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FEASIBILITY STUDY OF PODO TOWN SQUARE GEMEK PEDESTRIAN, KEDUNGWUNI DISTRICT, PEKALONGAN REGENCY

Aris Krisdiyanto, Kemmala Dewi, Archi Rafferti Kriswandanu, Althea Serafim Kriswandaru, M. Makhfud Riyadi
University 17 Agustus 1945 Semarang, Central Java, Indonesia
Email: ariskrisdiyanto123@gmail.com, kemmaladewi2234@gmail.com, raffertikriss@gmail.com, altheaserafim@gmail.com, riyadimakhfud@gmail.com

Abstract

The Institute of Technology and Science (ITS) campus, Pusmanu Polytechnic, SMA Negeri 1 Kedungwuni, SMK Negeri 1 Kedungwuni, SMP Negeri 2 Kedungwuni as an educational center, There are shophouses along the right and left side of the road as a trading place. This is the reason why so many people come to the area. So in the Podo-Surabaya segment, human movement in the area is high. The more visitors who come to the place will impact the concentration of pedestrians. With a large pedestrian flow and the presence of street vendors and illegal parking at several points along the sidewalk, it will significantly affect the comfort and flexibility of pedestrians. For this reason, it is necessary to plan for improving pedestrian facilities in the area. To obtain the minimum width, the required sidewalk width, and pedestrian facilities are calculated according to the Technical Guidelines no. 032/T/BM/1999 "Guidelines for Planning Pedestrian Paths on Public Roads, Minister of Public Works Decree No. 468/KPTS/1998 "Technical Requirements for Accessibility in Public Buildings and the Environment," Director General of Highways No.007/T/BNKT/1990 "Guidelines for Using Sidewalks," Minister of Public Works Regulation No. 03/PRT/M/2014 "Guidelines for Planning, Provision, and Utilization of Pedestrian Network Infrastructure and Facilities in Urban Areas," Technical Guidelines no. 022/T/BM/1999 "Accessibility Requirements on Public Roads." The results of the design are carried out with the AutoCAD program. From the calculation of pedestrian walking speed, the average rate is 43.80 m/minute, from the analysis of the minimum width obtained 1,6 meters.

Keywords: Pedestrians; Sidewalks; LOS; Pedestrian facilities

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Introduction

Transportation problems are constantly faced by developed and developing countries, one of which is Indonesia. Both in urban transportation, inter-city transportation, and regional transportation (Jotin Khisty & Kent Lall, 2003). Creating a sound transportation system capable of ensuring the smooth, safe, fast, cheap, comfortable, and environmentally appropriate movement of people and vehicles, both private and public, is a development goal in the transportation sector (Keputusan Menteri Pekerjan Umum & Indonesia, 1998). A pedestrian path is a pedestrian path separated from the gallery of public, transportation, usually located next to each other or adjacent, given a surface layer, given an elevation higher than the pavement's surface, and generally parallel to the vehicle traffic lane. The pedestrian path serves as a means of achievement that can protect pedestrians from the dangers of motorized vehicles. The primary function of the pedestrian path is to provide services to pedestrians to improve the smoothness, safety, and comfort of pedestrians.

Pedestrians process large amounts of sensory input for sophisticated signal exchanges to negotiate rights of way (Sarkar, 1993).

According to Law Number 22 of 2009 concerning Road Traffic and Transportation, it is clearly stated that pedestrians have the right to the availability of supporting facilities in the form of sidewalks, crossings, and other facilities (Manual, 2000b). According to Article 275 paragraph 1, it is stated that every person who commits an act that causes disturbance to the function of traffic signs, road markings, traffic signaling devices, pedestrian facilities, and road user safety devices shall be punished with imprisonment for a maximum of one month or a maximum fine of 250,000 rupiahs.

The availability of pedestrian facilities is one of the elements that need to be considered in the traffic engineering process (available pedestrian facilities) (Sisiopiku & Akin, 2003). The pedestrian lane represents a section that often experiences conflict with vehicular traffic, resulting in traffic delays and a high rate of traffic accidents.

Based on the background that has been described, the main problems in this final project are as follows (Kota, 1990):

1) Determine the average travel time of pedestrians crossing Simpang Podo Street - Surabaya Street, Kedungwuni District, Pekalongan Regency?
2) Determine the dimensions of the need for pedestrian sidewalks according to standards on Jalan Simpang Podo - Jalan Surabaya, Kedungwuni District, Pekalongan Regency?

The aims and objectives of this discussion are as follows:

1) Identify two-way pedestrians Jalan Simpang Podo - Jalan Surabayan, Kedungwuni District, Pekalongan Regency.
2) Identify the pedestrian volume and speed of the Intersection Podo-Jalan Surabayan, Kedungwuni District, Pekalongan Regency.
3) Identify pedestrian plans according to the standards of Jalan Simpang Podo-Jalan Surabayan, Kedungwuni District, Pekalongan Regency.

The benefits of this Final Project are as follows:

1) Obtained an appropriate and appropriate pedestrian sidewalk design on Jalan Simpang Podo - Jalan Surabaya, Kedungwuni District, Pekalongan Regency.
2) The planning concept in this final project can be used as an alternative to improve the design of sidewalks and pedestrian crossings that have the same characteristics.

The problem limitation of this final project is as follows (Yermadona, 2018):

1) The area studied is Kedungwuni District, Pekalongan Regency.
2) Analysis Not doing pavement structure planning.
3) Does not take into account the budget plan (RAB).
4) The survey is conducted on effective working days and school hours.
5) Not planning for bus stops, drainage flows, and other facilities.
6) The observed sample is all pedestrians who walk on sidewalks and crosswalks but does not include street vendors who occupy the sidewalks.

Pedestrian Planning for Jalan Simpang Podo-Jalan Surabayan (Setiawati, 2017), Kedungwuni District, Pekalongan Regency with the total length of the planned road, is 1,143 km. (Miro, 2005) The initial STA point of planning is at the intersection of Podo village, Kedungwuni sub-district, Pekalongan district, until the final STA is at the Suromadukaran bridge, Surabayan village, Kedungwuni district, Pekalongan district.

Figure 1
Location Plan

A. Sidewalk

Pedestrian comes from the Greek, from the word pedos which means foot. Pedestrian also comes from the Latin pedestal pedestrians, namely people walking or pedestrians, so pedestrians can be interpreted as pedestrians or people who walk. Pedestrian means "person walking in the street," which means people walking on the street. And while the lane is the part of the road used for vehicle traffic (PP No. 43 of 1993 on infrastructure and road traffic). According to the Big Indonesian Dictionary, a path is a straight column, a broad line, a wide strip, the space between two lines on a large surface, the elongated space between two rows of plants, the vast space between two straight boundary lines, the distance between a single playing line and a double playing line.

B. Crossing Place

The zebra cross is installed with the following conditions (Kota, 1990).

1) Zebra crosses must be installed on roads with low traffic volume, between 200-500 vehicles/hour, with a pedestrian volume of fewer than 100 people/hour.
2) The location of the zebra crossing must have sufficient visibility so that the vehicle bunches caused by the use of crossing facilities are still within safe limits.

C. Level of Service

According to HCM (2000), the service level is a qualitative measure describing traffic flow operational conditions (Nedevska, Ognjenović, & Murgul, 2017)(Quraisy, 2021). The following is the level of service for pedestrian facilities: (Asadi-Shekari, Moeinaddini, & Shah, 2014)

D. Pedestrian Survey

Pedestrian volume surveys are carried out to accurately determine the number of pedestrian movements that pass through an area or at selected locations. The use of survey data is to:

1) Basis for evaluation of pedestrian paths/pavements/walkways.
2) Evaluate whether or not the crossing is sufficient.
3) Protection and pedestrian facilities.
4) Calculation of traffic light timing.
5) Provide data for future pedestrian facility planning.

Method

Simulation Block Diagram

The order of implementation of the Final Project is carried out in the following stages.

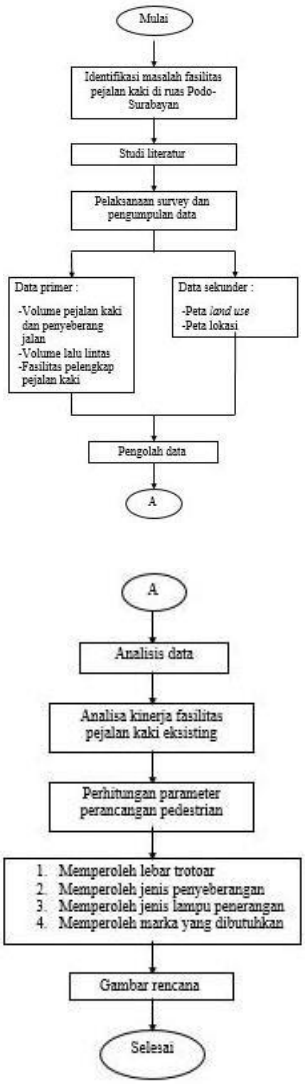

Figure 2
Research Method Flow

Results and Discussion

A. Data Volume

Table 1
pedestrian volume survey results

Segmen	Sisi	*Weekend*		*Weekday*	
		Volume Puncak Pejalan Kaki	Jam Puncak	Volume Puncak Pejalan Kaki	Jam Puncak
1	Kanan	47	10.45-11.45	150	11.15-12.15
	Kiri	48	10.45-11.45	140	11.30-12.30
2	Kanan	127	08.30-09.30	61	16.30-17.30
	Kiri	126	12.30-13.30	80	08.45-09.45
3	Kanan	204	15.15-16.15	82	16.45-17.45
	Kiri	95	08.15-09.15	82	10.30-11.30
4	Kanan	55	09.45-10.45	15	16.00-17.00
	Kiri	70	10.30-11.30	22	11.30-12.30

Table 2
wader volume survey results

Segmen	Sisi	*Weekend*		*Weekday*	
		Volume Puncak Penyeberang	Jam Puncak	Volume Puncak Penyeberang	Jam Puncak
1	Kanan-Kiri	21	11.15-12.15	91	10.00-11.00
	Kiri-Kanan	31	17.00-18.00	113	11.15-12.15
2	Kanan-Kiri	63	10.30-11.30	35	16.00-17.00
	Kiri-Kanan	65	11.30-12.30	45	16.15-17.15
3	Kanan-Kiri	112	15.15-16.15	35	08.00-09.00
	Kiri-Kanan	39	08.30-09.30	95	06.45-07.45
4	Kanan-Kiri	29	10.15-11.15	94	13.00-14.00
	Kiri-Kanan	32	13.45-14.45	94	13.00-14.00

Table 3
vehicle volume survey results

Segmen	Jenis Kendaraan	*Weekend*		*Weekday*	
		Volume Puncak Lalu Lintas	Jam Puncak	Volume Puncak Lalu Lintas	Jam Puncak
1	Sepeda Motor	1620	13.30-14.30	2391	07.15-08.15
	Kend.Ringan	964	13.00-14.00	1038	07.30-08.30
	Kend.Berat	8	11.45-12.45	15	10.30-11.30
	Unmotorized	78	08.00-09.00	30	17.00-18.00
2	Sepeda Motor	1947	17.00-18.00	2228	07.30-08.30
	Kend.Ringan	1589	12.45-13.45	1512	17.00-18.00
	Kend.Berat	32	08.30-09.30	5	13.45-14.45
	Unmotorized	135	07.45-08.45	25	09.00-10.00
3	Sepeda Motor	2343	09.00-10.00	2099	08.15-09.15
	Kend.Ringan	1294	16.15-17.15	1263	14.45-15.45
	Kend.Berat	14	08.30-09.30	36	11.30-12.30
	Unmotorized	194	08.30-09.30	46	07.30-08.30
4	Sepeda Motor	2513	08.45-09.45	2062	16.45-17.45
	Kend.Ringan	1246	16.45-17.45	1043	12.45-13.45
	Kend.Berat	14	08.45-09.45	49	13.45-14.45
	Unmotorized	219	07.45-08.45	58	07.00-08.00

B. Pavement Service Level Analysis

The first analysis is about the level of pavement service using the method of HCM and the Gainesville Prototype (Bhuyan & Nayak, 2013). For the analysis of HCM, the first thing to do is to calculate the volume of pedestrians in each sidewalk segment on the Podo-Surabaya section, Kedungwuni District, Pekalongan Regency. Which have been specified. After that, the volume data that has been obtained is processed to determine the peak volume of Pedestrians in each sidewalk segment (Dixon, 1996). Then the pavement service level is calculated using the formulation recommended by the (Manual, 2000a). The results of this calculation are entered into the level of service table to determine the level of pavement service in each segment. Meanwhile, a physical examination or facilities along the pedestrian path were carried out for the Gainesville Prototype analysis.

Table 4
Peak pedestrian volume
leg of each segment

Segmen	Sisi	Weekend		Weekday	
		Volume Puncak pejalan Kaki	Waktu	Volume Puncak Pejalan Kaki	Waktu
1	Kanan Kiri	17 25	11.30-11.45 11.15-11.30	47 54	13.00-13.15 11.45-12.00
2	Kanan Kiri	70 41	10.15-10.30 12.30-12.45	23 27	16.45-17.00 09.00-09.15
3	Kanan Kiri	144 36	15.15-15.30 09.00-09.15	27 25	17.15-17.30 11.15-11.30
4	Kanan Kiri	19 30	08.45-09.00 14.00-14.15	5 13	16.15-16.30 12.00-12.15

Segment 1

Right side (X1)

Total width (W_t) :2,30 m

Reduction width

W_1 (kereb) (Yermadona, 2018) : 0,10 m

W_2 (tree) : 0,90 m +

W_r (total width reduction) : 1,00 m

Effective Width (W_e) = W_t – Wr : 1,30 m

Pedestrian volume : V_1 = 47 org/15 minute

Pedestrian flow, V $= \frac{Vt}{15\ x\ We}$

$= \frac{47}{15\ x\ 1,3}$

= 3

human/m/ minute

Left side (X_2)

Total width (W_t) : 4,50 m

Reduction width W_1 (kereb) : 0,10 m

W_2 (PKL) : 1,70 m

W_3 (Motorcycle Parking Only) : 0,96 m

W_4 (tree) : 1,10 m +

W_t (total width reduction) : 3,86 m

Effective Width (W_e) = W_t - W_r : 0,64

Pedestrian volume: V_1 =54 org/15minute

Pedestrian flow, V $= \frac{Vt}{15\ x\ We}$

$= \frac{54}{15\ x\ 0,64}$

= 6

org/m/minute

Segment 2

Right side (X_3)

Total width (W_t) :1,6 m

Reduction width

W_1 (kereb) : 0,10 m

W_2 (PKL) : 1,50 m

W_3 (tree) : 0,80 m +

W_r (total width reduction) :140 m

Effective Width (W_e) = W_t– W_r: 0,050 m

Pedestrian volume: V_1 =70 human/15 minute

Pedestrian flow, V $= \frac{Vt}{15\ x\ We}$

$= \frac{70}{15 \; x \; 0,5}$
=10
org/m/minute

Left side (X_4)
Total width (W_t) :1,20 m
Reduction width
W_1 (kereb) : 0,10 m
W_2 (tree) : 1,30 m +
W_r (total width reduction) : 1,40 m
Effective Width (W_e) = W_t – W_r : 0,50 m
Pedestrian volume: V_1 = 70 org/15 minute
Pedestrian flow, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{70}{15 \; x \; 0,5}$
=10
org/m/minute

Segment 3

Left side (X_5)
Total width (W_t) : 1,80 m
Reduction width
W_1 (tree) : 1,40 m +
W_r (total width reduction) : 1,40 m
Effective Width (W_e) = W_t - W_r : 0,40 m
Pedestrian volume: V_1 =70 poeple/15 minute
Pedestrian volume, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{144}{15 \; x \; 0,4}$
=24
org/m/minute

Left side (X_6)
Total width (W_t) :1,50 m
Reduction width W_1 (kereb)
: 0,10 m
W_2 (PKL) : 0,50 m
W_3 (Pohon) : 1,12 m +
W_r (total width reduction): 1,72 m
Effective Width (W_e) = W_t- W_r : 0,78 m
Pedestrian volume: V_1 = 36 human/15 minute
Pedestrian flow, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{36}{15 \; x \; 0,78}$
= 4
org/m/minute

Right side (X_7)
Total width (W_t) :1,50 m
Reduction width:
W_1 (kereb) : 0,10 m
W_2 (channel) : 1,12 m +
W_r (total width reduction) : 1,72 m
Effective Width (W_e) = W_t – W_r : 0,78 m
Pedestrian volume: V_1 = 36 human/15 minute
Pedestrian volume, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{36}{15 \; x \; 0,78}$
= 4
human/m/minute

Left side (X_8)
Total width (W_t) :1,50 m
Reduction width
W_1 (kereb) : 0,10 m
W_2 (tree) : 1,12 m +
W_r (total width reduction) : 1,72 m
Effective Width (W_e) = W_t - W_r: 0,78 m
Pedestrian volume: V_1 = 36 org/15 minute
Pedestrian flow, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{36}{15 \; x \; 0,78}$
= 4
human/m/minute

The level of service (LOS) for the pedestrian path of Jalan Simpang Podo-Jalan Surabayan, Kedungwuni District, Pekalongan Regency. The complete list is shown in Table 5.2.

Table 5
The level of service (LOS) of the existing pedestrian path HCM method

Segmen	Titik survei				Wt (m)	Wr (m)	We (m)	Faktor	Vol. Max (orang/15menit)	V (Flow Rate) (orang/m/menit)	Tipe LOS	Keterangan
1	Zona Perdagangan	Kawasan Ruko dan Indomart	Kanan	Weekend	2,3	1	1,3	Perabot, Jalan dan Pohon	17	1	A	≤16orang/m/menit
				Weekdn					47	2	A	≤16orang/m/menit
			Kiri	Weekend	4,5	3,86	0,64	PKL, Parkir, Jalur hijau	25	3	A	≤16orang/m/menit
				Weekdn					54	6	A	≤16orang/m/menit
2	Zona Perdagangan dan Perkantoran	Kawasan SPBU, Ruko Kantor Bank BNI,BRI	Kanan	Weekend	2,9	2,4	0,5	PKL, Perabot jalan, Pohon	70	9	A	≤16orang/m/menit
				Weekdn					23	3	A	≤16orang/m/menit
			Kiri	Weekend	2,2	1,4	0,8	Perabot Jalan, Pohon	41	3	A	≤16orang/m/menit
				Weekdn					27	2	A	≤16orang/m/menit
3	Zona Perkantoran	Kawasan Kantor Kelurahan Kedungwuni Timur	Kanan	Weekend	1,8	1,4	0,4	Perabot Jalan, Pohon	144	24	B	>16-23orang/m/menit
				Weekdn					27	5	A	≤16orang/m/menit
			Kiri	Weekend	2,5	1,72	0,78	PKL, Perabot Jalan, Pohon	36	3	A	≤16orang/m/menit
				Weekdn					25	2	A	≤16orang/m/menit
4	Zona Pendidikandan Wisata	Kawasan SMA 1 kedungwuni dan Alun-Alun Gemek	Kanan	Weekend	2,3	1	1,3	PKL, Perabot Jalan, Pohon	19	1	A	≤16orang/m/menit
				Weekdn					5	1	A	≤16orang/m/menit
			Kiri	Weekend	2	1,5	0,5	PKL, Perabot Jalan, Pohon	30	4	A	≤16orang/m/menit
				Weekdn					13	2	A	≤16orang/m/menit

Table 6
Assessment of the level of service for the existing pedestrian Gainesville prototype method

No.	Kategori	Penilaian	Kriteria	Nilai Tiap Segmen							
				1		2		3		4	
				Kanan	Kiri	Kanan	Kiri	Kanan	Kiri	Kanan	Kiri
1	Fasilitas pedestrian Yang tersedia (Nilai maksimal=10)	0	Tidak menerus atau tidak ada	0	0	0	0	0	0	0	0
		4	Menerus pada satu sisi								
		6	Menerus pada dua sisi								
		2	Lebar min 1.53 m & bebas penghalang								
		1	Lebar Trotoar>1.53 m	1	1	1	1	1	1	1	1
		1	Fasilitas alternatif yang paralel								
2	Konflik (Nilai maksimal=10)	1	Jalan mobil dan trotoar	1	1	1	1	1	1	1	1
		0,5	Pedestrian signal delayz <40 dtk			0,5	0,5				
		0,5	Menguranai konflik putaran			0,5	0,5				
		0,5	Lebar persimpangan <18.3 m								
		0,5	Kecepatan Max 56 km/jam	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
		1	Median								
3	Amenitas (Nilai maksimal=2)	1	Pasar penyaman >1m		1	1					
		0,5	Banzku atau lampu pedestrian								
		0,5	Pohon rindang	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
		0,5	Tempat sampah								
		0,5	Marka/papan informasi								
		0,5	Halte					0,5		0,5	0,5
4	Penyeberangan (Nilai maksimal=1)	0,5	Zebra cross	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
		0,5	JPO								
5	LOS kendaraan Bermotor (Nilai maksimal=2)	0	LOS = E,F atau 6 lebih jalan setapak								
		1	LOS=D dan<6 jalan setapak								
		2	LOS=A,B,C dan<6 jalan setapak	2	2	2	2	2	2	2	2
6	Perawatan (Nilai maksimal=2)	-1	Banyak kerusakan	-1	-1						
		0	Sedikit kerusakan			0	0	0	0	0	0
		2	Tidak ada kerusakan								
7	TDM/Multimodal (Nilai maksimal=1)	0	Tidak ada dukungan	0	0	0	0		0		
		1	Ada dukungan					1		1	1
	Nilai max		Nilai yang diperoleh	4,5	5,5	7,5	6,5	7	5,5	7	7

Table 7
track service level recapitulation
existing pedestrian Gainesville prototype method

Segmen	Titik Survey			Nilai yang Diperoleh	LOS Rating
1	Zona Perdagangan	Kawasan Ruko-SPBU Indomart	Kanan	4,5	E
			Kiri	5,5	E
2	Zona Perdagangan dan Perkantoran	Kawasan SPBU, Ruko Kantor Bank BNI,BRI	Kanan	7,5	D
			Kiri	6,5	E
3	Zona Perkantoran	Kawasan Kantor Kelurahan Kedungwuni Timur	Kanan	7	E
			Kiri	5,5	E
4	Zona Pendidikan dan Ruang Publik	Kawasan SMA 1 kedungwuni dan Alun-Alun Gemek ITS dan Pusmanu	Kanan	7	E
			Kiri	7	E

C. Pavement Width Planning

$W = \frac{P}{35} + 1,5$

Where:
W = Planned road width (m)
P = Number of pedestrians (person /minute)

From the survey data in chapter 4, the maximum pedestrian volume is obtained, namely:

Segment 1

- Right (11:15 – 12:15) = 150 people/hour
- Left (11.30 – 12.30) = 140 people/hour

a) Design sidewalk width (right)
Vol. pedestrian = 150 people/hour
$= \frac{150}{60}$
= 15 org/minute

W $= \frac{P}{35} + 1,5$
$= \frac{2,5}{35} + 1,5$
= 1,57 m
= 1,6 m

b) Design sidewalk width (Left)
Vol. pedestrian = 140 people/hour
$= \frac{140}{60}$
= 13 people/minute

W $= \frac{P}{35} + 1,5$
$= \frac{2,3}{35} + 1,5$
= 1,56 m
= 1,6 m

From the results of these calculations, the width of the pavement plan for the right and left sides is 1.6 m.

Segment 2

- Right (at 08.15 – 09.30) = 127 people/hour
- Left (12.30 – 12.30) = 167 people/hour

a) Design sidewalk width (right)
Vol. pedestrians = 127 people/hour
$= \frac{127}{60}$
=112 person/minute

W $= \frac{P}{35} + 1,5$
$= \frac{2,12}{35} + 1,5$
= 1,56 m
= 1,6 m

b) Width pavement plan (Left)
Vol. pedestrians = 126 people/hour
$= \frac{126}{60}$
=110 person/minute

W $= \frac{P}{35} + 1,5$
$= \frac{2,10}{35} + 1,5$
= 1,56 m
= 1,6 m

From the results of these calculations, the width of the pavement plan for the right and left sides is 1.6 m.

Segment 3

- Right (15.15 – 16.15) = 204 people/hour
- Left (at 08.15 – 09.15) = 95 people/hour

a) Width pavement plan (right)
Vol. pedestrians = 204 people/hour
$= \frac{204}{60}$
= 3,4 person/minute

W $= \frac{P}{35} + 1,5$
$= \frac{3,4}{35} + 1,5$
= 1,6 m

b) Width pavement plan (Left)
Vol. pedestrians = 557 people/hour
$= \frac{557}{60}$
=0,92 person/minute

W $= \frac{P}{35} + 1,5$
$= \frac{0,92}{35} + 1,5$
= 1,53 m
= 1,6 m

From the results of these calculations, the width of the pavement plan for the right and left sides is 1.6 m.

Segment 4

- Right (at 15.15 – 16.15) = 94 people/hour
- Left (at 08.15 – 09.15) = 94 people/hour

a) Width pavement plan (right)

Vol. pedestrians = 94 people/hour

$= \frac{94}{60}$

= 1,56 person/minute

$W = \frac{P}{35} + 1,5$

$= \frac{1,56}{35} + 1,5$

= 1,54 m

= 1,6 m

b) Width pavement plan (Left)

Vol. pedestrians = 94 people/hour

$= \frac{94}{60}$

=1,56 person/minute

$W = \frac{P}{35} + 1,5$

$= \frac{1,56}{35} + 1,5$

= 1,54 m

= 1,6 m

From the results of these calculations, the width of the pavement plan for the right and left sides is 1.6 m.

D. Crossing Planning

Table 8
type of crossing facility based on PV2

PV^2	P	V	Rekomendasi
$> 10^{10}$	50 - 1100	300 – 500	Zebra
$> 2 \times 10^8$	50 - 1100	400 – 750	Zebra dengan lapak tunggu
$> 10^8$	50 - 1100	> 500	Pelikan
$>10^8$	> 1100	>300	Pelikan
$>2 \times 10^8$	50 - 1100	>750	Pelikan dengan lapak Tunggu
$>2 \times 10^8$	> 1100	>400	Pelikan dengan lapak tunggu

(Source: (Departemen Pekerjaan Umum, 1995))

Information:

P = Traffic flow of 100 meters long pedestrian crossing (person/hour).

V = Two-way traffic flow per hour (vehicles/hour).

All types of vehicles are added up or converted to flow.

Table 9
weekend vehicle volume calculation

Weekend							
Segmen	*Motorcycle*	0,25	*Light Vehicles*	1	*Heavy Vehicles*	1,2	Volume Total
	Kend / jam	Smp / jam	Kend / jam	Smp / jam	Kend / jam	Smp / jam	(kend/jam)
1	1620	405	964	964	8	9,6	1379
2	1947	486,75	1589	1589	32	38,4	2114
3	2343	585,75	1294	1294	14	16,8	1897
4	2513	628,25	1246	1246	14	16,8	1891

Table 10
weekday vehicle volume calculation

Weekday							
Segmen	*Motorcycle*	0,25	*Light Vehicles*	1	*Heavy Vehicles*	1,2	Volume Total
	kend/jam	smp/jam	kend/jam	smp/jam	kend/jam	smp/jam	(kend/jam)
1	2391	597,75	1038	1038	15	18	1654
2	2228	557	1512	1512	5	6	2075
3	2099	524,75	1263	1263	36	43,2	1831
4	2062	515,5	1043	1043	49	58,8	1617

Table 11
crossing type calculation

Weekend						
Segmen	Zona	Kawasan	Volume Total		PV^2	Jenis Fasilitas Penyeberangan
			Penyeberang	Kendaraan		
1	Zona Penrdagangan	Ruko, toko bangunan, Alfamart,	52	1379	98827974	Zebra
2	Zona Perdagangan Kantor	Kawasan SPBU Kantor BNI,BRI Ruko-ruko	128	2114	5,72E+08	Pelikan dengan lapak tunggu
3	Zona Pendidikan, Perkantoran titik kumpul, Perdagangan	Kawasan Kantor Kelurahan Kedungwuni Timur,SMA SMP SMK Alun-alun indomart	151	1897	5,43E+08	Pelikan dengan lapak tunggu
4	Zona Pendidikan perdagangan	Kawasan Kampus Pusmanu,ITS kedungwuni Pasar motor ruko-ruko	61	1891	2,18E+08	Pelikan dengan lapak tunggu

Conclusion

From the results of calculations that have been carried out, several conclusions have been obtained, namely from the Guidelines for Planning for Pedestrian Facilities on Public Roads, 1999, the minimum effective width is 1.6 m. We recommend that the sidewalk section is not used for trading so that the use of the sidewalk is optimal. And traders returned to trade according to the boundaries of their respective lands.

The level of service (LOS) of existing pedestrian facilities in the Podo-Surabaya section, Kedungwuni District, Pekalongan Regency, by using the HCM method as many as 7 out of 8 points in each segment on the Podo-Surabaya section, Kedungwuni District,

Pekalongan Regency is included in the LOS type category A, and 1 point LOS B. With the type of pedestrian path owned by the width of each point, pedestrians can walk freely without considering other pedestrians, determine the walking speed as desired, and there is no conflict with other pedestrians.

The service level value (LOS) of 7 points is in the range of 1-10 people/meter/minute, and this value is minimal compared to the size used by LOS type A, which is less than 16 people/meter/minute. Then 1 point is in the range of 16-23 people/meter/minute. The small LOS value of the pedestrian path on the Podo-Surabaya section, Kedungwuni District, Pekalongan Regency, shows that the level of utilization of the pedestrian path is not

optimal and is not used correctly by the community. Many things can cause the low utilization of pedestrian paths on this road.

Using the Gainesville prototype method, all points in each segment along the pedestrian path obtained LOS E, except for the rightside sidewalk in segment 2, which received LOS D. This is proven by the absence of safe and comfortable pedestrian facilities. To find out the factors that cause and formulate solutions for the lack of use of sidewalks, further research is needed regarding the performance of pedestrian paths.

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FEASIBILITY STUDY OF PODO TOWN SQUARE GEMEK PEDESTRIAN, KEDUNGWUNI DISTRICT, PEKALONGAN REGENCY

by Aris Krisdiyanto

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FEASIBILITY STUDY OF PODO TOWN SQUARE GEMEK PEDESTRIAN, KEDUNGWUNI DISTRICT, PEKALONGAN REGENCY

Aris Krisdiyanto, Kemmala Dewi, Archi Rafferti Kriswandanu, Althea Serafim Kriswandaru, M. Makhfud Riyadi
University 17 Agustus 1945 Semarang, Central Java, Indonesia
Email: ariskrisdiyanto123@gmail.com, kemmaladewi2234@gmail.com, raffertikriss@gmail.com, altheaserafim@gmail.com, riyadimakhfud@gmail.com

Abstract

The Institute of Technology and Science (ITS) campus, Pusmanu Polytechnic, SMA Negeri 1 Kedungwuni, SMK Negeri 1 Kedungwuni, SMP Negeri 2 Kedungwuni as an educational center, There are shophouses along the right and left side of the road as a trading place. This is the reason why so many people come to the area. So in the Podo-Surabaya segment, human movement in the area is high. The more visitors who come to the place will impact the concentration of pedestrians. With a large pedestrian flow and the presence of street vendors and illegal parking at several points along the sidewalk, it will significantly affect the comfort and flexibility of pedestrians. For this reason, it is necessary to plan for improving pedestrian facilities in the area. To obtain the minimum width, the required sidewalk width, and pedestrian facilities are calculated according to the Technical Guidelines no. 032/T/BM/1999 "Guidelines for Planning Pedestrian Paths on Public Roads, Minister of Public Works Decree No. 468/KP 1998 "Technical Requirements for Accessibility in Public Buildings and the Environment," Director General of Highways No.007/T/BNKT/1990 "Guidelines for Using Sidewalks," Minister of Public Works Regulation No. 03/PRT/M/2014 "Guidelines for Planning, Provision, and Utilization of Pedestrian Network Infrastructure and Facilities in Urban Areas," Technical Guidelines no. 022/T/BM/1999 "Accessibility Requirements on Public Roads." The results of the design are carried out with the AutoCAD program. From the calculation of pedestrian walking speed, the average rate is 43.80 m/minute, from the analysis of the minimum width obtained 1,6 meters.

Keywords: Pedestrians; Sidewalks; LOS; Pedestrian facilities

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Introduction

Transportation problems are constantly faced by developed and developing countries, one of which is Indonesia. Both in urban transportation, inter-city transportation, and regional transportation (Jotin Khisty & Kent Lall, 2003). Creating a sound transportation system capable of ensuring the smooth, safe, fast, cheap, comfortable, and environmentally appropriate movement of people and vehicles, both private and public, is a development goal in the transportation sector (Keputusan Menteri Pekerjan Umum & Indonesia, 1998). A pedestrian path is a pedestrian path separated from the gallery of public, transportation, usually located next to each other or adjacent, given a surface layer, given an elevation higher than the pavement's surface, and generally parallel to the vehicle traffic lane. The pedestrian path serves as a means of achievement that can protect pedestrians from the dangers of motorized vehicles. The primary function of the pedestrian path is to provide services to pedestrians to improve the smoothness, safety, and comfort of pedestrians.

Pedestrians process large amounts of sensory input for sophisticated signal exchanges to negotiate rights of way (Sarkar, 1993).

According to Law Number 22 of 2009 concerning Road Traffic and Transportation, it is clearly stated that pedestrians have the right to the availability of supporting facilities in the form of sidewalks, crossings, and other facilities (Manual, 2000b). According to Article 275 paragraph 1, it is stated that every person who commits an act that causes disturbance to the function of traffic signs, road markings, traffic signaling devices, pedestrian facilities, and road user safety devices shall be punished with imprisonment for a maximum of one month or a maximum fine of 250,000 rupiahs.

The availability of pedestrian facilities is one of the elements that need to be considered in the traffic engineering process (available pedestrian facilities) (Sisiopiku & Akin, 2003). The pedestrian lane represents a section that often experiences conflict with vehicular traffic, resulting in traffic delays and a high rate of traffic accidents.

Based on the background that has been described, the main problems in this final project are as follows (Kota, 1990):

1) Determine the average travel time of pedestrians crossing Simpang Podo Street - Surabaya Street, Kedungwuni District, Pekalongan Regency?
2) Determine the dimensions of the need for pedestrian sidewalks according to standards on Jalan Simpang Podo - Jalan Surabaya, Kedungwuni District, Pekalongan Regency?

The aims and objectives of this discussion are as follows:

1) Identify two-way pedestrians Jalan Simpang Podo - Jalan Surabayan, Kedungwuni District, Pekalongan Regency.
2) Identify the pedestrian volume and speed of the Intersection Podo-Jalan Surabayan, Kedungwuni District, Pekalongan Regency.
3) Identify pedestrian plans according to the standards of Jalan Simpang Podo-Jalan Surabayan, Kedungwuni District, Pekalongan Regency.

The benefits of this Final Project are as follows:

1) Obtained an appropriate and appropriate pedestrian sidewalk design on Jalan Simpang Podo - Jalan Surabaya, Kedungwuni District, Pekalongan Regency.
2) The planning concept in this final project can be used as an alternative to improve the design of sidewalks and pedestrian crossings that have the same characteristics.

The problem limitation of this final project is as follows (Yermadona, 2018):

1) The area studied is Kedungwuni District, Pekalongan Regency.
2) Analysis Not doing pavement structure planning.
3) Does not take into account the budget plan (RAB).
4) The survey is conducted on effective working days and school hours.
5) Not planning for bus stops, drainage flows, and other facilities.
6) The observed sample is all pedestrians who walk on sidewalks and crosswalks but does not include street vendors who occupy the sidewalks.

Pedestrian Planning for Jalan Simpang Podo-Jalan Surabayan (Setiawati, 2017), Kedungwuni District, Pekalongan Regency with the total length of the planned road, is 1,143 km. (Miro, 2005) The initial STA point of planning is at the intersection of Podo village, Kedungwuni sub-district, Pekalongan district, until the final STA is at the Suromadukaran bridge, Surabayan village, Kedungwuni district, Pekalongan district.

Figure 1
Location Plan

A. Sidewalk

Pedestrian comes from the Greek, from the word pedos which means foot. Pedestrian also comes from the Latin pedestal pedestrians, namely people walking or pedestrians, so pedestrians can be interpreted as pedestrians or people who walk. Pedestrian means "person walking in the street," which means people walking on the street. And while the lane is the part of the road used for vehicle traffic (PP No. 43 of 1993 on infrastructure and road traffic). According to the Big Indonesian Dictionary, a path is a straight column, a broad line, a wide strip, the space between two lines on a large surface, the elongated space between two rows of plants, the vast space between two straight boundary lines, the distance between a single playing line and a double playing line.

B. Crossing Place

The zebra cross is installed with the following conditions (Kota, 1990).

1) Zebra crosses must be installed on roads with low traffic volume, between 200-500 vehicles/hour, with a pedestrian volume of fewer than 100 people/hour.
2) The location of the zebra crossing must have sufficient visibility so that the vehicle bunches caused by the use of crossing facilities are still within safe limits.

C. Level of Service

According to HCM (2000), the service level is a qualitative measure describing traffic flow operational conditions (Nedevska, Ognjenović, & Murgul, 2017)(Quraisy, 2021). The following is the level of service for pedestrian facilities: (Asadi-Shekari, Moeinaddini, & Shah, 2014)

D. Pedestrian Survey

Pedestrian volume surveys are carried out to accurately determine the number of pedestrian movements that pass through an area or at selected locations. The use of survey data is to:

1) Basis for evaluation of pedestrian paths/pavements/walkways.
2) Evaluate whether or not the crossing is sufficient.
3) Protection and pedestrian facilities.
4) Calculation of traffic light timing.
5) Provide data for future pedestrian facility planning.

Method

Simulation Block Diagram

The order of implementation of the Final Project is carried out in the following stages.

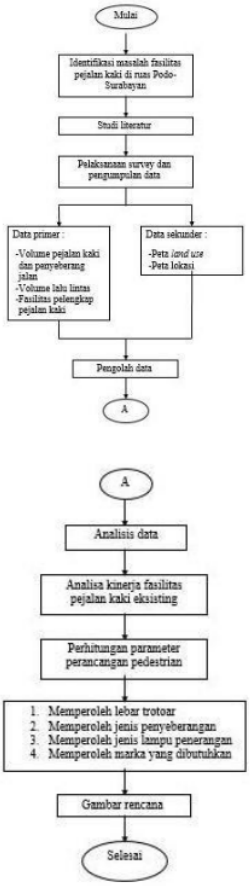

Figure 2
Research Method Flow

Results and Discussion

A. Data Volume

Table 1
pedestrian volume survey results

Segmen	Sisi	*Weekend*		*Weekday*	
		Volume Puncak Pejalan Kaki	Jam Puncak	Volume Puncak Pejalan Kaki	Jam Puncak
1	Kanan	47	10.45-11.45	150	11.15-12.15
	Kiri	48	10.45-11.45	140	11.30-12.30
2	Kanan	127	08.30-09.30	61	16.30-17.30
	Kiri	126	12.30-13.30	80	08.45-09.45
3	Kanan	204	15.15-16.15	82	16.45-17.45
	Kiri	95	08.15-09.15	82	10.30-11.30
4	Kanan	55	09.45-10.45	15	16.00-17.00
	Kiri	70	10.30-11.30	22	11.30-12.30

Table 2
wader volume survey results

Segmen	Sisi	*Weekend*		*Weekday*	
		Volume Puncak Penyeberang	Jam Puncak	Volume Puncak Penyeberang	Jam Puncak
1	Kanan-Kiri	21	11.15-12.15	91	10.00-11.00
	Kiri-Kanan	31	17.00-18.00	113	11.15-12.15
2	Kanan-Kiri	63	10.30-11.30	35	16.00-17.00
	Kiri-Kanan	65	11.30-12.30	45	16.15-17.15
3	Kanan-Kiri	112	15.15-16.15	35	08.00-09.00
	Kiri-Kanan	39	08.30-09.30	95	06.45-07.45
4	Kanan-Kiri	29	10.15-11.15	94	13.00-14.00
	Kiri-Kanan	32	13.45-14.45	94	13.00-14.00

Table 3
vehicle volume survey results

Segmen	Jenis Kendaraan	*Weekend*		*Weekday*	
		Volume Puncak Lalu Lintas	Jam Puncak	Volume Puncak Lalu Lintas	Jam Puncak
1	Sepeda Motor	1620	13.30-14.30	2391	07.15-08.15
	Kend.Ringan	964	13.00-14.00	1038	07.30-08.30
	Kend.Berat	8	11.45-12.45	15	10.30-11.30
	Unmotorized	78	08.00-09.00	30	17.00-18.00
2	Sepeda Motor	1947	17.00-18.00	2228	07.30-08.30
	Kend.Ringan	1589	12.45-13.45	1512	17.00-18.00
	Kend.Berat	32	08.30-09.30	5	13.45-14.45
	Unmotorized	135	07.45-08.45	25	09.00-10.00
3	Sepeda Motor	2343	09.00-10.00	2099	08.15-09.15
	Kend.Ringan	1294	16.15-17.15	1263	14.45-15.45
	Kend.Berat	14	08.30-09.30	36	11.30-12.30
	Unmotorized	194	08.30-09.30	46	07.30-08.30
4	Sepeda Motor	2513	08.45-09.45	2062	16.45-17.45
	Kend.Ringan	1246	16.45-17.45	1043	12.45-13.45
	Kend.Berat	14	08.45-09.45	49	13.45-14.45
	Unmotorized	219	07.45-08.45	58	07.00-08.00

B. Pavement Service Level Analysis

The first analysis is about the level of pavement service using the method of HCM and the Gainesville Prototype (Bhuyan & Nayak, 2013). For the analysis of HCM, the first thing to do is to calculate the volume of pedestrians in each sidewalk segment on the Podo-Surabaya section, Kedungwuni District, Pekalongan Regency. Which have been specified. After that, the volume data that has been obtained is processed to determine the peak volume of Pedestrians in each sidewalk segment (Dixon, 1996). Then the pavement service level is calculated using the formulation recommended by the (Manual, 2000a). The results of this calculation are entered into the level of service table to determine the level of pavement service in each segment. Meanwhile, a physical examination or facilities along the pedestrian path were carried out for the Gainesville Prototype analysis.

Table 4
Peak pedestrian volume
leg of each segment

Segmen	Sisi	Weekend		Weekday	
		Volume Puncak pejalan Kaki	Waktu	Volume Puncak Pejalan Kaki	Waktu
1	Kanan Kiri	17 25	11.30-11.45 11.15-11.30	47 54	13.00-13.15 11.45-12.00
2	Kanan Kiri	70 41	10.15-10.30 12.30-12.45	23 27	16.45-17.00 09.00-09.15
3	Kanan Kiri	144 36	15.15-15.30 09.00-09.15	27 25	17.15-17.30 11.15-11.30
4	Kanan Kiri	19 30	08.45-09.00 14.00-14.15	5 13	16.15-16.30 12.00-12.15

Segment 1
Right side (X1)
Total width (W_t) :2,30 m
Reduction width

W_1 (kereb) (Yermadona, 2018) : 0,10 m
W_2 (tree) : 0,90 m +
W_r (total width reduction) : 1,00 m
Effective Width (W_e) = W_t – Wr : 1,30 m
Pedestrian volume : V_1 = 47 org/15 minute

Pedestrian flow, V $= \frac{Vt}{15\ x\ We} = \frac{47}{15\ x\ 1,3} =$ 3 human/m/ minute

Left side (X_2)
Total width (W_t) : 4,50 m
Reduction width W_1 (kereb) : 0,10 m
W_2 (PKL) : 1,70 m
W_3 (Motorcycle Parking Only) : 0,96 m
W_4 (tree) : 1,10 m +
W_t (total width reduction) : 3,86 m
Effective Width (W_e) = W_t - W_r : 0,64
Pedestrian volume: V_1 =54 org/15minute

Pedestrian flow, V $= \frac{Vt}{15\ x\ We} = \frac{54}{15\ x\ 0,64} =$ 6 org/m/minute

Segment 2
Right side (X_3)
Total width (W_t) :1,6 m
Reduction width
W_1 (kereb) : 0,10 m
W_2 (PKL) : 1,50 m
W_3 (tree) : 0,80 m +
W_r (total width reduction) :140 m
Effective Width (W_e) = W_t– W_r: 0,050 m
Pedestrian volume: V_1 =70 human/15 minute

Pedestrian flow, V $= \frac{Vt}{15\ x\ We}$

$= \frac{70}{15 \; x \; 0.5}$
=10
org/m/minute

Left side (X_4)
Total width (W_t) :1,20 m
Reduction width
W_1 (kereb) : 0,10 m
W_2 (tree) : 1,30 m +
W_r (total width reduction) : 1,40 m
Effective Width (W_e) = W_t – W_r : 0,50 m
Pedestrian volume: V_1 = 70 org/15 minute

Pedestrian flow, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{70}{15 \; x \; 0.5}$
=10
org/m/minute

Segment 3

Left side (X_5)
Total width (W_t) : 1,80 m
Reduction width
W_1 (tree) : 1,40 m +
W_r (total width reduction) : 1,40 m
Effective Width (W_e) = W_t - W_r : 0,40 m
Pedestrian volume: V_1 =70 poeple/15 minute

Pedestrian volume, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{144}{15 \; x \; 0.4}$
=24
org/m/minute

Left side (X_6)
Total width (W_t) :1,50 m
Reduction width W_1 (kereb)
: 0,10 m
W_2 (PKL) : 0,50 m
W_3 (Pohon) : 1,12 m +
W_r (total width reduction): 1,72 m
Effective Width (W_e) = W_t- W_r : 0,78 m
Pedestrian volume: V_1 = 36 human/15 minute

Pedestrian flow, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{36}{15 \; x \; 0.78}$
= 4
org/m/minute

Right side (X_7)
Total width (W_t) :1,50 m
Reduction width:
W_1 (kereb) : 0,10 m
W_2 (channel) : 1,12 m +
W_r (total width reduction) : 1,72 m
Effective Width (W_e) = W_t – W_r : 0,78 m
Pedestrian volume: V_1 = 36 human/15 minute

Pedestrian volume, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{36}{15 \; x \; 0.78}$
= 4
human/m/minute

Left side (X_8)
Total width (W_t) :1,50 m
Reduction width
W_1 (kereb) : 0,10 m
W_2 (tree) : 1,12 m +
W_r (total width reduction) : 1,72 m
Effective Width (W_e) = W_t - W_r: 0,78 m
Pedestrian volume: V_1 = 36 org/15 minute

Pedestrian flow, V $= \frac{Vt}{15 \; x \; We}$
$= \frac{36}{15 \; x \; 0.78}$
= 4
human/m/minute

The level of service (LOS) for the pedestrian path of Jalan Simpang Podo-Jalan Surabayan, Kedungwuni District, Pekalongan Regency. The complete list is shown in Table 5.2.

Table 5
The level of service (LOS) of the existing pedestrian path HCM method

Segmen	Titik survei				Wc (m)	Wr (m)	Ws (m)	Faktor	Vol. Max (orang/16menit)	V (Flow Rate) (orang/m/menit)	Tipe LOS	Keterangan
1	Zona Perdagangan	Kawasan Ruko dan Indomart	Kanan	Weekend	2,3	1	1,3	Perabot Jalan dan Pohon	17	1	A	≤16orang/m/menit
				Weekdays					47	2	A	≤16orang/m/menit
			Kiri	Weekend	4,5	3,86	0,64	PKL, Parkir, Jalur hijau	25	3	A	≤16orang/m/menit
				Weekdays					54	6	A	≤16orang/m/menit
2	Zona Perdagangan dan Perkantoran	Kawasan SPBU, Ruko Kantor Bank BNI,BRI	Kanan	Weekend	2,9	2,4	0,5	PKL, Perabot jalan, Pohon	70	9	A	≤16orang/m/menit
				Weekdays					23	3	A	≤16orang/m/menit
			Kiri	Weekend	2,2	1,4	0,8	Perabot Jalan, Pohon	41	3	A	≤16orang/m/menit
				Weekdays					27	2	A	≤16orang/m/menit
3	Zona Perkantoran	Kawasan Kantor Kelurahan Kedungwuni Timur	Kanan	Weekend	1,8	1,4	0,4	Perabot Jalan, Pohon	144	24	B	>16-23orang/m/menit
				Weekdays					27	5	A	≤16orang/m/menit
			Kiri	Weekend	2,5	1,72	0,78	PKL, Perabot Jalan, Pohon	36	3	A	≤16orang/m/menit
				Weekdays					25	2	A	≤16orang/m/menit
4	Zona Pendidikandan Wisata	Kawasan SMA 1 kedungwuni dan Alun-Alun Gemek	Kanan	Weekend	2,3	1	1,3	PKL, Perabot Jalan, Pohon	19	1	A	≤16orang/m/menit
				Weekdays					5	1	A	≤16orang/m/menit
			Kiri	Weekend	2	1,5	0,5	PKL, Perabot Jalan, Pohon	30	4	A	≤16orang/m/menit
				Weekdays					13	2	A	≤16orang/m/menit

Table 6
Assessment of the level of service for the existing pedestrian Gainesville prototype method

No.	Kategori	Penilaian	Kriteria	Nilai Tiap Segmen							
				1		2		3		4	
				Kanan	Kiri	Kanan	Kiri	Kanan	Kiri	Kanan	Kiri
1	Fasilitas pedestrian Yang tersedia (Nilai maksimal=10)	0 4 6 2 1 1	Tidak menerus atau tidak ada Menerus pada satu sisi Menerus pada dua sisi Lebar min 1.53 m & bebas penghalang Lebar Trotoar>1.53 m Fasilitas alternatif yang paralel	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1
2	Konflik (Nilai maksimal=10)	1 0,5 0,5 0,5 0,5 1	Jalan mobil dan trotoar Pedestrian rigner' delinz <40 dtk Mengurangi konflik putaran Lebar persimpangan <18.3 m Kecepatan Max 56 km/am Median	1 0,5	1 0,5	1 0,5 0,5 0,5	1 0,5 0,5 0,5	1 0,5	1 0,5	1 0,5	1 0,5
3	Amenitas (Nilai maksimal=2)	1 0,5 0,5 0,5 0,5 0,5	Pasar pemanan >1m Bangku atau lampu pedestrian Pohon rindang Tempat sampah Marka/papan informasi Halte	 0,5 	1 0,5 	1 0,5 	 0,5 	 0,5 0,5 	 0,5 	 0,5 0,5 	 0,5 0,5
4	Penyeberangan (Nilai maksimal=1)	0,5 0,5	Zebra cross JPO	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
5	LOS kendaraan Bermotor (Nilai maksimal=2)	0 1 2	LOS = E,F atau 6 lebih jalan setapak LOS=D dan<6 jalan setapak LOS=A,B,C dan<6 jalan setapak	2	2	2	2	2	2	2	2
6	Perawatan (Nilai maksimal=2)	-1 0 2	Banyak kerusakan Sedikit kerusakan Tidak ada kerusakan	-1	-1	0	0	0	0	0	0
7	TDM/Multimodal (Nilai maksimal=1)	0 1	Tidak ada dukungan Ada dukungan	0	0	0	0	1	0	1	1
	Nilai max		Nilai yang diperoleh	4,5	5,5	7,5	6,5	7	5,5	7	7

Table 7
track service level recapitulation existing pedestrian Gainesville prototype method

Segmen	Titik Survey			Nilai yang Diperoleh	LOS Rating
1	Zona Perdagangan	Kawasan Ruko-SPBU Indomart	Kanan	4,5	E
			Kiri	5,5	E
2	Zona Perdagangan dan Perkantoran	Kawasan SPBU, Ruko Kantor Bank BNI,BRI	Kanan	7,5	D
			Kiri	6,5	E
3	Zona Perkantoran	Kawasan Kantor Kelurahan Kedungwuni Timur	Kanan	7	E
			Kiri	5,5	E
4	Zona Pendidikan dan Ruang Publik	Kawasan SMA 1 kedungwuni dan Alun-Alun Gemek ITS dan Pusmanu	Kanan	7	E
			Kiri	7	E

C. Pavement Width Planning

$W = \frac{P}{35} + 1,5$

Where:
W = Planned road width (m)
P = Number of pedestrians (person /minute)

From the survey data in chapter 4, the maximum pedestrian volume is obtained, namely:

Segment 1

- Right (11:15 – 12:15) = 150 people/hour
- Left (11.30 – 12.30) = 140 people/hour

a) Design sidewalk width (right)
Vol. pedestrian = 150 people/hour

$= \frac{150}{60}$

= 15 org/minute

$W = \frac{P}{35} + 1,5$

$= \frac{2,5}{35} + 1,5$

= 1,57 m
= 1,6 m

b) Design sidewalk width (Left)
Vol. pedestrian = 140 people/hour

$= \frac{140}{60}$

= 13 people/minute

$W = \frac{P}{35} + 1,5$

$= \frac{2,3}{35} + 1,5$

= 1,56 m
= 1,6 m

From the results of these calculations, the width of the pavement plan for the right and left sides is 1.6 m.

Segment 2

- Right (at 08.15 – 09.30) = 127 people/hour
- Left (12.30 – 12.30) = 167 people/hour

a) Design sidewalk width (right)
Vol. pedestrians = 127 people/hour

$= \frac{127}{60}$

=112 person/minute

$W = \frac{P}{35} + 1,5$

$= \frac{2,12}{35} + 1,5$

= 1,56 m
= 1,6 m

b) Width pavement plan (Left)
Vol. pedestrians = 126 people/hour

$= \frac{126}{60}$

=110 person/minute

$W = \frac{P}{35} + 1,5$

$= \frac{2,10}{35} + 1,5$

= 1,56 m
= 1,6 m

From the results of these calculations, the width of the pavement plan for the right and left sides is 1.6 m.

Segment 3

- Right (15.15 – 16.15) = 204 people/hour
- Left (at 08.15 – 09.15) = 95 people/hour

a) Width pavement plan (right)
Vol. pedestrians = 204 people/hour

$= \frac{204}{60}$

= 3,4 person/minute

$W = \frac{P}{35} + 1,5$

$= \frac{3,4}{35} + 1,5$

= 1,6 m

b) Width pavement plan (Left)
Vol. pedestrians = 557 people/hour

$= \frac{557}{60}$

=0,92 person/minute

$W = \frac{P}{35} + 1,5$

$= \frac{0,92}{35} + 1,5$

= 1,53 m
= 1,6 m

From the results of these calculations, the width of the pavement plan for the right and left sides is 1.6 m.

Segment 4

- Right (at 15.15 – 16.15) = 94 people/hour
- Left (at 08.15 – 09.15) = 94 people/hour

a) Width pavement plan (right)

Vol. pedestrians = 94 people/hour

$= \frac{94}{60}$

= 1,56 person/minute

W $= \frac{P}{35} + 1,5$

$= \frac{1,56}{35} + 1,5$

= 1,54 m

= 1,6 m

b) Width pavement plan (Left)

Vol. pedestrians = 94 people/hour

$= \frac{94}{60}$

=1,56 person/minute

W $= \frac{P}{35} + 1,5$

$= \frac{1,56}{35} + 1,5$

= 1,54 m

= 1,6 m

From the results of these calculations, the width of the pavement plan for the right and left sides is 1.6 m.

D. Crossing Planning

Table 8
type of crossing facility based on PV2

PV^2	P	V	Rekomendasi
$> 10^{10}$	50 - 1100	300 – 500	Zebra
$> 2 \times 10^8$	50 - 1100	400 – 750	Zebra dengan lapak tunggu
$> 10^8$	50 - 1100	> 500	Pelikan
$>10^8$	> 1100	>300	Pelikan
$>2 \times 10^8$	50 - 1100	>750	Pelikan dengan lapak Tunggu
$>2 \times 10^8$	> 1100	>400	Pelikan dengan lapak tunggu

(Source: (Departemen Pekerjaan Umum, 1995))

Information:

P = Traffic flow of 100 meters long pedestrian crossing (person/hour).

V = Two-way traffic flow per hour (vehicles/hour).

All types of vehicles are added up or converted to flow.

Table 9
weekend vehicle volume calculation

Weekend							
Segmen	*Motorcycle*	0,25	*Light Vehicles*	1	*Heavy Vehicles*	1,2	Volume Total
	Kend / jam	Smp / jam	Kend / jam	Smp / jam	Kend / jam	Smp / jam	(kend/jam)
1	1620	405	964	964	8	9,6	1379
2	1947	486,75	1589	1589	32	38,4	2114
3	2343	585,75	1294	1294	14	16,8	1897
4	2513	628,25	1246	1246	14	16,8	1891

Table 10
weekday vehicle volume calculation

Weekday							
Segmen	*Motorcycle*	0,25	*Light Vehicles*	1	*Heavy Vehicles*	1,2	Volume Total
	kend/jam	smp/jam	kend/jam	smp/jam	kend/jam	smp/jam	(kend/jam)
1	2391	597,75	1038	1038	15	18	1654
2	2228	557	1512	1512	5	6	2075
3	2099	524,75	1263	1263	36	43,2	1831
4	2062	515,5	1043	1043	49	58,8	1617

Table 11
crossing type calculation

Weekend						
Segmen	Zona	Kawasan	Volume Total		PV^2	Jenis Fasilitas Penyeberangan
			Penyeberang	Kendaraan		
1	Zona Penrdagangan	Ruko, toko bangunan, Alfamart,	52	1379	98827974	Zebra
2	Zona Perdagangan Kantor	Kawasan SPBU Kantor BNI,BRI Ruko-ruko	128	2114	5,72E+08	Pelikan dengan lapak tunggu
3	Zona Pendidikan, Perkantoran titik kumpul, Perdagangan	Kawasan Kantor Kelurahan Kedungwuni Timur,SMA SMP SMK Alun-alun indomart	151	1897	5,43E+08	Pelikan dengan lapak tunggu
4	Zona Pendidikan perdagangan	Kawasan Kampus Pusmanu,ITS kedungwuni Pasar motor ruko-ruko	61	1891	2,18E+08	Pelikan dengan lapak tunggu

Conclusion

From the results of calculations that have been carried out, several conclusions have been obtained, namely from the Guidelines for Planning for Pedestrian Facilities on Public Roads, 1999, the minimum effective width is 1.6 m. We recommend that the sidewalk section is not used for trading so that the use of the sidewalk is optimal. And traders returned to trade according to the boundaries of their respective lands.

The level of service (LOS) of existing pedestrian facilities in the Podo-Surabaya section, Kedungwuni District, Pekalongan Regency, by using the HCM method as many as 7 out of 8 points in each segment on the Podo-Surabaya section, Kedungwuni District, Pekalongan Regency is included in the LOS type category A, and 1 point LOS B. With the type of pedestrian path owned by the width of each point, pedestrians can walk freely without considering other pedestrians, determine the walking speed as desired, and there is no conflict with other pedestrians.

The service level value (LOS) of 7 points is in the range of 1-10 people/meter/minute, and this value is minimal compared to the size used by LOS type A, which is less than 16 people/meter/minute. Then 1 point is in the range of 16-23 people/meter/minute. The small LOS value of the pedestrian path on the Podo-Surabaya section, Kedungwuni District, Pekalongan Regency, shows that the level of utilization of the pedestrian path is not

optimal and is not used correctly by the community. Many things can cause the low utilization of pedestrian paths on this road.

Using the Gainesville prototype method, all points in each segment along the pedestrian path obtained LOS E, except for the rightside sidewalk in segment 2, which received LOS D. This is proven by the absence of safe and comfortable pedestrian facilities. To find out the factors that cause and formulate solutions for the lack of use of sidewalks, further research is needed regarding the performance of pedestrian paths.

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