TIPE-TIPE PARKIR DI BADAN JALAN TERHADAP KINERJA RUAS JALAN ATAU KAPASITAS DAN TINGKAT PELAYANAN JALAN
(Studi Kasus : Jalan Sirao Kota Gunungsitoli, Nias)

Diajukan Untuk Syarat Dalam Sidang Sarjana
Universitas Medan Area

Disusun oleh :
ANUGERAH SETIAWAN GULO
15.811.0035

PROGRAM STUDI TEKNIK SIPIL

FAKULTAS TEKNIK

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LEMBAR PERNYATAAN

ABSTRACT

Parking is a vehicle that stops at certain places whether stated by signs or not, and not solely for the benefit of raising or lowering people or goods. This study aims to determine the level of road performance caused by road body parking activities based on indicators of road service levels, and analyze the effectof vehicle parking activities on the sirao road on the capacity of the road sections. This research is a quantitative study and the methodology used in this study is a literature review, conducting a preliminary survey to determine the situation in the field and determining the appropriate survey time, conducting field surveys in order to obtain primary data, including: traffic volume surveys, namely by carrying out calculations vehicles manually (with a hand counter) and vehicle travel time surveys, as well as analyzing and processing data from field surveys results. From the results that are known after evaluating thr types of parking that are suitable for the sirao road are parking angle of 45^{o} with a capacity of 2543,64 pcu/ hour, degree of saturation of 0.88 % so that it can be known LOS namely E whish is where the current is stable but the speed and motion the vehicle is controlled by the driverand is limited in choosing the speed. The conclusion of this study is seen on the streets of sirao because there are changes caused by the types of parking with indicators of the level of road service.

Keywords: types of parking on the road body, performance of roads, level of road services

CHAPTER I

INTRODUCTION

1.1 Background of Study

One of the problems related to the transportation sector in big cities is on-street parking. This can cause traffic since it hampers vehicle mobility. Gunung Sitoli is one of the cities located on Nias Island, North Sumatra Province which is known to have a fairly high level of traffic density. This condition is exacerbated by on-street parking that reduces the road capacity used by road users.

According to Reni Puspitasari and I Ketut Mudana, parking is a problem that is often encountered in the transportation system. In many cities, either big or small cities, the issue of parking is always faced by road users, especially four-wheel vehicles. On-street parking has slowed down the vehicles, and this causes congestion. Traffic congestion on urban roads has become the main topic which is always a problem caused by several vehicles parking on the street and causing a traffic jam. The demand for parking spaces triggered by the presence of shops and markets can also be seen on Sirao Street, in Gunung Sitoli. This problem occurs because the parking space is not equal to the number of road users, so the segments of the street are used as parking spaces. This has greatly affected the function of Pandu street (Ricky Muhammad Yani, Ida Farida, and Eko Walujodjati).

According to Dionisius Rajagukguk and Yusandy Aswad, transportation problems will increase along with the development of a country. The decrease in income, vehicle ownership, and urbanization has increased traffic flow. The phenomenon of congestion is an interesting issue to be studied.

Similarly, in the case of congestion occurring on Sirao street where many four-wheel vehicles are found parking on the street and causing traffic jams. On-street parking is due to the large number of community activities that have no parking space or because there are not enough areas for parking. On-street parking can cause congestion because road users do parking maneuvers. On-street parking maneuvers require time and space following the road capacity. This results in a decrease in speed causing a traffic jam.

The problem that occurred on Sirao Street is on-street parking reducing the road capacity and decreasing the level of service. This results in an increase in traveling time followed by a decrease in the vehicle speed.

1.2 Objectives of Study

This study aims to evaluate the pattern of on-street parking on the performance of the street segment and the level of street service on Sirao street. The purpose of this study is to determine the level of street function because of the on-street parking activities based on road service indicators and to analyze the effect of parking activities on Sirao street on the street capacity.

1.3 Formulation of the Study

1. What is the effect of using street segments as on-street parking spaces for other road users?
2. How are traffic characteristics on street function caused by on-street parking?
3. How is the environmental condition of the street function on Sirao Street as a result of on-street parking?
4. The research method refers to the 1997 Indonesian Road Capacity Manual (MKJI).

1.4 Limitation of Study

Given the limited time that the researchers have, the problems of this study include:

This research will be limited to the location of this study, namely Sirao Street located in Gunungsitoli Nias

1. The survey is only conducted during peak hours, namely :
    a. Morning at 07.00-09.00 WIB
    b. Noon/Afternoon at 12.00-14.00 WIB
    c. Evening at 16.00-18.00 WIB
2. This study is limited to four-wheel vehicles (cars)

1.5 Research Methods

In this study, the author observed and collected data by using primary and secondary data. The primary data was obtained directly from the field, while the secondary data was needed to complete the data, and was obtained from an agency.

CHAPTER II

LITERATURE REVIEW

2.1 General Description

Transportation is the movement of people or goods from one place to another by using a vehicle driven by humans or machines. Transportation is used to make it easier for humans to carry out daily activities. In developed countries, people usually use the subway (subway) and taxis. Residents of developed countries rarely have private vehicles because they mostly use public transportation as their main transportation. Transportation itself is divided into 3 namely, land, sea, and air transportation. Air transportation is transportation that requires a lot of money to use it. Apart from having more sophisticated technology, air transportation is the fastest means of transportation compared to other means of transportation and has a relatively lower accident rate than land and water transportation.

According to Wikipedia, transportation is the movement of people or goods from one place to another by using a vehicle (https://id.wikipedia.org/wiki/Transportsi). From this definition, it can be understood that there are elements that are closely related to the concept of transportation itself.

2.2 Definition of Street

Based on the Law of the Republic of Indonesia No. 38 of 2004 concerning Roads, road/street is defined as land transportation infrastructure which includes all parts of the road, including complementary buildings and equipment intended for traffic, which are on the ground surface, above ground level, below ground level and/or water, as well as on the surface of the water, except for railroads, lorries, and cableways. Community activities are strongly influenced by the

existence of roads to facilitate activities, such as goods, services, and government activities to the state defense and security system. Especially for urban areas, roads can determine the nature and characteristics of the city structure, either directly or indirectly.

Meanwhile, based on the Law of the Republic of Indonesia No. 22 of 2009 concerning Road Traffic and Transportation which was promulgated after Law No. 38, road/street is defined as all parts of the road, including complementary buildings and equipment intended for public traffic, which are on ground level, above ground level, in below the ground and/or water surface, as well as above the water surface, except for rail and cable roads.

Road traffic and transportation infrastructure is a traffic room, terminal, and road equipment which includes markings, signs, traffic signaling devices, road user control, and safety devices, road monitoring and security tools, and supporting facilities.

2.2.1 Traffic Flow Characteristics

2.2.1.1 Traffic Volume

Traffic volume is the total number of vehicles that pass a point per unit time at a certain location. Traffic volume is usually expressed in years, months, days, hours, or part of hours. (MKJI, 1997)

$$Q = \frac{n}{T}$$

Information:

Q = Traffic flow (vehicle/hour)

n = the number of vehicles that pass that point in the time interval T

T = the time interval (hour)

2.2.1.2 Travel Speed

The Indonesian road capacity manual uses travel time as the main measure of road segment performance, as it is easy to understand and measure, and is an important input for road user costs in economic analysis.

$$V = \frac{L}{T}$$

Notes:

V = average of speed (km/hour)

L = Length of road segment (km)

TT = the average travel time along the segment (hour)

2.2.1.3 Free Flow Speed

The free-flow speed of light vehicles can be used as the main measure of road segment performance when the flow is equal to zero.

The equation for the determination of free flow is as follows (MKJI, 1997):

FV = (FVO + FVW) x FFVSF x FFVCS

Information:

FV = free flow speed (km/hour)

FVO = basic free flow (km/hour)

FVW = road traffic lane width adjustment (km/hour)

FFVSF = faktor penyesuaian hambatan samping

FFVCS = the city size adjustment factor

2.2.1.4 Density

Density is defined as the number of vehicles occupying a certain length of the road segment, or lane, which is generally expressed as the

number of vehicles per kilometer or units of passenger cars per kilometer (pcu/km).

2.2.2 Road Segment Capacity

The Indonesian Road Capacity Manual (MKJI 1997), provides an equation for estimating road capacity in Indonesia for urban areas with the following formula:

$$C = C0 \times FCw \times FCsp \times FCsf \times FCcs \text{ (pcu/hour)}$$

Notes:

C = Capacity (pcu/hour)

C0 = Basic Capacity (pcu/hour)

FCw = Adjustment Factor due to Traffic Flow

FCsp = Adjustment factor due to direction separator

FCsf = Adjustment factor due to side drag

FCcs = City size adjustment factor

2.2.3 The Level of Road Service

The level of road service is a measure that states the quality of service provided by a road under certain conditions. The value of the road service level (Level of service) can be seen in the following table.

Table 2.1 Value of Service Level

No	Service Level	V/C Ratio	Characteristic
1	A	0,00 – 0,20	- Free flow conditions - High speed 100 km/h - Traffic volume is about 30% of capacity
2	B	0,21 – 0,44	- Stable flow - Traffic speed is about 90 km/hour - Traffic volume is about 50% of capacity
3	C	0,45 – 0,75	- Stable flow - Traffic speed 75 km/h - Traffic volume is about 75% of capacity
4	D	0,76 – 0,84	- the approaching flow is not stable - Traffic speed is about 60 km/hour - Traffic volume is around 90%
5	E	0,85 – 1,00	- Unstable flow - Traffic speed is about 50 km/h - Traffic volume is approaching the capacity
6	F	>1,00	- The flow stuck, blocked conditions - Speed < 50 km/h

Source: Minister of Transportation Decree No. 16 of 2006.

2.1 Definition of Parking

According to the Technical Guidelines for the Implementation of Parking Facilities, the Directorate General of Land Transportation (1996) states that parking is a stationary state of a vehicle that is not temporary. Parking according to the Indonesian dictionary can be interpreted as a place to stop a vehicle for a while. Meanwhile, Joko Murwono (1996) argues, that parking is a stationary state of a vehicle that is not temporary, and the driver leaves the vehicle, including the interest of raising and lowering people or goods.

According to PP No. 43 of 1993 parking is defined as a vehicle that stops at certain places, whether indicated by signs or not, and not solely to raise or lower people and or goods. Meanwhile, another definition of parking is a condition where a vehicle stops temporarily (unloads) or stops long enough. Thus, parking space must be available at the end of the destination of the trip has been reached. (Warpani, 1990).

Parking has caused many problems in various big cities in Indonesia because of the limited urban space. However, parking can be used as an opportunity and potential or as a tool for managing city traffic. This requires the availability of parking spaces equipped with facilities for parking.

If the road becomes a parking lot, it will cause a reduction in the effective width of the road and will automatically decrease the capacity of the road space. Thus, the impact will be a decrease in road capacity resulting in traffic jams. For this reason, there must be a provision for parking time (parking duration), and parking angles to maintain the capacity of road space. The formulation of parking policies is one of the most difficult tasks a planner must undertake. The difficulty lies in coordinating parking policies with several other planners' goals. The following considerations can be taken into account:

a. Finding a compromise between many curb spaces that are reserved for

parking spaces and those reserved for moving vehicles.

b. Preparing facilities/spaces for parking delivery vehicles, short and long parking duration.

c. Designing parking barriers and driveways in such a way that road traffic is not exacerbated by incoming and outgoing vehicles.

d. Ensuring that the interests of business units along the road are improved by a good parking arrangement.

e. Ensuring that parking policies and public transit policies complement each other, for example, car park facilities adjacent to express bus routes will improve bus ride rates.

f. Maintaining the surrounding environment by limiting parking and enforcing land use controls.

g. Controlling the supply and demand for parking through tax mechanisms; encouraging short parking and making long parking difficult can serve to improve the main trade area (KPU) or Central Bussines District (CBD).

h. Parking facilities are an important part of the land transportation system. The need for parking spaces for private vehicles, public passenger transport, motorcycles, and trucks are very important. The need for a parking space depends on the shape and characteristics of each vehicle with the design and location of the parking lot. Parking problems occur when the number of parking requirements is greater than the parking capacity so that it can interfere with traffic around the parking location.

2.2 Types of Parking

2.2.1 Based on Placement

1. On-street parking is using the side of the road as a parking space
2. Off-street parking

Off-street parking is parking in a location that is specifically provided as a parking space and has an entrance service door or an exit service door as a place to pick up or hand over tickets so that you can know for sure the number of vehicles and the period for parking vehicles. According to the Technical Guidelines for the Implementation of Parking Facilities of the Directorate General of Land Transportation (1996), to design a parking lot, several important criteria must be considered, namely: land use planning, traffic safety and smoothness, environmental sustainability, convenience for users, availability of land use and the location of the main access road and the area served.

2.4.1 Based on Status

1. Public Parking

   Public Parking is a parking area that uses land that is managed by the Regional Government.

2. Special Parking

   Special parking is parking that uses land which is managed by a third party.

3. Emergency Parking

   Emergency parking is parking in public places using land owned by the local government or private sector that occurs due to incidental activities.

4. Parking Building

   A parking building is a building used as a parking area whose management is controlled by the regional government or a third party that has obtained a permit from the regional government.

5. Parking Area

   A parking area is a building or parking area complete with the necessary

parking facilities and its management is controlled by the Regional Government.

2.4.1 Based on Vehicle Type

Based on the type of vehicle that uses the parking area, parking can be divided into (Abubakar, 1998):

a. Parking for non-motorized two-wheeled vehicles (bicycles)
b. Parking for motorized two-wheeled vehicles (motorcycles)
c. Parking for three-wheeled, four-wheeled, or more vehicles and engines (cars, taxis, etc.).

2.3 Off-Street Parking Pattern

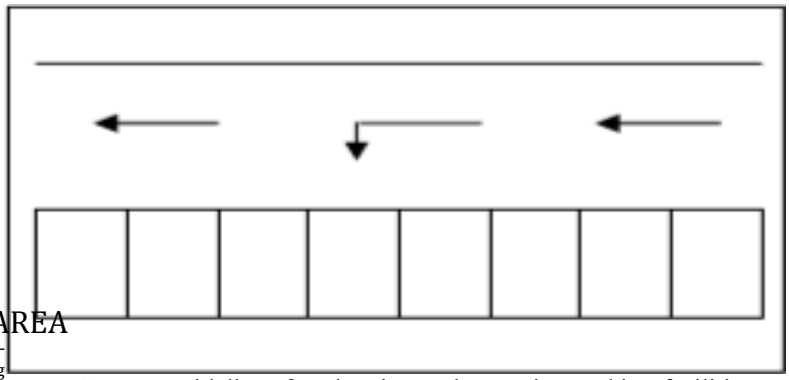
According to the Technical Guidelines for the Implementation of Parking Facilities (Directorate General of Land Transportation, 1996), off-street parking patterns are divided into:

2.3.1 One-side Parking

1. Form a 90º angle

This parking pattern has more capacity when compared to the parallel parking pattern, but the ease and convenience of the driver in maneuvering into and out of the parking space are less when compared to the parking angle pattern which is smaller than 90º.

Figure 2.1. 90º angle single-sided vehicle parking pattern



Source: guidelines for planning and operating parking facilities directorate general of land transportatio

2. Form an angle of 30º, 45º, 60º

   This parking pattern has more capacity when compared to parallel parking patterns, the ease and convenience of the driver in maneuvering into and out of the parking space are greater than the 90º angle parking pattern.

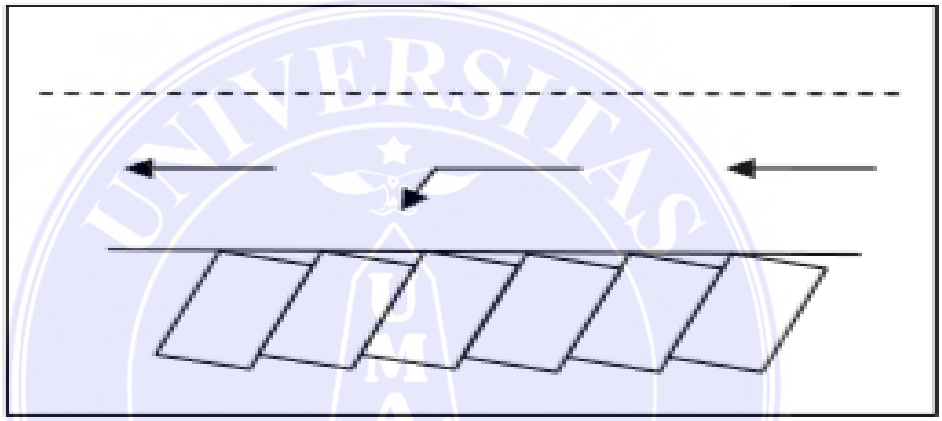


Figure 2.2 One-sided vehicle parking pattern angle 30o, 45o, 60o Source: guidelines for planning and operating parking facilities directorate general of land transportation

2.3.2 Two-Sided Parking

This parking pattern is applied if the availability of space is sufficient.

1. Form an angle of 90º

   The direction of vehicle traffic can be one-way or two-way.

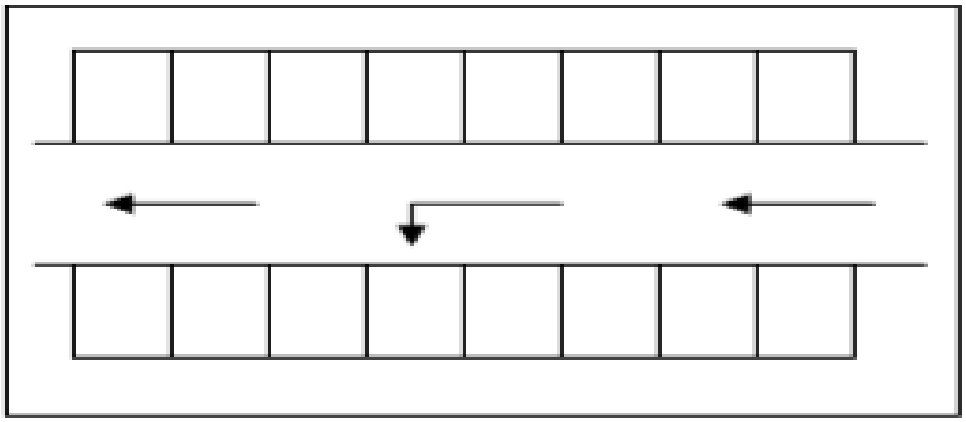


Figure 2.3. Two-sided vehicle parking pattern at 90o angle
Source: guidelines for planning and operating parking facilities of the Directorate General of Land Transportation.

2. Form an angle of 30º, 45º, 60º

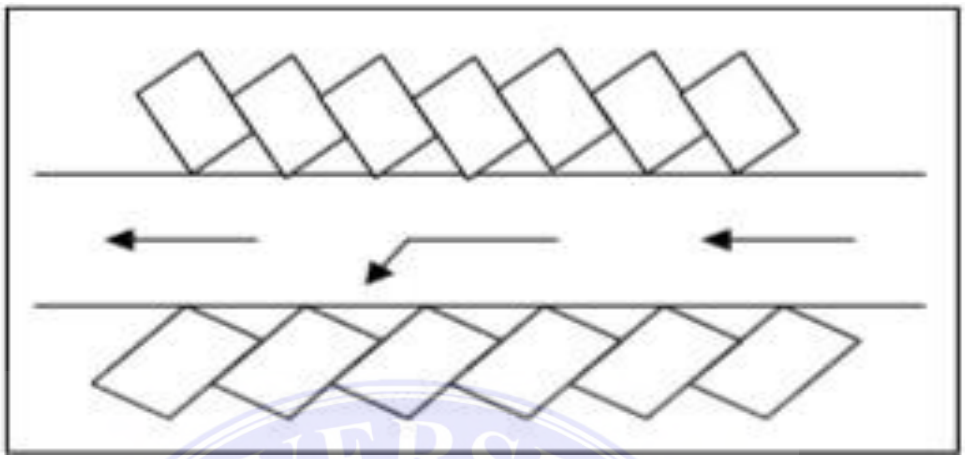


Figure 2.4. Two-sided vehicle parking pattern angle 30o, 45o, 60o Source: guidelines for planning and operating parking facilities at the Directorate General Of Land Transportation

2.3.3 Island Parking Pattern

The island parking pattern is used if the space is wide enough.

1. Form an angle of 90º

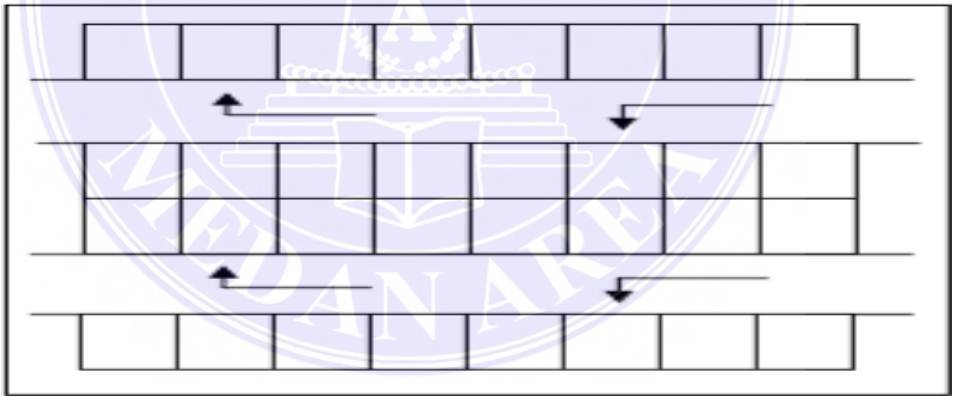


Figure 2.5. 90o angle island parking pattern Source: guidelines for planning and operating parking facilities at the Directorate General Of Land Transportation

2.3.4 Island Parking Pattern

The island parking pattern is used if the space is wide enough.

2. Form an angle of 90º

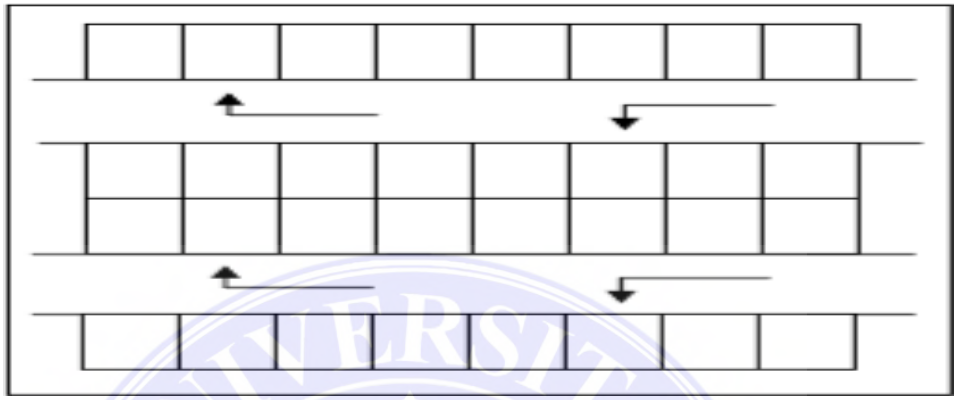
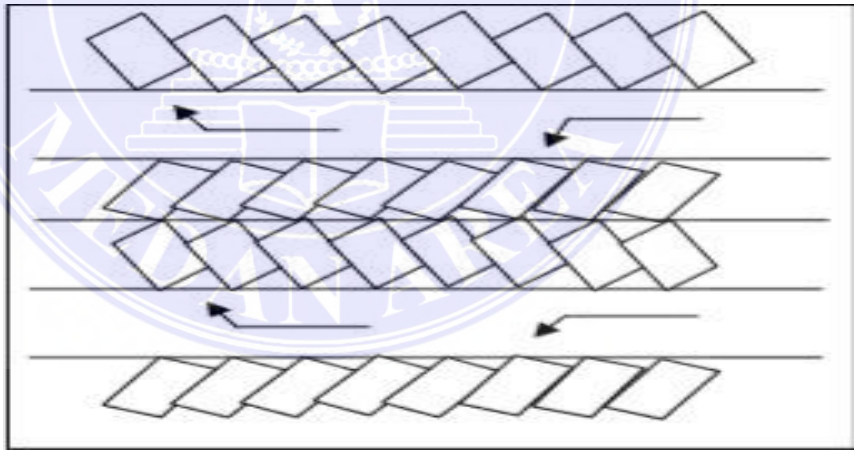


Figure 2.5. 90o angle island parking pattern Source: guidelines for planning and operating parking facilities at the Directorate General Of Land Transportation

1. Form an angle of 45º



a. Fishbone shape type A

Figure 2.6. Fishbone shape 45o type A
Source: guidelines for planning and operating parking facilities, at the Directorate General Of Land Transportation

a. Fishbone shape type B

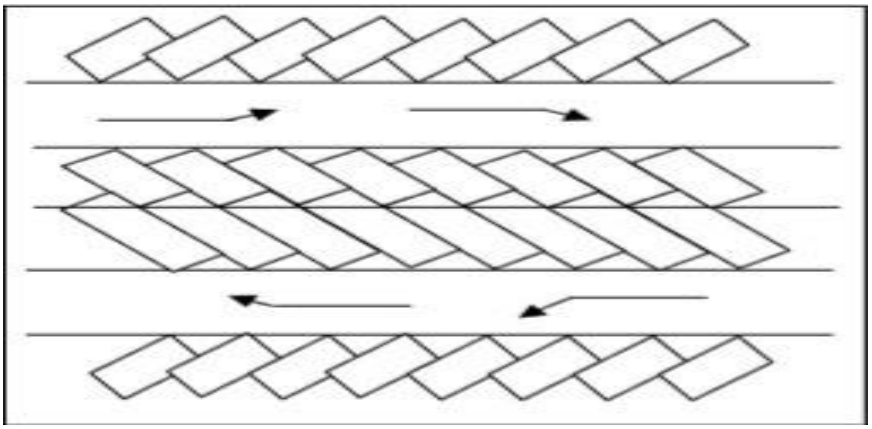


Figure 2.7. Fishbone shape 45o type B
Source: guidelines for planning and operating parking facilities at the Directorate General Of Land Transportation

b. Fishbone shape type C

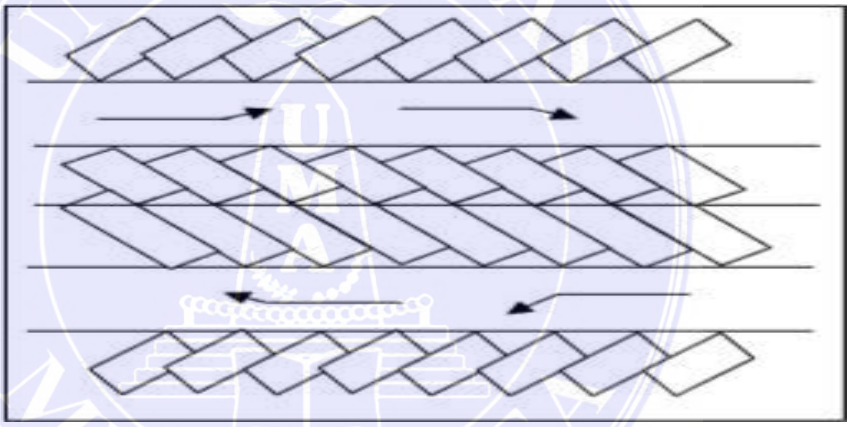


Figure 2.8. Fishbone shape 45o type C
Source: guidelines for planning and operating parking facilities at the Directorate General Of Land Transportation

2.1 Benefits of Good Parking Management

Parking is an economic commodity that is subject to the basic laws of the economy. Thus, if a parking policy is enforced to reduce parking spaces in the city center, a new equilibrium point will be reached, leading to higher travel costs due to higher parking rates, and the probability of traveling by car to the city center will decrease. In short, parking policies affect energy consumption, traffic congestion, and the use of public transport.

Good parking management has been implemented in many cities with amazing results. Some of these results are an increase in car ride rates, a decrease in people traveling, faster travel times, an increase in the use of public transport, and most importantly a decrease in traffic congestion. It has been suggested for

years that road congestion cannot be solved by adding more lanes. On the other hand, it has been argued that if motorists were to be charged congestion fees, this congestion problem might be alleviated. Parking fees can also be considered congestion rates, and this idea has been used in Singapore (khisty,1980).

2.2 Parking Characteristics

Parking characteristics are related to the large number of parking needs that must be provided. In parking characteristics, it is necessary to know several things that can be used as described below:

2.2.1 Parking Accumulation

Accumulated parking is the total amount parked in a certain place at a certain time and divided according to the category of type of trip intent. The integration of parking accumulation over a certain period shows the parking load (number of parking vehicles) in vehicle hours per certain period (Hobbs,1979 in Rickson C,2014).

Parking accumulation data can be presented in the form of adequate tables and graphs so that parking accumulation can be illustrated according to the category of travel intent. The accumulated value of parking is not the same from one place to another from time to time. At certain times the accumulated parking value exceeds the available parking capacity and at other times the value is below the available parking capacity.

Calculation of parking accumulation can use the equation:

Accumulation = Km – Kk. (1)

If the data collection already has parking vehicles, then:

Accumulation = Km – Kk + x (2)

Information:

Km = vehicles entering the parking location

Kk = vehicles leaving the parking location

X = number of vehicles that have been parked before the observation.

2.1.1 Parking Volume

Parking volume is the number of vehicles included in the parking load (ie the number of vehicles per certain period), (Hobbs, 1979 in Rickson C, 2014). The formula used to calculate the parking volume is:

Volume = Nin + X (vehicles)..... (3)

Information:

Nin = number of incoming vehicles

X = existing vehicles before the time of the survey

2.1.2 Parking Index

The parking index is another measure to express the use of the parking lot which is expressed as a percentage of the space occupied by parking vehicles. To determine the need for parking can be known from the peak parking time and parking index. Peak parking time provides an overview of the magnitude of parking demand at that time. When compared with normal capacity, it can be seen how much need can be met by the available parking infrastructure.

By using the parking index, it can be seen whether the parking demand is comparable or not with the available capacity. If the parking index value is >100%, it means that the demand for parking space is greater than the existing capacity. If the parking index value <100% means the request can still be fulfilled.

$$IP = \frac{AP}{R} \times 100\% \quad \text{.....(4)}$$

Information:

IP = Parking Index

AP = Parking Accumulation

R = Parking Space Available

2.1.3 Parking Duration

Parking duration is the time used by vehicles to park in a place whose average score can vary for each certain period. The duration of parking is obtained by finding the time difference between the time the vehicle leaves the parking location and the time the vehicle enters the parking lot. According to the time used for parking, parking can be classified as follows:

2.1.3.1 Short–Time Parking

Short-time parking is a driver who parks his vehicle (using a parking space) for less than one (1) hour and shopping purposes.

2.1.3.2 Medium–Time Parking

Medium time parking is a driver who parks his vehicle (using a parking space) between one (1) hour to four (4) hours and for trading purposes.

2.1.3.3 Long-Time Parking

Long time parking is a driver who parks his vehicle (using a parking space) for more than four (4) hours and usually for work purposes.

$$\text{Duration} = T_1 - T_0 \quad \text{.....(5)}$$

Information:

Ti = vehicle entry time (hours)

To = vehicle exit time (hours)

2.1.4 Parking Capacity

Parking capacity is the maximum ability of a parking space to accommodate vehicles, in this case, the volume of vehicles using existing parking facilities. Vehicles using parking facilities are viewed from the process, namely when they arrive, park, and leave the parking facility. A review of this will provide the amount of capacity of an existing parking facility. The formula used to calculate parking capacity is:

$$KP = \frac{\text{waktu pelayanan}}{D} \times S \quad \text{.....(6)}$$

Information:

KP = Parking capacity (vehicles/hour)
S = Number of parking lots (plots)
D = Average parking duration (hours/vehicle)

2.1.5 Parking Turnover

A parking turnover rate is a number that shows the level of use of parking spaces obtained by dividing the parking volume by the number of parking spaces for each unit of time. The formula used to calculate the parking turnover rate is:

$$TR = \frac{n}{R} \quad \text{.....(7)}$$

Information:

TR = parking turnover rate (vehicles/plot/hour)

n = Total number of vehicles at the time of the survey (vehicles)

R = Available parking space (SRP)

2.2 Parking Supply

Parking availability/supply or the ability to provide parking is a limit to the size of the number of vehicles that can be accommodated during a certain period (during the survey time).

The formula used to express the provision of parking is as follows:

$$Ps = \frac{S \cdot Ts}{D} \cdot f \quad \text{.....(8)}$$

Information :

Ps = Vehicle capacity that can be parked (vehicle)

S = Number of parking lots available at the study site (plots)
Ts = Length of analysis period/survey time (hours)
D = Average parking time (hours/car)

F = The reduction factor due to parking changes, the value between 0,85 s/d 0,95.

2.2.1 Parking Procedures and Equipment

In carrying out parking, both drivers and parking attendants must pay attention to the following:

1. Parking limit following the road markings

Vehicle security, by locking the vehicle door and applying the parking brake

According to the type of facility, the parking procedure is as follows.

2.2.1.1 Parking Facilities without Parking Control :

a) The parking attendant can guide the vehicle driver.
b) The parking attendant will provide proof of payment before the vehicle leaves the parking space.
c) The parking attendant must wear a uniform and identity.

2.2.1.2 Parking facilities with parking control (using entrance/exit).

a. At the entrance, either with an officer or with an automatic door, the driver must get a parking ticket, which states the time of entry (if needed, the officer records the vehicle number).)

b. With and without a parking attendant, the driver parks the vehicle according to parking procedures.

c. At the exit, the officer must check the correctness of the parking ticket, record the length of parking, calculate the parking rate according to the provisions, and receive parking payments by submitting a proof of payment ticket to the driver.

2.2.2 Parking Supporting Facilities

Parking support facilities that require maintenance are:

1. Post officer,
2. lighting lamp,
3. Exit and entrance doors,
4. Electronic timekeeping device,
5. The electronic door on the parking facility with automatic entrance.

2.3 Parking Controlling

There is no doubt that on-street parking greatly interferes with the smooth flow of traffic, but vehicle parking is the end of a part of the journey so parking is unavoidable. What needs to be done is to manage parking with a good system so that the negative impact it causes can be reduced to a minimum. Many cities implement a free parking policy, but it is not possible to apply it to all roads, even on many streets in the center of city activities it is impossible to apply a free parking policy.

2.3.1 Controlling On-Street Parking

Parking can be used as a traffic control tool, through free parking area policies and/or parking time restrictions. In free parking areas, along certain roads, parking is prohibited. With the policy of free parking, the width of the road can be used optimally for traffic movement.

PP No.43 of 1993, article 66 prohibits anyone from using parking in a way that can impede freedom and endanger traffic safety, or cause damage to roads. In certain places, even though there are no prohibition signs, road users are not allowed to park their vehicles. On any road where there are no prohibition signs or markings, or other signs, road users can park their vehicles. Certain places as referred to above are:

1. Around a pedestrian crossing, or a designated pedestrian crossing. The crossing lanes are marked with zebra crossing road markings. In traffic ethics that apply throughout the world, pedestrians always have priority. Vehicles that are moving also have to reduce their speed when they know there is a crossing marking. Parking must be at least 6 meters from the edge of the crossing.
2. Pedestrian special lanes, namely the presence of parking on the student lane will disrupt the comfort of pedestrians and can cause pedestrians to use vehicle lanes.
3. In certain corners, an environment is a place that lacks free view space so the presence of parking vehicles will increase the possibility of accidents.
4. Bridge, parking must be at the closest distance of 50 meters from the mouth of the bridge.
5. Narrow roads, and parking on narrow roads usually result in turning off traffic flow because passing vehicles appear to be blocked by parked vehicles or at least very difficult for other vehicles that will pass. The road is classified as narrow if the width of the road is less than 5 meters.
6. Tunnel, there is no special technical reason other than the tunnel was built not for parking. In addition, bridges and tunnels generally do not provide adequate and adequate extra space for vehicle parking.
7. The top of the incline, top of the incline limits the driver's perspective,

especially on sharp inclines. The new driver will see the traffic conditions in front of him after reaching a certain point on the incline, and vehicles parked at the top of the incline will increase the visibility for the driver.

2.3.2 The Purpose of Parking Control

The objectives of parking control are (Directorate General of Land Transportation 1998):

1. Preventing the occurrence of obstacles to the flow of vehicles
2. Reducing accidents
3. Making more effective use of parking spaces
4. Preserving historical objects, if they are in a city with high historical value.
5. Acting as a barrier mechanism against road use in congested areas.

2.4 Free Parking Space

Free space must be provided for vehicles parked in both the lateral and longitudinal directions of the vehicle. Free space is intended to avoid collisions between the vehicle door and the vehicle parked next to it. Longitudinal free space is provided in front of the vehicle to avoid collisions against walls or vehicles passing through the aisle. The lateral free distance is taken as 5 cm and the longitudinal direction clearance is 30 cm.

2.5 Parking Space Unit

According to the Technical Guidelines for the Implementation of Parking Facilities (Directorate General of Land Transportation, 1996) the Parking Space unit (SRP) is the effective area for parking one vehicle (passenger cars, trucks, motorbikes) including free space and width of door openings. Determine the SRP is based on the following:

2.5.1 Standard Vehicle Dimensions

Standard Vehicle Dimensions for passenger cars are 5.0 m x 2.5 m

while for motorcycles are 0.7 m x 1.75 m.

2.5.2 Free Parking Space

Free space for parking vehicles is given in the lateral and longitudinal or longitudinal directions of the vehicle. The lateral direction space is applied when the position of the vehicle door is opened, which is measured from the outermost edge to the body of the parking vehicle beside it. This free space is provided so that there is no collision between the vehicle door and the vehicle parked beside it when the passenger gets off the vehicle. Longitudinal free space is provided in front of the vehicle to avoid collisions with walls or vehicles passing through the aisle. The free distance of the lateral direction is taken by 5 cm and the longitudinal direction free distance is 3 cm.

2.5.3 The Width of Vehicle Door Opening

The size of the width of the door opening is a function of the characteristics of vehicle users who use parking facilities. The determination of the parking space unit (SRP) is divided into three types of vehicles as shown in the following table:

Table 2.2 Determination of Parker Space Unit (SRP)

Type of vehicles	Parking space unit (m2)
1. class I passenger car	2,3 x 5,0
2. class II passenger car	2,5 x 5,0
3. class III passenger car	3,0 x 5,0
Buses and trucks	3,4 x 12,5
Motorcycles	0,75 x 2,0

Source: Directorate General of Land Transportation, 1996

The size of the parking space unit for each type of vehicle is as follows::

2.5.4 Parking Space Unit for Passenger Cars

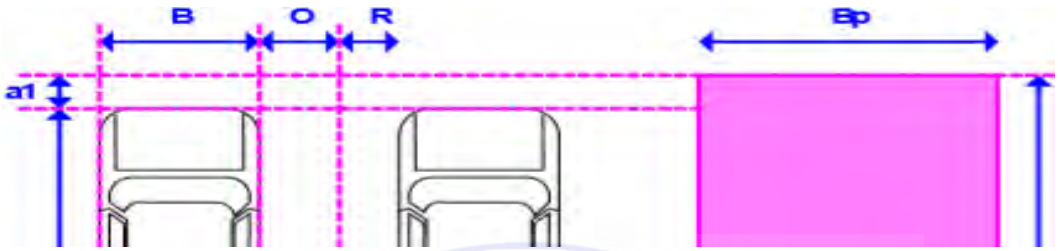


Figure 2.9 determination of parking space units (SRP) Source: Directorate General of Land Transportation, 1996

Information:

B = Total Vehicle Width O = Non Door Width
L = Total Length of Vehicle
a1, a2 = Longitudinal Free Distance
R = Lateral Free Distance

Table 2.3 passenger car parking unit sizes (in meters)

GOL I	B = 1,70	al = 0,10	Bp = B + O+ R
	O = 0,55	L = 4,70	Lp = L + al + a2
	R = 0,05	a2 = 0,20	Bp = 2,30 Lp = 5,0
GOL II	B= 1,70	al = 0,10	
	O = 0,75	L= 4,70	
	R = 0,05	a2 = 0,20	Bp = 2,50 Lp = 5,0
GOL III	B = 1,70	al = 0,10	
	O = 0,80	L = 4,70	
	R = 0,05	a2 = 0,20	Bp = 3,0 Lp = 5,0

Source: Directorate General of Land Transportation, 1996

2.5.5 Parking Space Unit for Bus and Truck

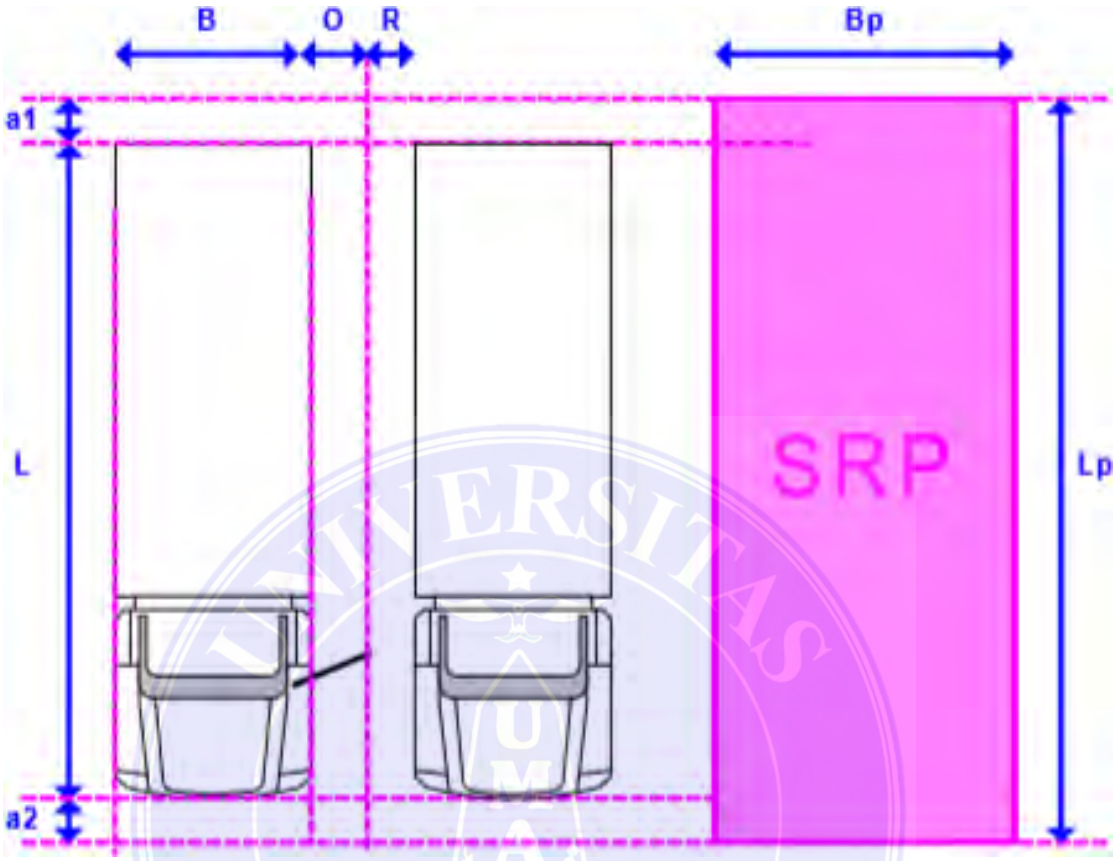


Figure 2.11.5 bus and truck parking spaces Source: Directorate General of Land Transportation, 1996

Information :

B = Width of vehicle

L = Length of Vehicle O = Width of door opening

a1, a2 =Front/rear clearance R = Side clearance

Bp = SRP minimum width Lp = SRP minimum length

Table 2.4 passenger car parking unit sizes (in meters)

Small	B = 1,70	a1 = 0,10	Bp = B + O + R	
	O = 0,80	L = 4,70	Lp = L + a1 + a2	
	R = 0,30	a2 = 0,20	Bp = 2,80	Lp = 5,00
Medium	B = 2,00	a1 = 0,20		
	O = 0,80	L = 8,00		
	R = 0,40	a2 = 0,20	Bp = 3,20	Lp = 8,40

Big	B = 2,50	a1 = 0,30		
	O = 0,80	L =12,00		
	R = 0,50	a2 = 0,20	Bp = 3,80	Lp = 12,50

Source: Directorate General of Land Transportation, 1996

CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

From the results of data collection and processing carried out on the types of parking on Sirao Street, several conclusions can be drawn including Installation of parallel angle parking types, 30o angles, 45o angles, and 60o angles on Sirao street does not interfere with the smooth flow of traffic where performance the road is in a stable flow, with an indicator of the level of road service C. Meanwhile, the parking angle is 90º the level of road service is at a flow approaching unstable with an indicator of the value of road service D.

5.2 Suggestion

Based on the research that has been done, suggestions can be given as follows:

1. There must be the installation of traffic signs at which points are allowed to park their vehicles so that there is no confusion for drivers in parking their vehicles.

2. For driving, it is important to always pay attention to speed when crossing Sirao road to avoid accidents so as not to interfere with traffic flow.

3. To get better research results, it is recommended for further research to increase the number of data collection locations so that it can become a better reference in the future.