Evaluate the Performance of Jalan Otista Bandung with on-Street Parking

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Abstract. Road performance is the ability of a road to serve traffic flow which can be determined by its capacity, free-flow speed, and degree of saturation. The performance problem of Jalan Otto Iskandar Dinata (Otista) Bandung, which is located in an office and trade area, occurs due to high side activity, namely on-street parking marked by congestion. Analysis conducted using the Indonesian Road Capacity Guidelines (PKJI 2014) to the traffic data collected on weekdays and weekends. This research tries to find a solution by eliminated on-street parking. The existing condition shows the volume on weekend at noon at 3242 pcu/hr, side friction is classified as very high with the proportion of on-street parking at 76%, spoot speed of 12 km/hr, the free flow speed of 36.89 km/hr, a capacity that occurs is 3324 pcu/hr, and degree of saturation is 0.98 with the level of service E. The road performance improvement scenario is carried out by setting on-street parking which gives the free flow speed value greater than the existing condition, class of side friction becomes very low, increased capacity, degree of saturation below 0.85 as determined by PKJI 2014 by improving the level of service to C.

1. Introduction

Jalan Otto Iskandar Dinata (Otista) is a primary collector road with a length of 2,473 meters and a width of 12.70 meters, which is located in the office area and the trade center area of Pasar Baru in Bandung City. This one-way three-lane road (3/1 UD) serves a fairly busy movement by parking on the road (on-street parking). High land use activity in this area affects traffic performance and results in congestion [1].

2. Approach and methodology

The performance of roads can change due to the influence of various factors [2]. One of the factors that often result in decreased road performance is the high side friction, especially on-street parking. Measurement of road performance that is carried out is calculating traffic flow (V), free-flow speed (VB), capacity (C), degree of saturation (DJ), and obtaining information on-road service levels using PKJI 2014 [3]. This study uses primary data by conducting a survey on Jalan Otista Bandung in the form of a geometric road survey, a traffic flow survey, a spot speed survey, and a side friction survey. The flow chart of the research stages is shown in Figure 1.

Parking is a condition in which a vehicle stops for a moment or for a long period of time [4]. On-street parking is parking that uses part of the road so that it is included in the criteria for side barriers that affect the value of road capacity. This condition results in reduced lanes used for vehicle traffic.
3. Results and discussion
The test is carried out by comparing the performance of existing roads with on-street parking and without on-street parking as discussed in the section below.

3.1. Road section geometry and road performances
*Jalan Otista* consists of 3 lanes with one direction of movement (3/1 UD). The existing geometry of the road section with on-street parking is shown in Figure 2.

![Geometry of Jalan Otto Iskandar Dinata](image)

**Figure 2.** Geometrics of *Jalan Otto Iskandar Dinata, Kota Bandung.*

The results of the survey conducted for weekday and weekend show that the highest traffic flow occurs on weekend at noon 3242 pcu/hr and in the afternoon 2993 pcu/hr. The weekend traffic flow at nonpeak increased by 51% compared to weekday as shown in Figure 3. This condition is caused by the increasingly crowded trading activity on weekends compared to a weekday.

The highest spot speed occurs in the morning because parking activities on-street are not yet busy. The spot speed that occurs during the weekend and weekday in the morning is around 41 km/hr. Meanwhile, the lowest spot speed occurs on weekends at nonpeak about 12 km/hr or a decrease of 64% of the free-flow speed of the roads. This condition indicates that the speed that occurs is far below the value of the expected free-flow speed. The spot speed diagram is shown in Figure 4. The existing free-
flow speed (VB) is calculated according to the 2014 PKJI with the value of the basic free-flow speed of all vehicles (VBD) of 57 km/hour, the speed adjustment factor for the 3-meter road width per lane (VBL) is -4, the speed adjustment factor for roadside width (FVBHS) of 0.73 and the speed adjustment factor for city size (FVBUK) of 1, resulting in a free flow speed value of the road segment of 38.69 km/hr.

![Figure 3. Traffic flow diagram](image1)

![Figure 4. Spot speed diagram](image2)

The weighted frequency of the side friction multiplied by the multiplier factor of each type of side friction that occurs on Jalan Otista is shown in Table 1. The frequency of the biggest side friction occurred on weekend is 1046 disturbances per hour which were included in the side friction class was very high. This condition indicates that the area is in a commercial area and exists high roadside activity. Side friction with on-street parking is the largest proportion compared to other side friction is in the range of over 76%.

**Table 1. Side Friction Calculation**

| Day       | Time   | Pedestrian | Slow Vehicle | Parking Vehicle | Vehicle in and out | Total     | Information |
|-----------|--------|------------|--------------|-----------------|-------------------|-----------|-------------|
|           |        | hourly interruptions |               |                 |                   |           |             |
| Weekday   | Morning| 48         | 37           | 145             | 21                | 250       | Low         |
|           | Noon   | 76         | 9            | 695             | 94                | 873       | High        |
|           | Afternoon | 85       | 9            | 848             | 73                | 1.016     | Very High   |
|           | Average | 70         | 18           | 563             | 63                | 713       |             |
|           | Morning | 65         | 57           | 161             | 28                | 311       | Medium      |
| Weekend   | Noon   | 93         | 19           | 773             | 105               | 991       | Very High   |
|           | Afternoon | 84     | 15           | 845             | 102               | 1.046     | Very High   |
Road capacity is the ability of a road segment to accommodate the ideal flow or volume of traffic in a certain time unit, expressed in terms of the number of vehicles passing certain road sections in one hour. The total capacity is calculated by multiplying the base capacity value (C0) by adjustment factors such as lane width adjustment factor (FCLJ), direction separation adjustment factor (FCPA), side friction adjustment factor (FCHS), and city size adjustment factor (FCUK) [1]. The results of the capacity calculation are presented in Table 2.

The comparison of traffic flow to the road capacity based on the 2014 PKJI requirements shows whether the road is performing well or not [5]. The highest degree of saturation occurs on weekends about 0.98 or greater than the required degree of saturation 0.85. The characteristics of the movement that occur are unstable flow, speed sometimes stops [6], the volume is approaching capacity and congestion occurs with service level E.

### Table 2. The existing road performance with on-street parking

| Day    | Time  | VB (veh/hr) | C0 (pcu/hr) | FCLJ | FCPA | FCHS | FCUK | C (pcu/hr) | Q (pcu/hr) | DS    | LOS |
|--------|-------|-------------|-------------|------|------|------|------|-----------|-----------|-------|------|
| Morning| Noon  | 38,69       | 4950        | 0,92 | 1    | 0,96 | 1    | 4190      | 1296      | 0,31  | B    |
|        | Noon  | 38,69       | 4950        | 0,92 | 1    | 0,82 | 1    | 3734      | 2147      | 0,57  | C    |
|        | Noon  | 38,69       | 4950        | 0,92 | 1    | 0,73 | 1    | 3324      | 2585      | 0,78  | D    |
|        | Noon  | 38,69       | 4950        | 0,92 | 1    | 0,91 | 1    | 4053      | 1901      | 0,47  | C    |
|        | Noon  | 38,69       | 4950        | 0,92 | 1    | 0,73 | 1    | 3324      | 3242      | 0,98  | E    |
|        | Noon  | 38,69       | 4950        | 0,92 | 1    | 0,73 | 1    | 3324      | 2993      | 0,90  | E    |

The scenario offered is to eliminate the side friction of on-street parking. This scenario can be a recommendation in determining the policy for providing parking buildings in this trading area [7]. This scenario provides a change in the weighted frequency due to on-street parking, the side friction class becomes very low, the road base capacity is larger, the capacity adjustment factor due to side friction, increased road capacity, the degree of saturation is below 0.85 with the level of service B and C [8]. The results obtained shown in Table 3.

### Table 3. Traffic performance scenario without on-street parking

| Day    | Time  | VB (veh/hr) | Side Friction Frekuensi | Information | C0 (pcu/hr) | FCw | FCsp | FCSf | FCcs | C (pcu/hr) | Q (pcu/hr) | DS    | LOS |
|--------|-------|-------------|-------------------------|-------------|-------------|-----|------|------|------|-----------|-----------|-------|------|
| Morning| Noon  | 53,53       | 24                      | Very Low    | 6600        | 0,92 | 1    | 0,94 | 1    | 5708      | 1296      | 0,23  | B    |
|        | Noon  | 53,53       | 38                      | Very Low    | 6600        | 0,92 | 1    | 0,94 | 1    | 5708      | 2147      | 0,38  | B    |
|        | Noon  | 53,53       | 43                      | Very Low    | 6600        | 0,92 | 1    | 0,94 | 1    | 5708      | 2585      | 0,45  | C    |
|        | Noon  | 53,53       | 32                      | Very Low    | 6600        | 0,92 | 1    | 0,94 | 1    | 5708      | 1901      | 0,33  | B    |
|        | Noon  | 53,53       | 47                      | Very Low    | 6600        | 0,92 | 1    | 0,94 | 1    | 5708      | 3242      | 0,57  | C    |

4. Conclusions

The existing performance road conditions with on-street parking resulted in an average reduction in the capacity of 76%, a 45% higher average degree of saturation, and a 38% lower free-flow speed. The level of road service is 2 levels lower than the performance of roads without on-street parking. Based on these
conditions, the scenario to eliminate on-street parking can be an option in overcoming the problems of Jalan Otista Bandung.

References

[1] Fadriani, H., & Syah, A. I. (2019). PENGARUH PEDAGANG KAKI LIMA DI BADAN JALAN TERHADAP KECEPATAN DAN KAPASITAS JALAN. Jurnal Online Sekolah Tinggi Teknologi Mandala, 14(1), 1-7.

[2] Rachman, A. P., Rompis, S. Y., & Timboeleng, J. A. (2020). ANALISIS PENGARUH TATA GUNA LAHAN TERHADAP KINERJA JALAN DI KOTA GORONTALO. JURNAL ILMIAH MEDIA ENGINEERING, 10(1).

[3] Departemen Pekerjaan Umum Dirjen Bina Marga, (2014). Pedoman Kapasitas Jalan Indonesia. Jakarta. Departemen Pekerjaan Umum.

[4] Yulmida, D. A., Mudjanarko, S. W., Setiawan, M. I., & Limantara, A. D. (2017). Analisis Kinerja Parkir Sepanjang Jalan Walikota Mustajab. U KaRsT, vol. Volume1, no. nomor1, 39-46.

[5] Fadriani, H., & Ekawati, P. (2016). ANALISA TUNDAAN PADA SIMPANG BERSINYAL JL. SOEKARNO HATTA–IBRAHIM ADJIE BANDUNG. Jurnal Online Sekolah Tinggi Teknologi Mandala, 11(1), 45-56.

[6] Ramady, G. D., & Wowiling, R. G. (2017). Analisis prediksi laju kendaraan menggunakan metode linear regresion sebagai indikator tingkat kemacetan. Jurnal Online Sekolah Tinggi Teknologi Mandala, 12(2), 22-28.

[7] Mahardika, A. G., Fadriani, H., Afiyah, S., & Ramady, G. D. (2019, December). Analysis of Time Acceleration Costs in Level Building Using Critical Path Method. In Journal of Physics: Conference Series (Vol. 1424, No. 1, p. 012025). IOP Publishing.

[8] Fadriani, H. (2018). Pengaruh Gerakan Putar Balik Arah Kendaraan Terhadap Derajat Kejenuhan Ruas Jalan Arteri. Jurnal Online Sekolah Tinggi Teknologi Mandala, 13(2), 51-59.