cakes, and so on. The number of food stalls like this adds to the density of activity on the sidewalk in the form of circulation of people, circulation of vehicles and goods.

b. Daytime

The flow of traffic is relatively the same between the entry and exit lanes. At the time of this observation, the sidewalk was used as a parking lot in front of office buildings, banks, hospitals and restaurants/culinary due to the activity of pathways during lunch break. Because of the careless parking in the pedestrian lane, pedestrians who are active at the time of the walk on the traffic lane can have an impact on slowing down the speed of the driver's vehicle and the minimum level of pedestrian safety.

c. Afternoon

Sidewalks are used as parking lots, especially in front of restaurant buildings. The high intensity of vehicles that pass through this lane causes congestion due to the slowing down of the vehicle rate. Due to parking activities, pedestrians who are active at the time of the observation walk on the traffic lane that can have an impact on the minimum level of user safety.

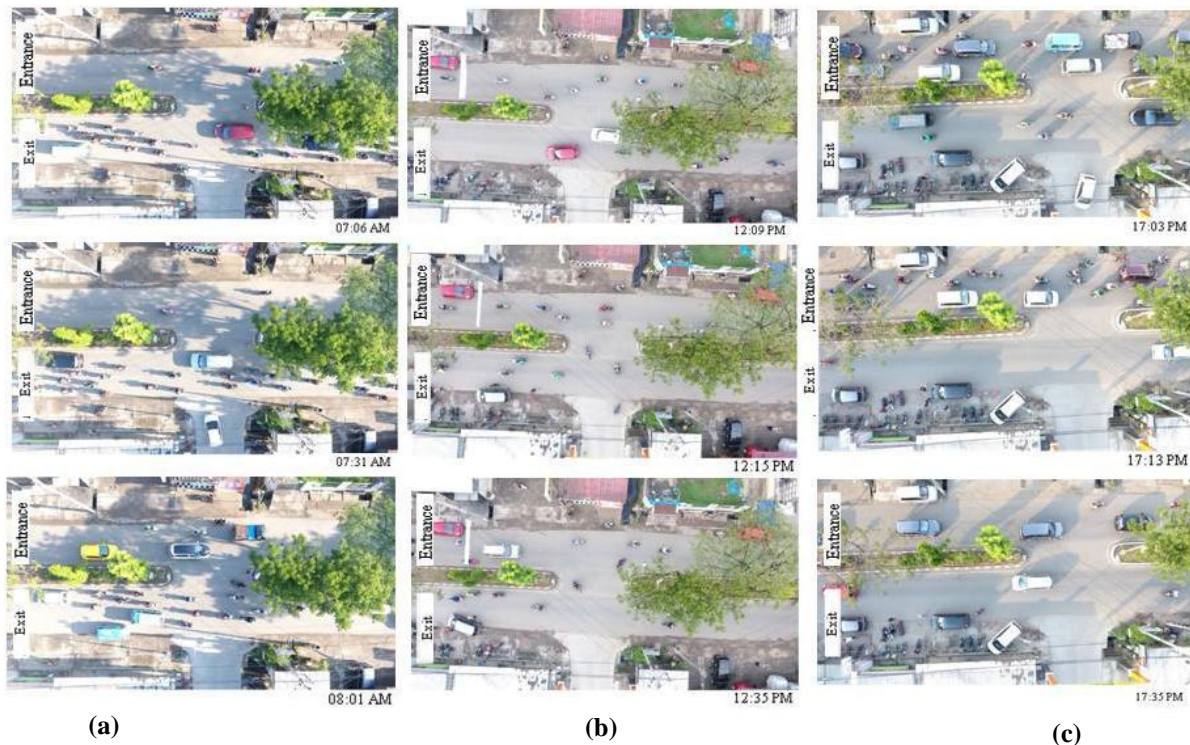


Figure 1. RoadUserCirculationat (a) Morning, (b) Daytime. (c) Evening

The Purpose and Intensity of Torotar Use

The use of sidewalks as a means to move from one building to another is classified as moderate (33.33%). For the purpose of exercising and walking casually or simply chatting, the level of use is very rare (40%). The use of sidewalk as a place to wait for public transportation is classified as moderate (36.67%). The most frequently used destinations for use are sidewalks as vehicle parking lots (34.44%) and shopping destinations at street vendors (29.44%).

Table 1. Results of the Purpose Questionnaire for Sidewalks

The Intended Use	Intensity of Use					Total
	Very Rarely	Rarely	Medium	Often	Very Often	
	%	%	%	%	%	%
Move from one building to another	30,56	26,67	36,67	6,11	0	100

Sports/jogging	40	30	17,22	10	2,78	100
Relaxing/Chatting	40	26,11	23,89	10	0	100
Waiting for public transportation	30,56	10	36,67	19,44	3,33	100
Vehicle parking	16,67	22,22	16,67	34,44	10	100
Shop at a street vendor	21,11	13,33	22,78	29,44	13,33	100

Intensity of Sidewalk Use

In the afternoon until the afternoon, sidewalks are used with moderate intensity based on the results of the highest response of respondents as much as 36.67%. The intensity of the use of sidewalks in the afternoon until the evening is classified as moderate with reference to the results of the accumulation of respondents' answers that is equal to 33.33%.

Table 2. Intensity Questionnaire Results on Sidewalks

Time of use	Intensitas Penggunaan					Total
	Very Often	Often	Normally	Rarely	Very rarely	
	%	%	%	%	%	%
Morning-afternoon	10	6,67	26,67	23,33	33,33	100
Daytime-afternoon	10	3,33	36,67	30	20	100
Afternoon-night	3,33	13,33	40	23,3	20	100

Analysis of the Availability of Pavement Facilities and Infrastructure

1. Continuity

Supporting facilities from the sidewalk that can meet the continuity of pedestrian activity is inadequate. Supporting facilities such as road crossings and speed controllers are not yet available, while supporting facilities in the form of traffic signs and signs, waiting booths and bus stops are available but in minimal quantities.

a. Sidewalk Dimensions and Materials

The conditions that generally occur on the main road of BTP residential complex tend to have fairly heavy vehicle traffic, especially during peak hours. Although vehicles and pedestrians have their own space for the movement of their respective activities, due to the condition of the sidewalks generally have the same elevation as the road body, motor vehicles and pedestrians overlap. Therefore an identification of physical conditions was carried out on parts of the road in the main road of BTP residential complex section.

Table 3. Dimensions of Road Area Segments 1-6

Segment	Lane	Pedestrian		Landscape Lane (m)	Drainage		Wide Traffic lane (m)	Road median	
		Wide (m)	Elevation (cm)		Wide (m)	in (m)		Wide (m)	Elevation (cm)
1	Entrance	1,25	+ 10	1,25	0,5	0,7	5,5	2	+ 40
	Exit	1,25	- 2	1,25	0,5	0,7	5,5		
2	Entrance	1,45	- 1	1	0,56	0,6	5,25	2	+ 40
	Exit	1,65	- 2	0,8	0,64	0,5	5,25		
3	Entrance	1,32	- 1	-	1,83	1,38	5	2,5	10
	Exit	2,00	- 1	-	1,6	1,07	5,09		
4	Entrance	1,43	- 1	-	0,725	0,8	5,9	3,14	- 2
	Exit	0,42	0,0	-	1	1,1	5,93		
5	Entrance	2	- 1	-	1,75	1,4	6,1	2,3	+ 33
	Exit	1,1	0,0	-	1,5	1,2	6,2		
6	Entrance	2	- 1	-	2	0,86	6	2,25	- 2,7
	Exit	1,1	- 1	-	1,59	0,8	5,9		

b. Obstacles on the sidewalk

Some of the obstacles found at the time of observation at the study site are outlined in Table 4.

Table 4. Barriers to sidewalks

Segment / Lane	Type of Obstacle	
1	Entrance	Relatively fewer obstacles, there are only a few vehicles parked on the sidewalk in a short time (for example ATM users)
	Exit Lane	<ul style="list-style-type: none"> • There are many guest vehicles and office employees parked on the roadside • There are parking vehicles along the road which are restaurant/culinary customers
2	Entrance	There are street vendors, drainage control tanks, parking vehicles at certain times (especially in the afternoon), parking vehicles for visitors who stop by to shop at the shops
	Exit lane	The relatively little obstacle can be seen from the number of vehicles parked is still relatively small
3	Entrance	There are parking vehicles, street vendors (at night), and sloping sidewalks
	Exit lane	There is a parking vehicle
4	Entrance	There are parking vehicles and electric poles right on the shoulder of the road or sidewalk along with the segment 4 observation area
	Exit lane	There is a parking vehicle
5	Entrance	There are parking vehicles and street vendors at several points along the sidewalk
	Exit lane	There are parking vehicles (especially at night, that is, visitors to the cafe), there are drainage control tanks that are not closed
6	Entrance	There are uncovered drainage control tanks and vehicles parked along the road
	Exit lane	Barriers are relatively less but there are still parking vehicles along the road



Figure 2. Obstacles on the sidewalk

c. Road Crossing

Road crossing facilities are not available in all entry and exit paths of each road segment at BTP. The current crossing activities are still not organized, where crossing activities can be done anywhere without zebra crossing.

d. Bus Stop

Supporting facilities in the form of shelters are only found at the entrance to segment 3. The seating facilities and protective roofs are still functioning properly. However, this time the bus stop functions as a motorcycle taxi station filled with motorbike parking lots that are waiting for passengers and the halt seats are functioning as a resting place or waiting for passengers for motorcycle taxi drivers.

2. Security and safety

Table 5. Observation Results of Supporting Facilities for Security and Safety

No.	Supporting Facilities	Observation Results
1.	SpeedControl	In the main road, no speed control facilities were found along the road, either from segment 1 to segment 6. The winding and contoured road conditions make this road condition dangerous without the speed control facility being found.
2.	Lighting	There are lighting lamps along the settlement lane. Laying the lighting on the road median and currently functioning properly. Lighting along the road is assisted by lighting from buildings on the shaft road. However, lighting is still relatively lacking in some locations where there are no buildings.
3.	Bollard	Supporting facilities in the form of bollard are not available along this residential lane which is one of the causes of the easy sidewalk changing function into a vehicle parking area along this lane.
4	Crossing Island	Crossing island on the road median is only available in the segment 1, namely 8 units. Currently, the waiting stalls are quite well functioned by the community in carrying out crossing activities along this path. The condition of the crossing island that are available at this time is still grounded but is easily recognized as a waiting stall because it is marked with barriers in the form of vegetation boundary wire to green the road median.

3. Convenience

Table 6. Observation Results of Supporting Facilities Facilities

No.	Supporting facilities	Result Observation
1.	Bench/Seat	Supporting facilities in the form of road benches are not available along the settlement lane
2.	Trash can	Supporting facilities such as trash cans are not available along the settlement lane. The trash can that is available in the building's private trash.
3.	Drainage	Supporting facilities in the form of water channels or drainage are located along the settlement shaft road section. This water channel is placed on the outer edge of the shoulder of the road and is currently functioning properly. Closed drainage is generally used as a sidewalk.

4. Accessibility

Table 7. Observation Results of Facilities for Supporting Accessibility

No.	Supporting facilities	Result Observation
1	Pedestrian Facilities with Special Needs	Facilities for pedestrians with special needs in the form of a guidelane both the guide block and warning block for pedestrians with special needs are not found along this residential lane. The physical condition of the sidewalks is still relatively dangerous for people with disabilities.
	Traffic Signs and Markings	There are 6 units of sidewalk supporting facilities in the form of parking ban signs that were found in the entry lane of segment 1. The condition of the road signs is still in good condition making it easier for road users to comply with traffic signs. As for the road signs in the form of traffic lights, 1 unit was found at the entry lane and 1 unit at the settlement exit lane.

Pedestrian Satisfaction Analysis

IPA Analysis (Importance Performance Analysis)

The results of the assessment of pedestrians on the performance and importance of the 4 indicators are detailed in each of the questionnaire questions in Table 8.

Table 8. Pedestrian Assessment Results on Performance and Interests

No.	Question	Importance Score (expectation)	Importance Weighting Factor (WF)	Performance Level Score (reality)	Weighted Score (WS)
P 1.1	Ease of walking on the sidewalk	3,00	0,06	1,31	0,07
P 1.2	The level of interference from motorized vehicles parked on the sidewalk	2,31	0,04	1,56	0,07
P 1.3	The level of interference from street vendors who sell on the sidewalk	2,12	0,04	1,37	0,05
P 1	P 1.4 The level of interference from the hardscape element above the sidewalk	2,60	0,05	1,85	0,09
	P 1.5 Availability of road crossings	2,71	0,05	1,96	0,10
	P 1.6 Bus stop availability	1,19	0,02	1,64	0,04
	P 1.7 Road crossing function	2,31	0,04	1,96	0,08
	P 1.8 Bus stop function	1,41	0,03	1,66	0,04
P 2	P 2.1 Speed controller availability	1,52	0,03	1,77	0,05
	P 2.2 Availability of lighting	1,90	0,04	2,65	0,09
	P 2.3 Bollard availability	1,37	0,03	1,62	0,04

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P 2.4	Availability of crossing island facilities	1,86	0,03	2,11	0,07	
P 2.5	Function of speed control facilities	1,83	0,03	2,08	0,07	
P 2.6	The lighting function works	1,29	0,02	2,94	0,07	
P 2.7	Bollard function	1,79	0,03	2,04	0,07	
P 2.8	Are the crossing islands to function?	1,69	0,03	1,94	0,06	
P 3	P 3.1	Availability and function of green belt (trees) as a protector/shade	2,11	0,04	2,76	0,11
	P 3.2	Availability of benches / seats	1,97	0,04	2,02	0,07
	P 3.3	Availability of rubbish bins	2,27	0,04	1,62	0,07
	P 3.4	Availability of drainage/drainage along the sidewalk	1,49	0,03	2,74	0,08
	P 3.5	Comfort walking on the sidewalk	1,88	0,04	2,63	0,09
	P 3.6	Thermal comfort/temperature (heat or shade)	1,32	0,02	2,57	0,06
	P 3.7	Sidewalk cleanliness	2,71	0,05	2,96	0,15
P 4	P 4.1	The level of ease of reaching the sidewalk	1,66	0,03	0,53	0,02
	P 4.2	Availability of sidewalks for pedestrians in the form of driver tiles in the form of direction tiles and pedestal columns in the form of warning tiles.	3,05	0,06	1,30	0,07
	P 4.3	The availability of sidewalk facilities in the form of markers and traffic signs	2,08	0,04	1,93	0,08
	P 4.4	Function of markers and traffic signs	2,13	0,04	1,98	0,08
Total		53,58		53,51	1,96	
Straight Perpendicular Lines Coordinates		1,98		1,98		

Based on the table 8, the attributes that have been calculated for importance and performance are described in a detailed Cartesian diagram, namely per point question questionnaire with the aim of making it easier to prepare recommendations and direct plans for improvement of the problems found.

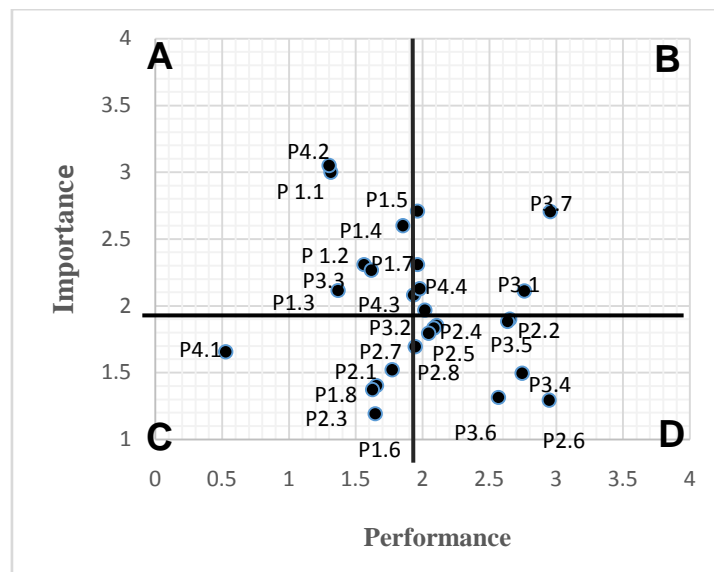


Figure 3. Results of Pedestrian Assessment in Cartesian Diagrams

Table 9. Quadrant Attributes based on IPA Analysis Results

Quadrant	Attribute
a	Attributes that must be made the first priority for improvement are attributes that are in quadrant A. These attributes are very important for pedestrians but have not been able to meet the needs. The attributes are the level of ease of walking on the sidewalk, the obstacles that are above the sidewalk, the availability of supporting facilities such as crossing roads, trash bins, markers and traffic signs as well as lane guidance facilities for pedestrians with special needs.
b	Attributes in quadrant B are attributes that need to be maintained or improved because of the level of performance that has been implemented is generally in accordance with the level of pedestrian interests. Attributes that are in quadrant B are the availability of green lines as a protector or shade and the level of pavement cleaning.
c	In quadrant C, the attribute has a low level of importance and satisfaction. Sidewalk users do not feel important to these attributes. The attributes in the C quadrant are the availability and function of the bus stop, speed control, bollard, the function of the waiting booth and the level of ease in reaching the sidewalk.
d	In quadrant, D is, an attribute that has a very high level of performance but felt very unimportant by visitors. Attributes that are in quadrant D are the availability and function of lighting lamps, the availability of waiting for booth facilities, benches/seats, availability of drainage, the comfort of walking on sidewalks and thermal / temperature comfort.

Customer Satisfaction Index (CSI) Analysis

Through Customer Satisfaction Index (CSI) analysis, it can be seen that customer satisfaction can then be used as a reference in determining future planning. Based on the table of performance and importance, the results obtained that the assessment of respondents stated that the performance aspect of comfort is the best, while the least good performance is the continuity aspect.

Table 10. CSI Analysis Results

No.	Indicator	Importance Score	Importance Weighting Factor (WF)	Performance Level Score	Weihgted Score (WS)	GAP
P 1	Continuity	2,21	0,27	1,66	0.46	0.46
P 2	Safety and security	1,66	0.21	2,15	0.44	0.44
P 3	Comfort	1,96	0.24	2,47	0.60	0.60
P 4	Accessibility	2,23	0.28	1,83	0,51	0.51
CSI			0.50			

The results of CSI analysis calculations produce a value of 0.50 which means that the respondent expressed less satisfaction with the condition of the sidewalks along the main road of BTP residential complex.

IV. Referral Recommendations

Based on the results of the analysis of the level of pedestrian satisfaction in the Cartesian diagram, several aspects are given top priority for improvement in the recommendations and direction of the plan. Attributes that become objects are attributes that are in quadrants A and B while still considering the results of field observations.

Table 11. Referral Recommendationaion

Object Attribute	Direction of Plan
Continuity	<p>a) Distribution of Sidewalk Zones</p> <p>Referring to Makassar Mayor Regulation number 8 of 2008 concerning Border Lines and Functions of Buildings in each of the Roads in the Makassar City Area, the use of the building boundary area which is a DAWASJA (Road Control Area) is released or is not permitted to be built. The appendix states that the BumiTamalanreaPermai Raya road, which is a BTP housing shaft, has a Building Boundary distance of 10 meters, calculated from the outer boundary of the fence to the outer wall. The area is Dawasja which must be freed from the building, both permanent and non-permanent. The area is intended for parking needs in each of these buildings.</p>
	<p>b) Sidewalk Dimensions and Materials</p> <p>The height of the sidewalk that originally had an elevation of +/- 0.00 cm to the road, that is, with a height of 25 cm from the road adjusted to the standard height of the curb. Intermsof material used in the form of paving blocks accompanied by a kereb which is a physical boundary between the sidewalk and the motor vehicle lane.</p>
	<p>Provision of parking facilities in the building border area that has the functions of offices, shops, restaurants, and services. Tominimize the divided sidewalks, the entrance to the building is arranged in a couple of ways and accompanied by a ramp to facilitate pedestrians in crossing the entrance.</p> <p>To add value to the function of the parking space, then in planning using the concept of Green Parking Lot, namely the concept of parking using the following rules:</p> <ul style="list-style-type: none"> • Uses materials that absorb water like perme able paving blocks • Manage rain water run off (capturing, filtering, filtering and storing rain water) • The use of lighting systems that are energy efficient and renewable • Provides safe pedestrian circulation, shade and greening.
Obstacles on the sidewalk	
Availability of Road Crossing Facilities	<p>Road crossing facilities are placed in the ZoSS or Happy School Zone with the consideration that the reare several schools and educational institutions located right on theedgeoftheroads suchas PAUD, secondar yschools, and educational in stitutions. School-age children are still very vulnerable in traffic, especially when crossing the road. The requirements of ZoSS are as follows.</p>

Object Attribute		Direction of Plan
		<ul style="list-style-type: none"> On the sidewalk and the color of the road in front of the school uses red. Traffic signs in the form of speed limit signs (25 km / h), parking ban signs, cross signs are prohibited. Road markings are zebra crossings, parking bans, longitudinal and other transverse markers Traffic lights
Comfort	The availability of green lines as a protector/shade	The condition of the main road which is dense causes limited land. By the direction of the plan, the addition of a green line in the form of a flower pot that integrates with the sidewalk and is placed on the side bordering the traffic lane. It is expected that the green belt can function as a barrier while reducing pollution.
	Trash Can Availability	Garbage bins are separated from organic waste and plastic and metal waste which is placed every 20 meters and at the meeting points of the intersection. The trash can material used is printed concrete with high durability consideration.
Accessibility	Availability of Signs and Traffic Marks	Signs and traffic markings that will be placed at several points such as at crossing facilities and intersections along the shaft road BTP housing is divided into two types namely; <ul style="list-style-type: none"> Traffic signs for the driver are speed limit warning signs (25 km/h) and parking prohibition signs. Signs for road users such as Signs for the location of pedestrian crossing facilities
	Track Guides for Pedestrians with Special Needs	To accommodate the needs of pedestrians with special needs, in accordance with the standard principles of pedestrian facility planning, the pavement surface is equipped with steering and warning tiles and on the pavement is given an 8% marking (ramp).

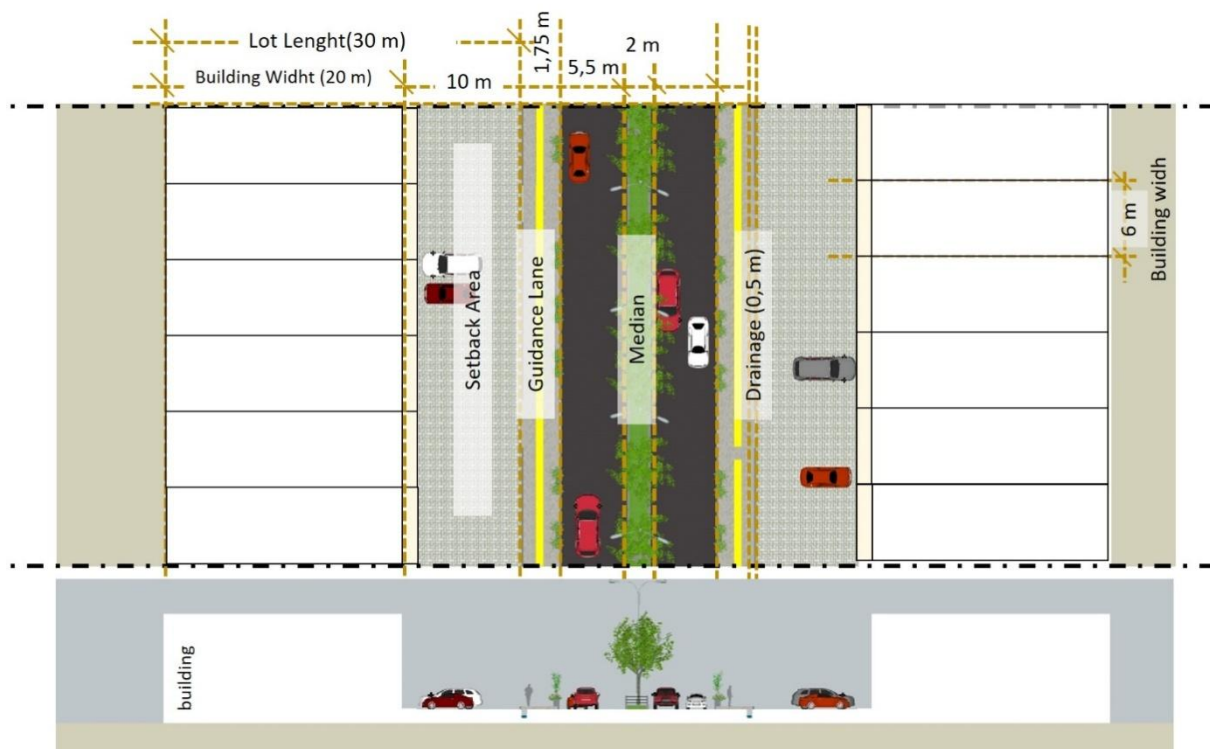


Figure 4. Direction of Road Area Plan

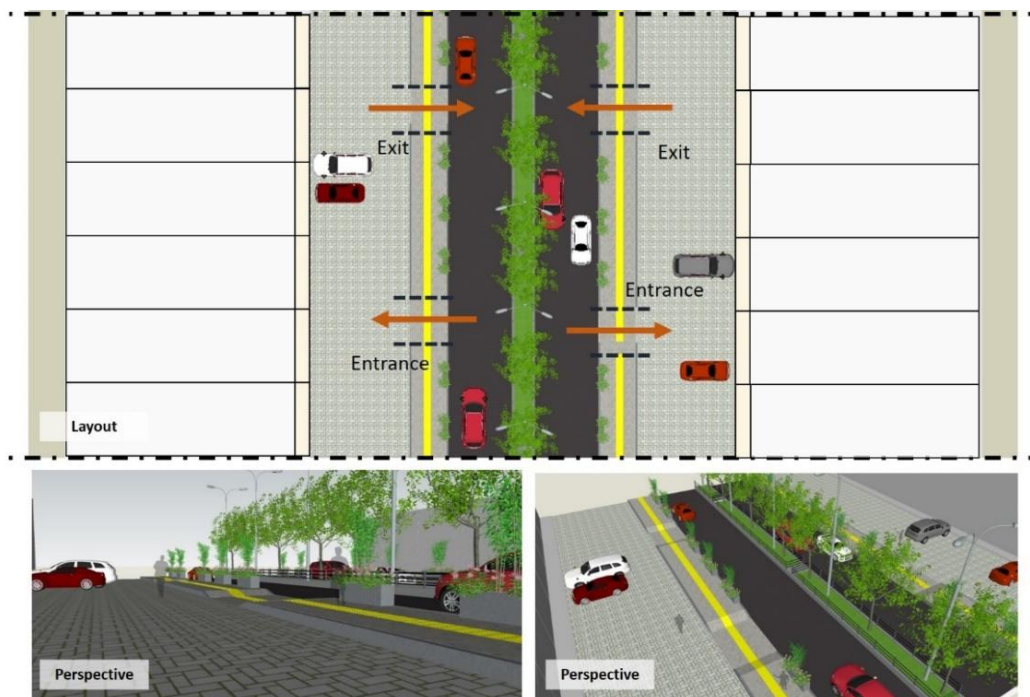


Figure 5. Direction of Parking Area Plan

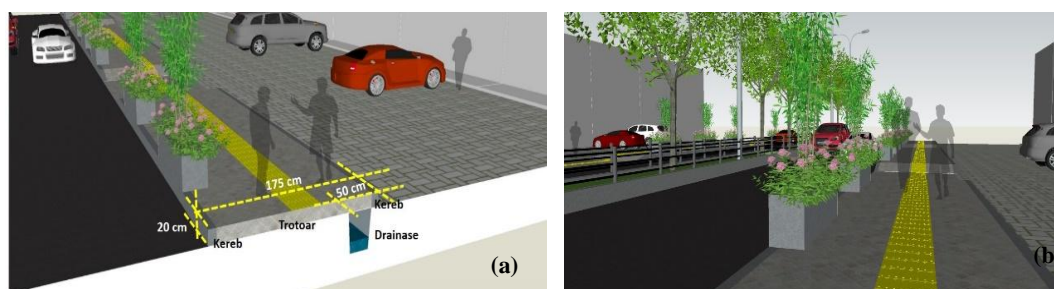


Figure 6. Illustration of Directed Dimension and Material Planning Directive (a) and Illustration of Directed Lines and Guidance Line Plan (b)

References

- [1]. Anggriani, Niniek, 2009, Pedestrian Ways in Urban Planning, Surabaya: Humanities Foundation
- [2]. Ministry of Public Works Directorate General of Spatial Planning, 2014
- [3]. National Association of City Transportation Officials, 2013, *NACTO, Urban Street Design Guide*, New York
- [4]. New Jersey State Department of Transportation, 2017. *Complete Street Design Guide*, New Jersey
- [5]. Makassar City Regulation Number 4 of 2015 concerning, Makassar City Spatial Planning 2015-2034
- [6]. Minister of Public Works Regulation No. 03/PRT/M/2014 concerning, Guidelines for Planning, Provision and Utilization of Pedestrian Network Infrastructure and Facilities in Urban Areas, Jakarta
- [7]. Makassar Mayor Regulation number 8 of 2008 concerning, Borderline and Function of Buildings on each Road in the Makassar City Area.
- [8]. Makassar Mayor Regulation Number 26 of 2005 concerning, Regulation of the Implementation of Law Number 28 of 2002 concerning Buildings.
- [9]. Sakinah, Riesta. Kusuma, Hanson E. Tampubolon, Angela. Foreword, Bakri, (2018), Pedestrian Road Criteria in Indonesia, *Journal of Construction Environment Indonesia* 7 (2), ISSN 2301-9247 | E-ISSN 2622-0954.
- [10]. Indonesian National Standard RSNI T-14 - 2004 concerning, Urban Road Geometry.
- [11]. Circular of the Minister of PUPR Number: 02/SE/M/2018 concerning, *Technical Planning for Pedestrian Facilities*.
- [12]. Institute for Transportation and Development Policy (ITDP), 2019, *Pedestrian Facility Design Guide: DKI Jakarta 2017-2022*, Jakarta
- [13]. Wunas, Shirly., 2018, Lecture Material: Complete Street. Postgraduate of Hasanuddin University, Makassar.

Nindya Karlina*. "The Evaluation of Pedestrian Lane Infrastructure in Residential Complex (A Case Study: BTP Residential Complex in Makassar city)". *IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)*, 17(1), 2020, pp. 01-10