

## DESIGN OF OFF STREET PARKING FACILITIES ON PASAR TANJUNG – JEMBER DISTRICT

**RizkiHippriyantiDewi N**  
Undergraduate in Civil Eng.  
Civil Engineering Departement  
Faculty of Engineering  
University of Jember  
Jl. Kalimantan 37 Jember  
Telp./Fax. (0331) 410241  
[rizki.hippriyanti28@gmail.com](mailto:rizki.hippriyanti28@gmail.com)

**NunungNuringHayati**  
Lecturer in Department of  
Civil Engineering  
Faculty of Engineering  
University of Jember  
Jl. Kalimantan 37 Jember  
Telp./Fax. (0331) 410241  
[nunung.nuring@yahoo.co.id](mailto:nunung.nuring@yahoo.co.id)

**AkhmadHasanuddin**  
Lecturer in Department of  
Civil Engineering  
Faculty of Engineering  
University of Jember  
Jl. Kalimantan 37 Jember  
Telp./Fax. (0331) 410241  
[damha.sipilunej@gmail.com](mailto:damha.sipilunej@gmail.com)

### Abstract

The PasarTanjung parking problems at Jember makes width effectivity of the street reduced, because of most the activities of the parking and unloading occurs On Street Parking. With 24,970 m<sup>2</sup> of area of PasarTanjung, its only have 1,569 m<sup>2</sup> area of motorcycle parking and 63 m<sup>2</sup> area of the goods transportation . This study has function to planning the location of parking in the PasarTanjung in order to accommodate the vehicles and unloaded goods. Determination spacious parking requirements based on the arrival and departure of vehicles methods and based on the floor area of the building. The methods that have the biggest needed area was choosen. The results of the analysis show that the method is based on the floor area of the building resulted in the largest total parking demand that is 7,101.5 m<sup>2</sup>. Determination of the location of off-street parking is planned at Tanjung Market building floor area of 11,400 m<sup>2</sup>. The division obtained 344 vehicle parking area for motorcycles, passenger cars 174 vehicles, 244 cars of freight vehicles. Other parking locations for motorcycle parking is in an existing park (Area 1) the number of 379 vehicles with a land area of 840 m<sup>2</sup> parking , and Location 3 as much as 780 vehicle parking lot with a land area of 1,638 m<sup>2</sup> .

**Keywords:** *PasarTanjung, off street parking, on street parking*

### Abstrak

Masalah parkir pada Pasar Tanjung Kabupaten Jember mengakibatkan berkurangnya lebar efektif jalan karena sebagian besar aktifitas parkir dan bongkar muat barang terjadi di badan jalan (*On Street Parking*). Dengan luas 24,970 m<sup>2</sup> Pasar Tanjung hanya memiliki luas parkir untuk sepeda motor 1,569 m<sup>2</sup>, dan 63 m<sup>2</sup> untuk angkutan barang. Penelitian ini dilakukan untuk melakukan perencanaan lokasi parkir pada Pasar Tanjung agar dapat menampung kendaraan yang parkir dan bongkar muat. Penentuan kebutuhan luas parkir menggunakan metode berdasarkan kedatangan dan keberangkatan kendaraan, serta berdasarkan luas lantai bangunan. Berdasar perhitungan dari kedua metode tersebut, diambil kebutuhan luas terbesar. Hasil analisa menunjukkan metode berdasarkan luas lantai bangunan menghasilkan total luas kebutuhan parkir terbesar yaitu 7,101.5 m<sup>2</sup>. Penentuan lokasi parkir di luar badan jalan direncanakan pada gedung Pasar Tanjung lantai 3 seluas 11,400 m<sup>2</sup>. Pembagian area parkirnya diperoleh 344 kendaraan untuk sepeda motor, 174 kendaraan mobil penumpang, 244 kendaraan mobil angkutan barang. Lokasi parkir lainnya untuk sepeda motor berada di taman parkir yang sudah ada (Lokasi 1) dengan jumlah 379 kendaraan dengan luas lahan parkir sebesar 840 m<sup>2</sup>, serta Lokasi 3 sebanyak 780 kendaraan dengan luas lahan parkir sebesar 1,638 m<sup>2</sup>.

**Kata kunci :** *Pasar Tanjung, Parkir di luar badan jalan, parkir di badan jalan*

## INTRODUCTION

PasarTanjung is the biggest wholesale market traditionally located in Jember District with an area of 24,970 m<sup>2</sup>. The market should have parking facilities loading and unloading of goods is sufficient, so that the traders and visitors can engage in economic activities comfortably. But the market does not have sufficient land area parking. The total area for motorcycle parking only 1,569 m<sup>2</sup>, stevedoring activities only 63 m<sup>2</sup> (can accommodate 3 - 4 cars of freight) and places to park passenger cars are not available. It mostly affects the activity of parking and unloading occurs on Jl.Samanhudi, Jl. Dr. Wahidin and Jl.

Trunojoyo. This condition reduces the effective width of the road, causing congestion on the roads in the vicinity of the Cape market.

Anggriawan(2012) research results showed the value of the degree of saturation is large enough that Jl.Trunojoyo 0.86 at peak hours with side barriers weighted reached in 1,056. According Cahyadi (2014), the Jl. Samanhudiveragesmanuver vehicles parked on the street for 15 seconds. Congestion happens a lot in the use of the road for parking. This study was conducted to review the parking area to meet the needs of the activities in the Cape market. Furthermore, the provision of alternative planning area is done off street parking.

## RESEARCH METHODOLOGY

### Location and Time Research

Location of research taking place Jl. Samanhuji, Jl. Dr.Wahidin, Jl. Trunojoyo (Segment PasarTanjung) and PasarTanjung official parking area. In this study conducted a parking survey observation that, by recording the number of vehicles that perform activities on street parking and parking areas that serve as the official study area. Time the survey was conducted over three days from 06.00 am - 17.00 pm that is, the day Wednesday, December 11, 2013, Sunday on December 15, 2013, and Monday, December 16, 2013. To represent digunakan holiday Sunday, and Monday and Wednesday are days the daily routine.

### Processing Method

Biggest difference between methods based on arrival and departure vehicle:according Tamin (2000), the characteristics of parking namely:

#### *Duration*

$$\text{Duration} = \text{Exit time} - \text{Entry time} \dots\dots\dots (1)$$

With: Exit time = time when the vehicle out of the parking locations (departure)  
Entry time = time when the vehicle enter the parking area (arrival)

#### *Parking Accumulation Calculation*

To get the amount of parking capacity and the total land area required parking, parking needs to be calculated on the amount accumulated a certain time interval, and obtained by accumulating the number of vehicles that have been in the parking lot at the previous interval plus the number of vehicles entering, and reduced the number of vehicles out at the interval.

$$\text{Accumulation} = E_i - E_x + X \dots\dots\dots (2)$$

With:  $E_i$  = Entry (number of vehicles entering the parking area)  
 $E_x$  = Exit (exit the vehicle at the parking locations)

#### *Building Floor Area Based Methods*

Calculate the parking requirements according to the type and function of the building.

**Table 1** SRP in Market Needs

Area Total (100m <sup>2</sup> )	40	50	75	100	200	300	400	500	1,000
Needs (SRP )	100	185	240	300	520	750	870	1,200	2,300

Sources: Pedoman Teknis Penyelenggaraan Parkir, 1996

### ***Needs Parking Building Area (m<sup>2</sup>)***

Broad needs of the parking deck to come out of the maximum number of parking of vehicles of each type of vehicle. Of the two methods (based on the largest difference between the arrival and departure of vehicles) and method (based on floor area) taken the highest maximum number of parking vehicles, it is widely known parking lot. After that is done the planning design off-street parking with the applicable statutes, can be seen in the bibliography.

## **RESULTS AND DISCUSSION**

### **Based on the Biggest Difference between Arrival and Departure Vehicle**

#### ***Duration parking***

This calculation using the formula in equation (1). With the results shown in Table 2.

**Table 2** Average Parking Duration Pasar Tanjung

No	Type of Vehicle	Wednesday December 11, 2013	Sunday December 15, 2013	Monday December 16, 2013
1	Motorcycles	92 minutes	91 minutes	81 minutes
2	Passenger cars	86 minutes	60 minutes	90 minutes
3	Cargo cars	90 minutes	73 minutes	80 minutes

From the above calculation of the duration average obtained longest duration for parking motorcycles on Wednesday, December 11, 2013 for 92 minutes, for passenger car vehicles obtained the average duration longest on Monday, December 16, 2013 for 90 minutes, and for freight cars goods longest average duration on Wednesday, December 11, 2013 for 90 minutes.

#### ***Accumulation of Parking***

Parking accumulation is the amount of vehicles parked in the area at any given time using equation (2). The results show on Table 3.

Base on Table 3, from the calculations above retrieved accumulated the highest parking accumulation for each vehicle type are obtained for this type motorcycle 474 vehicles on Monday, December 16, 2013, for passenger cars 55 vehicles on Monday, December 11, 2013, for the type of car goods vehicle on day 77 Monday, December 16, 2013.

**Table 3** Accumulation of Parking Top

No	Research	Motorcycles	Passenger cars	Freight car
1	Monday, December 11, 2013	461	55	72
2	Sunday, December 15, 2013	439	44	39
3	Monday, December 16, 2013	474	53	77

**Parking Area Needs**

Width requirement is obtained by multiplying the unit Parking Space (SRP) of each type of vehicle with the highest parking accumulation results.

**Table 4** Based Parking Area Requirements The Biggest Difference Between Arrival and Departure Vehicle

No.	Types Unit	Vehicle Parking Space (m <sup>2</sup> )	Accumulated highest parking	Land Area Parking Requirement (m <sup>2</sup> )
1	Motorcycle	1.5	474	711
2	Passenger car	11.5	55	632.5
3	Cargo cars	11.5	77	885.5
<b>Total</b>				<b>2,229</b>

From the above calculations it can be seen that the area of the parking lot by using the method based on the difference between the arrival and departure of vehicles amounting to 2,229 m<sup>2</sup>

**Based on the Parking Area of Building Floor Area**

To find extensive parking using methods based on building area, it can be obtained from the conditions set by the (Technical Implementation Guidelines for Parking, 1996) by using the table statutes Parking Space Unit (SRP) as follows Table 1.

Of secondary data that has been known to be able to market a total area of 24,970 m<sup>2</sup> cape worn interpolation formula.

$$Y = 500 - \left( \frac{300 - 249.7}{300 - 200} \right) * (520 - 750) = 614.5$$

$$SRP = y * SRP = 614.5 * 11.5 = 7,066.7 \text{ m}^2$$

From the above it can be seen interpolation calculation needs PasarTanjung parking area of land with a building area method based on the SRP market requires a land area of 7,101.5 m<sup>2</sup> parking.

From the results of the second calculation method chosen needs of the largest land area parking lot, which is a method based on the floor area of the building with the needs of the land area of 7,101.5m<sup>2</sup>Park, because the results of calculations by choosing a larger area is expected to accommodate more vehicles.

**Land Area Parking Requirement for Every Type of Vehicle**

Parking needs of land area is obtained by multiplying the percentage requirement SRP (method based on building area) with a land area of parking requirements (methods based on the difference between the arrival and departure of vehicles). After knowing the land area of parking, the number of vehicles can be determined by dividing the land area parking requirements (methods based on building area) with a SRP of each type of vehicle.

**Table 5** Land Area Needs Parking Building Floor Area Based Methods

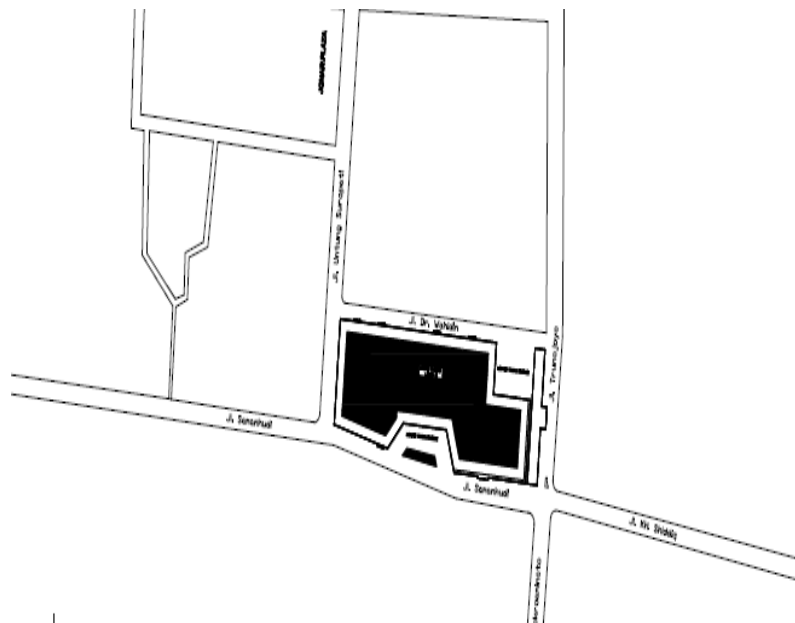
No.	Types Unit	Needs Vehicle Type vast parking lot with a method based on the difference between the arrival and departure of vehicles (m <sup>2</sup> )	Percentage SRP needs (method based on building area) (%)	Needs extensive parking area with a method based on building area (m <sup>2</sup> )	Number of Vehicles
1	Motorcycle	711	32	2,254	1,503
2	Passenger cars	632.5	28	2,005	174
3	Cargo car	885.5	40	2,807	244
<b>Total</b>		<b>2.229</b>		<b>7,066</b>	

The need for this type of vehicle parking plots motorcycle requires a land area of 2,265 m<sup>2</sup> park with 1,510 parking of vehicles number of vehicles, types of vehicles passenger cars need land area of 2,015 m<sup>2</sup> park with a number of vehicles parked 175.22, type of Cargo car requires a land area of 2,821 m<sup>2</sup> parking the number of vehicles parked vehicle 245.3, with a total area of 7,066 m<sup>2</sup>.

### Planning Area Parking

#### Siting parking

Ideally, the parking lot was built not too far from a place that will be addressed by user, 300-400 m of distance is considered close, when more than it will look for another alternative parking space (Warpani, 1993).



**Figure 1** Determination of PasarTanjung Parking Pasar Area

To determine the location of offstreet parking Tanjung Market is on the 3<sup>rd</sup> floor of the Cape and Garden Market building, which has been parked there, because after doing the survey, the location of the land area closest to PasarTanjung located on the 3<sup>rd</sup> floor with an area of The floor area of 11,400 m<sup>2</sup> and parking in two locations of existing park, with an area of location 1 and location 3,744 m<sup>2</sup> of land with an area of 729 m<sup>2</sup> available. To park on-site parking 3 performed the appropriate parking arrangements and parking location

extensions so that in the area of 1,638 m<sup>2</sup> can. Here is a picture of the location of PasarTanjung off street parking.

***Design off Street Parking***

**Parking Building (3<sup>rd</sup> Floor PasarTanjung)**

3<sup>rd</sup> floor location with extensive parking 11,400 m<sup>2</sup>.can accommodate 344 motorcycles, 174 passenger cars, 244 cargo cars great angle 90° for all types of vehicles, and the width of the alley to the type of motorcycle 1.6 m, and the type of vehicle car passenger and freight transport car 6.5 m with the availability of pedestrian facilities. To facilitate the classification made table needs parking area located on the 3<sup>rd</sup> floor of the building following the Cape market.

**Table 6** Requirements Location Parking (parking Building)

No	Type of Vehicle	Number Vehicle	SRP (m <sup>2</sup> )	Width Gang	Angle	Remarks
1	Motorcycles	344	1.5	1.6	90°	Supplied pedestrian facilities
2	Passenger Car	174	11.5	6,5	90°	Supplied pedestrian facilities
3	Cargo car	244	11.5	6.5	90°	Supplied pedestrian facilities

With total land area of 11,400 m<sup>2</sup>

**Garden Parking**

For the offstreet parking location in the form of using the parking garden at the existing sites, namely:

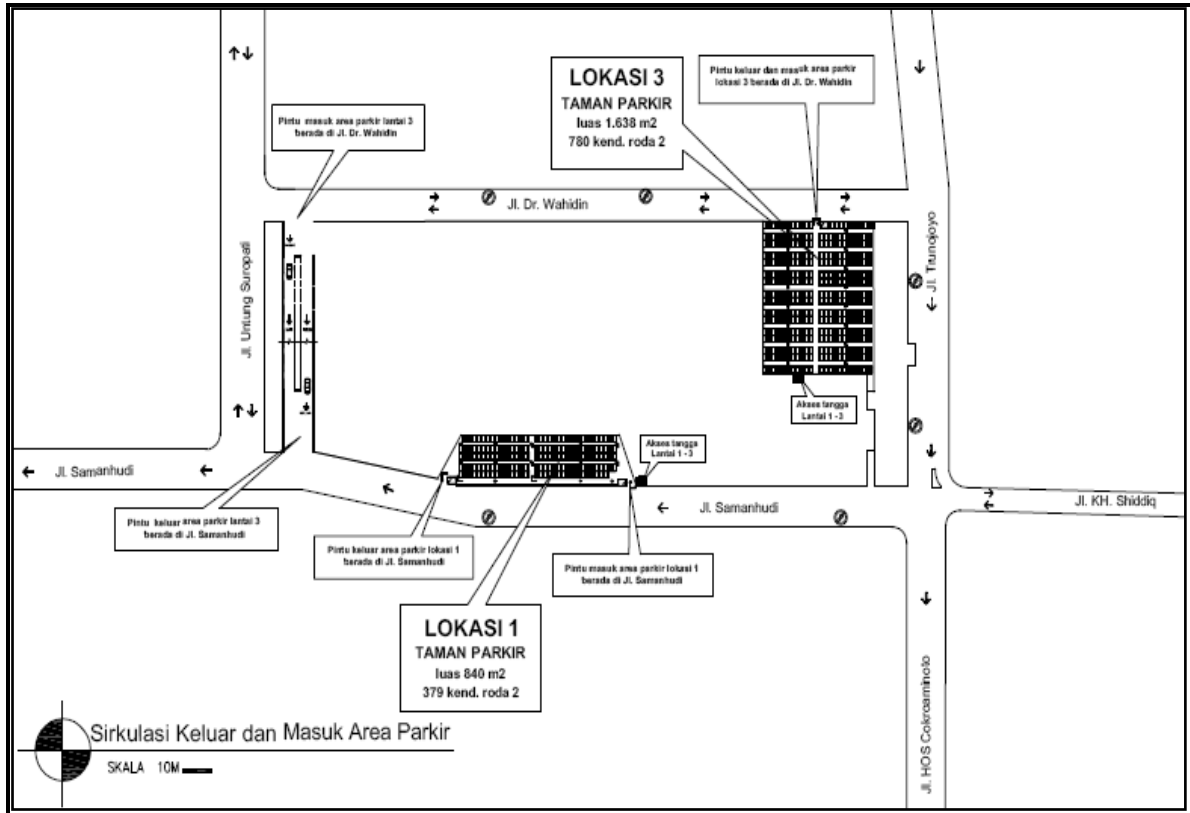
1. Location 1: separate entrance and exit as many as 379 motorcycles, with 840 m<sup>2</sup> of parking area.
2. Location 3: entrance and exit into a motorcycle as much as 780, with 1,638 m<sup>2</sup> of parking area.

Respectively - each using a 90° angle parking and aisle width of 1.6 m to provide pedestrian facilities. For simplicity can be seen in the following Table 7.

**Table 7** The need for parking locations (garden parking)

No	Location	Number of vehicles	SRP (m <sup>2</sup> )	Width gang (m <sup>2</sup> )	Angle	Remarks
1	Location 1	379	1.5	1.6	90°	Supplied pedestrian facilities
2	Location 3	780	1.5	1.6	90°	Supplied pedestrian facilities

Circulation of vehicles in and out is shown in Figure 2.



**Figure 2** Circulation Exit and Log Area Parking

Setting circulation out of the vehicle is to look at the road network, land area and the number of vehicles being stored after analysis calculations. Some settlement circulation in and out of parked vehicles in service to provide convenience for loading and unloading activities and access, for vehicle and motorcycle which will be parked on the 3<sup>rd</sup> floor area of Pasar Tanjungon Jl. Trunojoyo or when passing through the Jl. Untung Suropati can pass through Jl. Dr. Wahidin, If the vehicle and motorcycle from the direction of the road to pass through Jl. Samanhudi and Jl. Untung Suropati then toward the entrance of the parking area is located on the 3<sup>rd</sup> floor of the Jl. Dr. Wahidin, access to exit the parking area is located on the 3<sup>rd</sup> floor Jl. Samanhudi. For motorcycle when passing through Jl. Trunojoyo can choose the location of the park parking has been provided, namely in the Jl. Samanhudi location 1 and location 3 on the Jl. Dr. Wahidin, if the motorcycles from the direction Jl. Untung Suropati can park in the parking area of the park road past the location 3 with Jl. Dr. Wahidin. To facilitate viewing of circulation can be seen in Figure 2.

#### Circulation Parking 3<sup>rd</sup> Floor

To facilitate viewing the pattern of circulation following vehicle is parked circulation picture for the parking area on the 3<sup>rd</sup> floor.

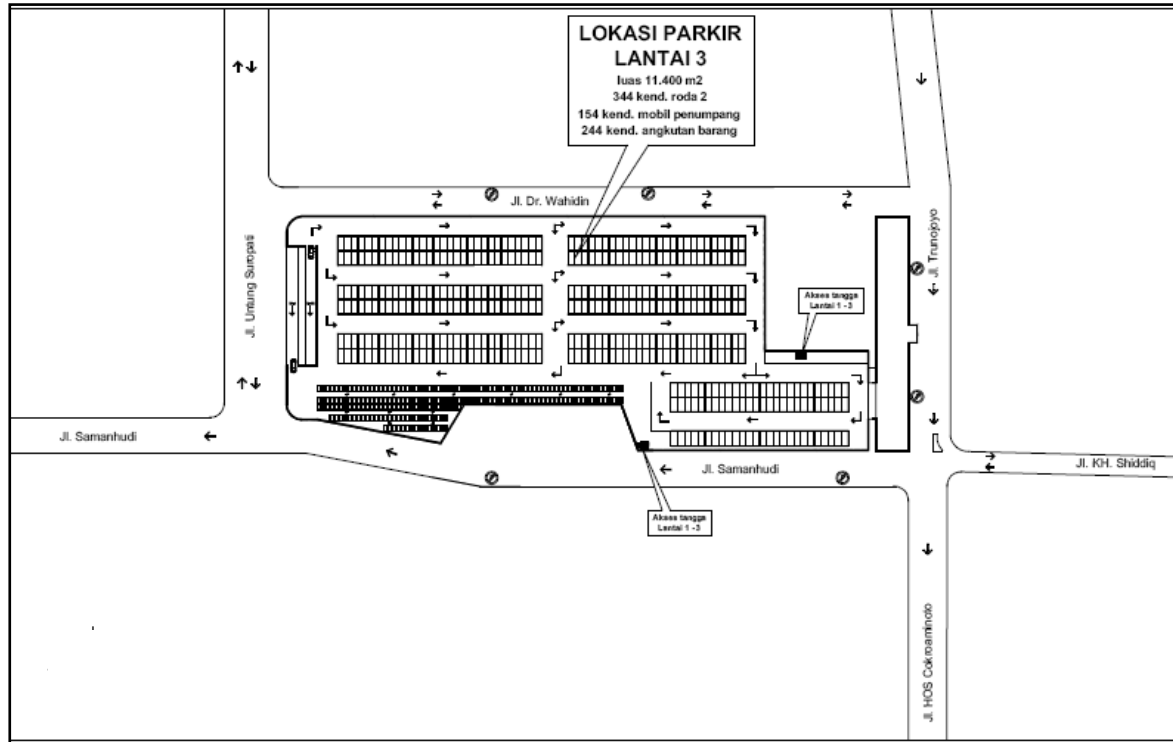


Figure 33<sup>rd</sup> Floor Circulations

Setting the parking circulation on the 3<sup>rd</sup> floor using one-way street with wide aisles for vehicle type motorcycle of 1.6 m, for the type of vehicles and passenger cars of Cargo cars by 6.5 m with angle parking for each vehicle type by 90°. To facilitate viewing the 3<sup>rd</sup> floor circulation can be seen in Figure 3.

### Planning Results

From the above analysis calculations can be seen in Figure 4. In Figure 4 it can be seen that the parking area has been planned is on the 3<sup>rd</sup> floor of PasarTanjung for parking motorcycles, passenger cars and car goods transportation, special parking for motorcycles is in location 1 (park parking) Jl. Samanhudi, and Location 3 (park parking) Jl. Dr. Wahidin. After the planned area of offstreet parking then not allowed to park On Street Parking.

## CONCLUSION

From the calculation and analysis in the previous discussion it was concluded among other things that the parking area of land required to meet the lack of parking facilities in the PasarTanjung based on the maximum amount of parking is 7,066.7 m<sup>2</sup>, for the type of area of 2,254 m<sup>2</sup> motorcycle with a number of 1,503 vehicles, passenger cars area of 2,005 m<sup>2</sup> with 174 number of vehicles, car goods transportation measuring 2,807 m<sup>2</sup> with 244 number of vehicles.

Determination of the location off street parking PasarTanjung located on the 3<sup>rd</sup> floor of the building area of 11,400 m<sup>2</sup>, the number of 344 vehicles for the types of motorcycles, 174 vehicles for passenger cars, 244 car type vehicle for the transport of goods and the determination The next location is at existing garden parking location 1,379 the number of



vehicles parked on a land area of 840 m<sup>2</sup>, in 3 locations with as many as 780 vehicle parking land area of 1,638 m<sup>2</sup>. This area in getting from the addition of the alley.

Circulation entry for vehicles and motorcycle on the 3<sup>rd</sup> floor of the parking area are PasarTanjungon Jl. Dr. Wahidin and circulation are on the out Jl. Samanhudi. For circulation in and out of the park in the parking area (site 1) are on the Jl. Samanhudi and circulation in and out (3 locations) are on the Jl. Dr. Wahidin.

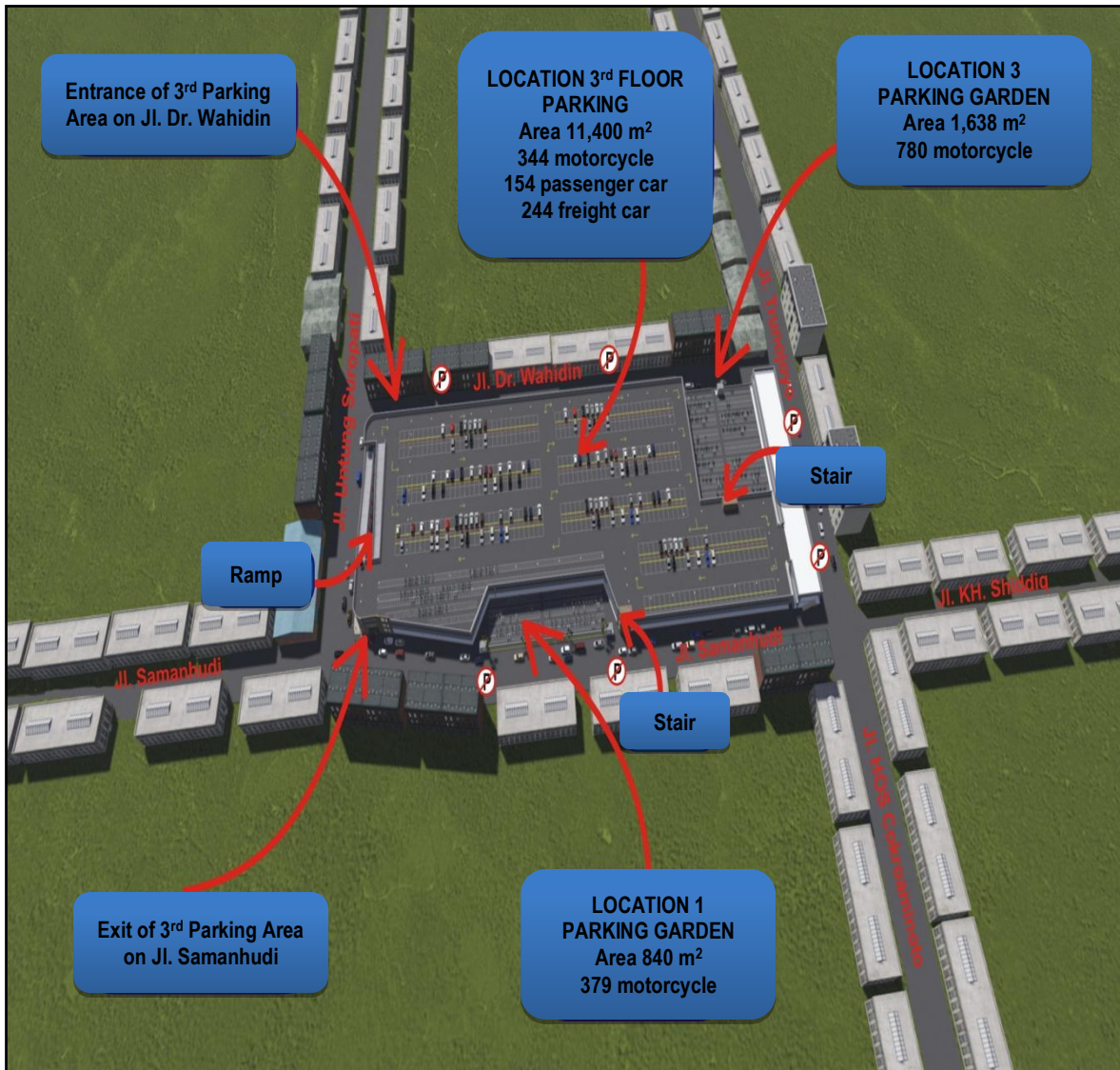


Figure 4 Results of Planning

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