CERUCUK
Volume 7 No. 7 2023 (341-351)

ANALYSIS OF THE EFFECT OF PARKING ON THE STREET AGENCY ON THE PERFORMANCE OF THE BANJARMASIN VETERAN ROAD

Ahmad Naufal Adriannoor, Prof. Dr. Iphan Fitrian Radam, ST, MT
Civil Engineering Study Program, Faculty of Engineering, Lambung Mangkurat University
Jl. A. Yani Km. 35.8 South Kalimantan, Indonesia
Tel. (0511) 47738568-4781730 Fax.(0511) 4781730
*E-mail:*hybridevo@gmail.com

ABSTRACT

Roads are traffic flows of various movements that are not in the same direction, both movements made by people with vehicles and without vehicles (pedestrians). Roads have a very important role in ensuring the smooth flow of traffic.Based on the previous explanation, this study aims to determine the effect of on-street parking on the performance of Jalan Veteran, Banjarmasin City. The method used in this study uses field research, namely the observation method in the form of direct observation and recording in the field which is carried out on Jalan Veteran, Banjarmasin City. The data collected in the study are geometric data, traffic volume and travel time,The data is input for calculating road segment performance using conventional methods, namely the Greenshield model, Greenberg model, and Underwood model. The results of the analysis will show whether there is an effect of on-street parking on the performance of Jalan Veteran.

***Keywords**:* Road segment performance, On-street parking, Traffic characteristics model.

1. INTRODUCTION

One of the locations that need to be considered in traffic is the road. Roads are traffic flows of various movements that are not in the same direction, both movements made by people with vehicles and without vehicles (pedestrians). Roads have a very important role in ensuring the smooth flow of traffic. The decline in road performance will cause losses to road users due to a decrease in speed, increased delays, and vehicle queues which can result in increased operating costs of a vehicle.

The road section analyzed in this research is Jalan Veteran, Banjarmasin City. This road section has several street lights warning caution and Jalan Veteran is a road located in an area of business (urban), education, and health facilities. Activities beside the road such as transporting goods, crossing people irregularly, parking carelessly on the shoulder of the road, plus there are several fork in the road add to the cause of congestion so that it can increase travel time. In addition, the development of shopping centers is also one

of the causes of congestion, as well as a discourse from the Banjarmasin Provincial Government to widen the Veterans road.

2. THEORITICAL STUDY

2.1 Parking Placement Theory

a. On-street parkingis a parking facility that uses the edge of the road which is usually found in shopping areas, schools, or public facilities that do not have adequate parking spaces. The on-street parking has effectively reduced the road surface. Vehicles parked on the side of the road are the main factor in 50% of accidents that occur in the middle of the road in the shopping area. This is mainly due to reduced freedom of view, vehicles stop and/or exit the parking lot in front of passing vehicles suddenly (Ditjenhub, 1998). On-street parking can be seen in Figure 2.1.

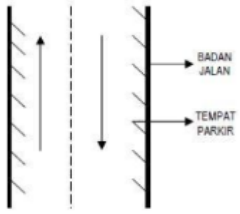


Figure 2.1 On-street parking (Miro, 1997)

b. Off-street parkingis parking for vehicles that are not located on the road or directly on the road, but are outside the specially made road body as shown in Figure 2.2.

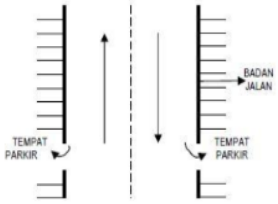


Figure 2.1 Off-street parking (Miro, 1997)

2.2 Speed – Volume and Density Relationship Model of Traffic Flow

a. Greenshield Modelis the earliest recorded model in an attempt to observe the characteristics of traffic flow on a highway. Greenshield found that the relationship between speed and density is linear. This linear relationship of speed and density has become a popular relationship in the review of traffic flow movements,

considering that the relationship function is the simplest so that it is easy to apply. This model can be written as follows:

S = Sf – (Sf/Dj) D

Where:

S = Average speed (km/h)

sf = Speed in free flow (km/h)

D = Average density (pcu/km)

dj = Density at traffic jam (pcu/km)

b. Greenberg modelAssuming that traffic flow is similar to fluid flow, the relationship between velocity and density is in the form of a logarithmic curve. Greenberg's model can be described as follows (McShane & Roes, 1990):

$$S = Sc.ln\frac{Dj}{D}$$

Where :

Sc = speed at maximum volume (km/h)

Dj = density when jammed (pcu/hour)

c. Underwood Modelput forward the hypothesis that the relationship between velocity and density is an exponential function with the following equation form (McShane & Roes, 1990):

$$S = Sf.exp.\frac{-D}{Dc}$$

Where :

Sf = speed in free flow conditions (km/hour)

Dj = density at maximum volume (pcu/hour)

2.3 Statistic analysis

a. Regression analysis, modeling the relationship between traffic flow characteristics variables used regression analysis techniques (Sudjana, 1983).

With the basic formula: Y = a + b. X

$$a = \frac{\sum X_i^2.\sum y_i - \sum X_i.\sum xy}{n\sum X_i^2 - (\sum X_i)^2}$$

$$b = \frac{n\sum(x_i.y_i) - \sum x_i.y_i}{n\sum X_i^2 - (\sum X_i)^2}$$

b. Correlation analysis, to study the degree of relationship between the independent variable and the dependent variable. The degree of this relationship is expressed by the "correlation coefficient" symbolized by "r" and calculated by the formula (2.11) (Sudjana, 1983).

$$r = \frac{n\sum(x_i.y_i) - \sum x_i.y_i}{\sqrt{(n\sum X_i^2.(\sum X_i)^2\,(n\sum y_i^2 - (\sum y_i)^2)}}$$

3. METHOD

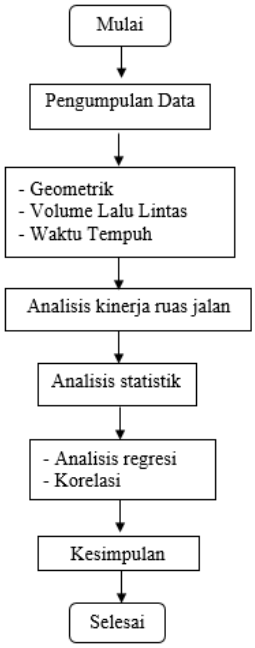


Figure 3. 1Flow chart

4. RESULTS AND DISCUSSION

4.1 Data Description

The results of observations made on the Veterans Road in Banjarmasin City are as follows:

Table 4.1 Field Observation Results

	Road Inventory Data	Information
1)	Observation location	Jln. Veteran
2)	road type	one segment 2 lanes divided direction (2/2)D
3)	Road Width For Research	6 m
4)	Drainage Condition(Ka/Ki)	Permanently Closed Drainage
5)	Parking Type	Parallel and Angle 0
6)	Usage For Parking	Left Street (each direction)
7)	Effective road width	6m

4.2 Veterans Road Traffic Characteristics

The research was conducted on the Veterans Highway of Banjarmasin City from 06.00 WITA to 21.00 WITA on Monday 15 March 2021 and Tuesday 16 March 2021.The observed traffic is vehicle traffic with the classification of motorcycles, private cars, pick-ups, trucks, city transportation, buses, bicycles and pedestrians, bajaj/three-wheeled vehicles with obstacles and without obstacles.The results of the calculation of traffic volume and density (without obstacles) and (no obstacles) can be seen in Table 4.1 and Table 4.2 below:

Table 4. 1 Result of Calculation of Traffic Volume and Density per hour (without Obstacles)

No.	WAKTU	Volume (smp/10 menit)	Kecepatan (km/jam)	*Rate of Flow* (smp/jam)	Kepadatan (smp/km)
1	06:00-07:00	490,14	26,87	1960,54	18,24
2	06:10-07:10	532,63	25,81	2130,54	20,63
3	06:30-07:30	562,13	26,18	2248,54	21,47
4	06:40-07:40	565,63	25,91	2262,54	21,83
5	07:00-08:00	640,63	25,45	2562,52	25,17
6	07:10-08:10	752,62	25,18	3010,49	29,89
7	07:30-08:30	896,77	23,41	3587,10	38,31
8	07:40-08:40	939,27	25,29	3757,08	37,14
9	07:50-08:50	970,94	24,25	3883,74	40,04
10	08:00-09:00	983,27	23,86	3933,08	41,21
11	08:30-09:30	1037,77	24,31	4151,08	42,70
12	08:40-09:40	1100,77	22,34	4403,07	49,28
13	08:50-09:50	1115,77	22,29	4463,08	50,06
14	09:00-10:00	1096,94	23,78	4387,75	46,13
15	09:10-10:10	1120,77	23,43	4483,08	47,84
16	09:30-10:30	1096,94	22,92	4387,75	47,87
17	09:40-10:40	1083,27	23,64	4333,09	45,83
18	09:50-10:50	1083,93	23,58	4335,74	45,96
19	10:00-11:00	1098,44	22,94	4393,74	47,88
20	10:10-11:10	1102,77	22,79	4411,08	48,38
21	10:20-11:20	1086,44	23,48	4345,75	46,26
22	10:30-11:30	1060,77	23,62	4243,09	44,90
23	10:50-11:50	1074,77	23,41	4299,09	45,92
24	11:00-12:00	1075,60	23,81	4302,41	45,18
25	11:10-12:10	1110,77	22,41	4443,08	49,57
26	11:20-12:20	1139,93	21,84	4559,73	52,20
27	11:30-12:30	1131,10	21,56	4524,40	52,47
28	11:40-12:40	1133,93	22,78	4535,73	49,77
29	11:50-12:50	1139,27	22,80	4557,07	49,96
30	13:00-14:00	1034,11	22,85	4136,43	45,25
31	13:10-14:10	1052,44	23,35	4209,78	45,08
32	13:20-14:20	1083,28	23,01	4333,10	47,09
33	13:30-14:30	1090,94	23,82	4363,77	45,80
34	13:40-14:40	1122,77	24,09	4491,09	46,62
35	14:00-15:00	1058,94	23,39	4235,75	45,27
36	14:10-15:10	1051,11	23,45	4204,43	44,82
37	14:20-15:20	1029,94	23,29	4119,77	44,23
38	14:30-15:30	1056,94	23,64	4227,77	44,72
39	15:20-16:20	1030,61	23,24	4122,43	44,35
40	15:30-16:30	1038,94	23,30	4155,76	44,58
41	15:40-16:40	998,94	23,95	3995,78	41,71
42	15:50-16:50	972,78	23,95	3891,11	40,61
43	16:00-17:00	939,44	23,57	3757,78	39,86
44	16:10-17:10	1018,11	24,06	4072,43	42,31
45	16:20-17:20	1072,44	23,79	4289,75	45,07
46	16:40-17:40	1213,43	22,93	4853,71	52,92
47	16:50-17:50	1273,42	22,81	5093,70	55,82
48	17:00-18:00	1268,92	22,39	5075,69	56,68
49	17:10-18:10	1296,92	20,63	5187,67	62,87
50	17:20-18:20	1267,42	19,78	5069,68	64,06
51	17:30-18:30	1253,92	21,53	5015,68	58,23
52	17:40-18:40	1239,09	20,93	4956,35	59,20
53	18:00-19:00	1199,09	20,92	4796,37	57,33

Table 4. 2 Results of Calculation of Traffic Volume and Density per hour (There are Obstacles)

No.	*WAKTU*	*Volume (smp/10 menit)*	*Kecepatan (km/jam)*	*Rate of Flow (smp/jam)*	*Kepadatan (smp/km)*
1	06:50-07:50	639,46	20,93	2557,83	30,55
2	07:00-08:00	723,45	22,14	2893,80	32,67
3	07:10-08:10	869,94	22,15	3479,75	39,27
4	07:20-08:20	943,43	22,81	3773,73	41,35
5	07:30-08:30	1016,59	20,65	4066,38	49,24
6	07:40-08:40	981,76	19,45	3927,05	50,49
7	07:50-08:50	1026,43	18,77	4105,70	54,69
8	08:00-09:00	1000,60	18,33	4002,39	54,58
9	08:10-09:10	1040,10	17,83	4160,39	58,33
10	08:30-09:30	1075,93	18,39	4303,72	58,50
11	08:40-09:40	1155,76	18,51	4623,04	62,45
12	08:50-09:50	1181,93	17,76	4727,71	66,55
13	09:00-10:00	1177,76	17,33	4711,05	67,95
14	09:10-10:10	1153,26	16,58	4613,05	69,55
15	09:30-10:30	1109,10	18,81	4436,40	58,96
16	09:40-10:40	1077,77	19,31	4311,06	55,82
17	09:50-10:50	1023,10	20,47	4092,40	49,98
18	10:00-11:00	1003,43	19,90	4013,73	50,43
19	10:10-11:10	1004,93	19,67	4019,73	51,09
20	10:20-11:20	1050,26	16,86	4201,05	62,31
21	10:30-11:30	1083,60	16,83	4334,38	64,39
22	10:40-11:40	1060,76	16,93	4243,06	62,64
23	10:50-11:50	1052,77	18,44	4211,07	57,10
24	11:00-12:00	1038,60	19,42	4154,42	53,47
25	11:10-12:10	1039,44	19,71	4157,75	52,74
26	11:20-12:20	1041,61	20,05	4166,42	51,95
27	11:30-12:30	1056,27	18,85	4225,09	56,02
28	11:40-12:40	1101,27	18,47	4405,09	59,62
29	11:50-12:50	1153,77	18,09	4615,08	63,79
30	12:00-13:00	1120,61	17,50	4482,43	64,02
31	12:10-13:10	1125,78	17,02	4503,10	66,15
32	12:20-13:20	1184,27	16,62	4737,09	71,26
33	12:40-13:40	1182,27	15,57	4729,09	75,93
34	12:50-13:50	1114,94	14,81	4459,77	75,30
35	13:00-14:00	1092,78	16,22	4371,10	67,36
36	13:10-14:10	1063,78	16,40	4255,10	64,87
37	13:20-14:20	1033,28	17,01	4133,11	60,74
38	13:30-14:30	1021,28	18,04	4085,11	56,63
39	13:40-14:40	1044,94	19,36	4179,77	53,97
40	13:50-14:50	1076,44	19,39	4305,77	55,51
41	14:00-15:00	1110,61	18,10	4442,43	61,37
42	14:10-15:10	1102,11	19,50	4408,43	56,52
43	14:20-15:20	1104,44	19,09	4417,76	57,84
44	14:30-15:30	1084,94	19,38	4339,77	55,99
45	14:40-15:40	1080,61	19,44	4322,43	55,59
46	14:50-15:50	1044,78	20,52	4179,10	50,90
47	15:00-16:00	1040,78	17,38	4163,10	59,89
48	15:10-16:10	1045,11	17,20	4180,43	60,76
49	15:20-16:20	1154,94	19,20	4619,75	60,15
50	15:30-16:30	1138,61	19,36	4554,42	58,82
51	15:40-16:40	1182,27	19,30	4729,08	61,26
52	15:50-16:50	1157,94	21,33	4631,76	54,28
53	16:00-17:00	1169,44	21,22	4677,77	55,12
54	16:10-17:10	1140,44	18,92	4561,78	60,28
55	16:20-17:20	1213,78	18,40	4855,10	65,95
56	16:30-17:30	1198,11	18,43	4792,44	65,00
57	16:40-17:40	1248,44	17,73	4993,75	70,40
58	16:50-17:50	1261,43	16,26	5045,73	77,59
59	17:00-18:00	1327,59	13,59	5310,37	97,66
60	17:10-18:10	1339,75	13,83	5359,01	96,85
61	17:20-18:20	1377,42	13,29	5509,67	103,67
62	17:30-18:30	1353,75	12,10	5415,00	111,84
63	17:40-18:40	1341,75	13,17	5367,01	101,88
64	17:50-18:50	1208,59	15,08	4834,38	80,14
65	18:00-19:00	1188,94	15,13	4755,75	78,60
66	18:10-19:10	1152,78	15,71	4611,10	73,38
67	18:20-19:20	1175,78	17,31	4703,10	67,93
68	18:30-19:30	1204,61	17,58	4818,43	68,54
69	18:40-19:40	1247,10	17,34	4988,41	71,92
70	18:50-19:50	1176,60	15,78	4706,41	74,54
71	19:00-20:00	1161,93	14,84	4647,74	78,32
72	19:10-20:10	1136,27	14,27	4545,07	79,61
73	19:20-20:20	1060,10	15,18	4240,42	69,83
74	19:30-20:30	1024,27	15,42	4097,09	66,42
75	19:40-20:40	1052,44	17,06	4209,76	61,70
76	19:50-20:50	1039,61	18,77	4158,43	55,40
77	20:00-21:00	1012,44	19,36	4049,77	52,29
78	20:10-21:10	1013,94	18,53	4055,77	54,72
79	20:20-21:20	967,61	17,69	3870,44	54,71
80	20:30-21:30	914,95	17,14	3659,78	53,37
81	20:40-21:40	867,28	17,82	3469,13	48,67

4.3 Calculation of the Veterans Path Without Barriers

4.3.1 The Unhindered Greenshields Method

Table 4. 3.Linear Regression Data for Greendshield(No Barrier) Method

No.	WAKTU	volume (F)	kecepatan y = (S)	kepadatan x = (D) = (F) / (S)	1 y-y	2 x-x	1x2	(y-y)2	(x-x)2	x.y	y.y	x.x
1	06:00-07:00	490,14	26,87	18,244	3	-26,60	-92,97	12	707	460,136	721,749	332,849
2	06:10-07:10	532,63	25,81	20,634	2	-24,21	-59,15	6	586	532,634	666,321	425,769
3	06:30-07:30	562,13	26,18	21,471	3	-23,37	-65,71	8	546	562,135	685,464	460,995
4	06:40-07:40	565,63	25,91	21,828	3	-23,01	-59,53	6	530	565,635	671,485	476,470
5	07:00-08:00	640,63	25,45	25,175	2	-19,67	-40,85	4	387	640,630	647,554	633,779
6	07:10-08:10	752,62	25,18	29,888	2	-14,95	-27,09	3	224	752,622	634,111	893,282
7	07:30-08:30	896,77	23,41	38,307	0	-6,53	-0,26	0	43	896,775	548,038	1467,424
8	07:40-08:40	939,27	25,29	37,142	2	-7,70	-14,77	4	59	939,271	639,514	1379,531
9	07:50-08:50	970,94	24,25	40,041	1	-4,80	-4,22	1	23	970,935	588,002	1603,251
10	08:00-09:00	983,27	23,86	41,211	0	-3,63	-1,78	0	13	983,269	569,265	1698,364
11	08:30-09:30	1037,77	24,31	42,697	1	-2,14	-2,01	1	5	1037,769	590,750	1823,046
12	08:40-09:40	1100,77	22,34	49,278	-1	-4,44	-4,58	1	20	1100,768	498,976	2438,352
13	08:50-09:50	1115,77	22,29	50,059	-1	-5,22	-5,64	1	27	1115,771	496,808	2505,885
14	09:00-10:00	1096,94	23,78	46,125	0	1,29	0,53	0	2	1096,938	565,468	2127,922
15	09:10-10:10	1120,77	23,43	47,841	0	3,00	0,17	0	9	1120,770	548,822	2288,769
16	09:30-10:30	1096,94	22,92	47,868	0	3,03	-1,37	0	9	1096,939	525,135	2291,363
17	09:40-10:40	1083,27	23,64	45,833	0	0,99	0,26	0	1	1083,272	558,630	2100,634
18	09:50-10:50	1083,93	23,58	45,961	0	1,12	0,24	0	1	1083,935	556,202	2112,389
19	10:00-11:00	1088,44	22,94	47,488	0	3,04	-1,30	0	9	1088,436	526,319	2292,453
20	10:10-11:10	1102,77	22,79	48,384	-1	3,54	-2,05	0	13	1102,770	519,468	2341,052
21	10:20-11:20	1086,44	23,48	46,263	0	1,42	0,16	0	2	1086,437	551,485	2140,304
22	10:30-11:30	1060,77	23,62	44,904	0	0,06	0,02	0	0	1060,772	558,047	2018,386
23	10:50-11:50	1074,77	23,41	45,916	0	1,07	0,04	0	1	1074,771	547,902	2108,287
24	11:00-12:00	1075,60	23,81	45,178	0	0,34	0,15	0	0	1075,604	566,838	2041,011
25	11:10-12:10	1110,77	22,41	49,566	-1	4,72	-4,53	1	22	1110,769	502,209	2456,761
26	11:20-12:20	1139,93	21,84	52,197	-2	7,36	-11,26	2	54	1139,933	476,935	2724,578
27	11:30-12:30	1131,10	21,56	52,468	-2	7,63	-13,82	3	58	1131,100	464,747	2752,868
28	11:40-12:40	1133,93	22,78	49,772	-1	4,93	-2,89	0	24	1133,933	519,048	2477,235
29	11:50-12:50	1139,27	22,80	49,963	-1	5,12	-2,91	0	26	1139,268	519,948	2496,274
30	13:00-14:00	1034,11	22,85	45,253	-1	0,41	-0,21	0	0	1034,108	522,197	2047,845
31	13:10-14:10	1052,44	23,35	45,082	0	0,24	-0,01	0	0	1052,444	544,995	2032,384
32	13:20-14:20	1083,28	23,01	47,086	0	2,25	-0,82	0	5	1083,276	529,281	2217,132
33	13:30-14:30	1090,94	23,82	45,804	0	0,96	0,43	0	1	1090,942	567,288	2097,973
34	13:40-14:40	1122,77	24,09	46,617	1	1,78	1,27	1	3	1122,774	580,096	2173,123
35	14:00-15:00	1058,94	23,39	45,272	0	0,43	0,01	0	0	1058,938	547,110	2049,589
36	14:10-15:10	1051,11	23,45	44,821983933	0	0,02	0,00	0	0	1051,107	549,936	2009,010
37	14:20-15:20	1029,94	23,29	44,227193575	0	-0,61	0,05	0	0	1029,941	542,308	1956,045
38	14:30-15:30	1056,94	23,64	44,715	0	-0,13	-0,03	0	0	1056,943	558,716	1999,457
39	15:20-16:20	1030,61	23,24	44,355	0	-0,49	0,07	0	0	1030,608	539,893	1967,342
40	15:30-16:30	1038,94	23,30	44,583	0	-0,26	0,02	0	0	1038,941	543,050	1987,659
41	15:40-16:40	998,94	23,95	41,706	1	-3,14	-1,83	0	10	998,944	573,713	1739,354
42	15:50-16:50	972,78	23,95	40,613	1	-4,23	-2,46	0	18	972,778	573,713	1649,425
43	16:00-17:00	939,44	23,57	39,861	0	-4,98	-0,99	0	25	939,445	555,446	1588,916
44	16:10-17:10	1018,11	24,06	42,310	1	-2,53	-1,76	0	6	1018,106	579,036	1790,114
45	16:20-17:20	1072,44	23,79	45,071	0	0,23	0,10	0	0	1072,437	566,184	2031,354
46	16:40-17:40	1213,43	22,93	52,916	0	8,07	-3,54	0	65	1213,429	525,845	2800,083
47	16:50-17:50	1273,42	22,81	55,818	-1	10,98	-6,10	0	121	1273,424	520,464	3115,700
48	17:00-18:00	1268,92	22,39	56,678	-1	11,84	-11,62	1	140	1268,923	501,231	3212,417
49	17:10-18:10	1296,92	20,63	62,869	-3	18,03	-49,41	8	325	1296,919	425,552	3952,506
50	17:20-18:20	1267,42	19,78	64,062	-4	19,22	-68,91	13	369	1267,419	391,420	4103,910
51	17:30-18:30	1253,92	21,53	58,229	-2	13,39	-24,57	3	179	1253,920	463,730	3390,579
52	17:40-18:40	1239,09	20,93	59,202	-2	14,36	-35,04	6	206	1239,088	438,056	3504,881
53	18:00-19:00	1199,09	20,92	57,332	-2	12,49	-30,66	6	156	1199,093	437,439	3286,917
		jumlah	1239	2376,580	0,000	0,000	-652,152	96,241	5032,421	54887,839	29041,938	111680,996
		rata-rata	23,3698	44,8411								

4.3.2 Calculation Greenberg No Barriers

Table 4. 4 Linear Regression Data for Greenberg's Method

No.	WAKTU	volume (F)	kecepatan y = (S)	kepadatan x = (D) = (F) / (S)	1 ln(x)	2 y-y	3 ln(x)-x	2x3	(y-y)2	3x3 (ln(x)-x)2	ln(x).y	1x1 (ln(x))2
1	06:00-07:00	490,1	26,9	18,24	2,90	3	-0,87	-3,04	12	1	78,013	8,432
2	06:10-07:10	532,6	25,8	20,63	3,03	2	-0,75	-1,82	6	1	78,135	9,162
3	06:30-07:30	562,1	26,2	21,47	3,07	3	-0,71	-1,98	8	0	80,290	9,405
4	06:40-07:40	565,6	25,9	21,83	3,08	3	-0,69	-1,75	6	0	79,895	9,506
5	07:00-08:00	640,6	25,4	25,17	3,23	2	-0,55	-1,14	4	0	82,088	10,406
6	07:10-08:10	752,6	25,2	29,89	3,40	2	-0,38	-0,68	3	0	85,553	11,543
7	07:30-08:30	896,8	23,4	38,31	3,65	0	-0,13	-0,01	0	0	85,345	13,291
8	07:40-08:40	939,3	25,3	37,14	3,61	2	-0,16	-0,30	4	0	91,412	13,066
9	07:50-08:50	970,9	24,2	40,04	3,69	1	-0,08	-0,07	1	0	89,475	13,615
10	08:00-09:00	983,3	23,9	41,21	3,72	0	-0,05	-0,03	0	0	88,726	13,829
11	08:30-09:30	1037,8	24,3	42,70	3,75	1	-0,02	-0,02	1	0	91,245	14,094
12	08:40-09:40	1100,8	22,3	49,28	3,90	-1	0,12	-0,13	1	0	87,061	15,190
13	08:50-09:50	1115,8	22,3	50,06	3,91	-1	0,14	-0,15	1	0	87,222	15,313
14	09:00-10:00	1096,9	23,8	46,13	3,83	0	0,06	0,02	0	0	91,110	14,680
15	09:10-10:10	1120,8	23,4	47,84	3,87	0	0,10	0,01	0	0	90,613	14,961
16	09:30-10:30	1096,9	22,9	47,87	3,87	0	0,10	-0,04	0	0	88,649	14,965
17	09:40-10:40	1083,3	23,6	45,83	3,82	0	0,05	0,01	0	0	90,405	14,631
18	09:50-10:50	1083,9	23,6	45,96	3,83	0	0,06	0,01	0	0	90,274	14,652
19	10:00-11:00	1088,4	22,9	47,88	3,87	0	0,10	-0,04	0	0	88,754	14,967
20	10:10-11:10	1102,8	22,8	48,38	3,88	-1	0,11	-0,06	0	0	88,414	15,048
21	10:20-11:20	1086,4	23,5	46,26	3,83	0	0,06	0,01	0	0	90,045	14,702
22	10:30-11:30	1060,8	23,6	44,90	3,80	0	0,03	0,01	0	0	89,875	14,474
23	10:50-11:50	1074,8	23,4	45,92	3,83	0	0,05	0,00	0	0	89,575	14,645
24	11:00-12:00	1075,6	23,8	45,18	3,81	0	0,04	0,02	0	0	90,724	14,523
25	11:10-12:10	1110,8	22,4	49,57	3,90	-1	0,13	-0,13	1	0	87,473	15,236
26	11:20-12:20	1139,9	21,8	52,20	3,96	-2	0,18	-0,28	2	0	86,373	15,642
27	11:30-12:30	1131,1	21,6	52,47	3,96	-2	0,19	-0,34	3	0	85,374	15,683
28	11:40-12:40	1133,9	22,8	49,77	3,91	-1	0,13	-0,08	0	0	89,022	15,268
29	11:50-12:50	1139,3	22,8	49,96	3,91	-1	0,14	-0,08	0	0	89,186	15,298
30	13:00-14:00	1034,1	22,9	45,25	3,81	-1	0,04	-0,02	0	0	87,117	14,533
31	13:10-14:10	1052,4	23,3	45,08	3,81	0	0,04	0,00	0	0	88,909	14,505
32	13:20-14:20	1083,3	23,0	47,09	3,85	0	0,08	-0,03	0	0	88,619	14,838
33	13:30-14:30	1090,9	23,8	45,80	3,82	0	0,05	0,02	0	0	91,088	14,626
34	13:40-14:40	1122,8	24,1	46,62	3,84	1	0,07	0,05	1	0	92,534	14,761
35	14:00-15:00	1058,9	23,4	45,27	3,81	0	0,04	0,00	0	0	89,180	14,537
36	14:10-15:10	1051,1	23,5	44,82	3,80	0	0,03	0,00	0	0	89,176	14,461
37	14:20-15:20	1029,9	23,3	44,23	3,79	0	0,02	0,00	0	0	88,244	14,359
38	14:30-15:30	1056,9	23,6	44,72	3,80	0	0,03	0,01	0	0	89,829	14,442
39	15:20-16:20	1030,6	23,2	44,35	3,79	0	0,02	0,00	0	0	88,114	14,381
40	15:30-16:30	1038,9	23,3	44,58	3,80	0	0,02	0,00	0	0	88,491	14,420
41	15:40-16:40	998,9	24,0	41,71	3,73	1	-0,04	-0,02	0	0	89,357	13,918
42	15:50-16:50	972,8	24,0	40,61	3,70	1	-0,07	-0,04	0	0	88,722	13,720
43	16:00-17:00	939,4	23,6	39,86	3,69	0	-0,09	-0,02	0	0	86,857	13,582
44	16:10-17:10	1018,1	24,1	42,31	3,75	1	-0,03	-0,02	0	0	90,117	14,025
45	16:20-17:20	1072,4	23,8	45,07	3,81	0	0,04	0,02	0	0	90,615	14,503
46	16:40-17:40	1213,4	22,9	52,92	3,97	0	0,20	-0,09	0	0	91,008	15,751
47	16:50-17:50	1273,4	22,8	55,82	4,02	-1	0,25	-0,14	0	0	91,759	16,177
48	17:00-18:00	1268,9	22,4	56,68	4,04	-1	0,26	-0,26	1	0	90,390	16,301
49	17:10-18:10	1296,9	20,6	62,87	4,14	-3	0,37	-1,01	8	0	85,425	17,148
50	17:20-18:20	1267,4	19,8	64,06	4,16	-4	0,39	-1,39	13	0	82,300	17,304
51	17:30-18:30	1253,9	21,5	58,23	4,06	-2	0,29	-0,54	3	0	87,524	16,519
52	17:40-18:40	1239,1	20,9	59,20	4,08	-2	0,31	-0,75	6	0	85,414	16,654
53	18:00-19:00	1199,1	20,9	57,33	4,05	-2	0,28	-0,68	6	0	84,682	16,393
		jumlah	1239	2377	200	0	0	-17	96	4	4655,801	758,082
		rata-rata	23,370	44,841	3,773							

4.3.3 Barrierless Underwood Model

Table 4. 5 Regression Data for Underwood Model

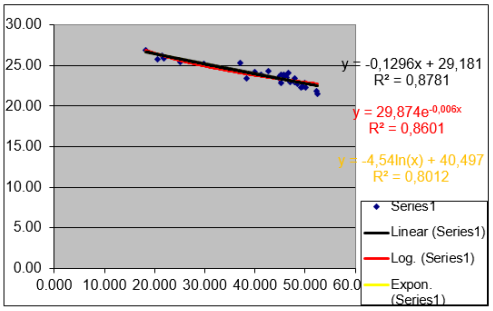
No.	Waktu	volume (F)	kecepatan y = (S)	kepadatan x = (D) = (F) / (S)	1 0,4343.x	2 0,4343x-x	3 log y	4 log y-y	2x4	1x3	1x1	2x2	4x4
1	06:00-07:00	490,1	26,9	18,24	7,923	-11,551	1	0,061	-1	11,324	62,781	133,427	0,004
2	06:10-07:10	532,6	25,8	20,63	8,961	-10,513	1	0,044	0	12,652	80,307	110,525	0,002
3	06:30-07:30	562,1	26,2	21,47	9,325	-10,150	1	0,050	-1	13,222	86,951	103,017	0,003
4	06:40-07:40	565,6	25,9	21,83	9,480	-9,995	1	0,046	0	13,400	89,870	99,891	0,002
5	07:00-08:00	640,6	25,4	25,17	10,933	-8,541	1	0,038	0	15,369	119,541	72,949	0,001
6	07:10-08:10	752,6	25,2	29,89	12,980	-6,494	1	0,033	0	18,186	168,488	42,175	0,001
7	07:30-08:30	896,8	23,4	38,31	16,637	-2,838	1	0,001	0	22,782	276,780	8,053	0,000
8	07:40-08:40	939,3	25,3	37,14	16,131	-3,344	1	0,035	0	22,630	260,202	11,180	0,001
9	07:50-08:50	970,9	24,2	40,04	17,390	-2,085	1	0,017	0	24,079	302,400	4,347	0,000
10	08:00-09:00	983,3	23,9	41,21	17,898	-1,576	1	0,010	0	24,657	320,339	2,485	0,000
11	08:30-09:30	1037,8	24,3	42,70	18,543	-0,931	1	0,018	0	25,696	343,857	0,867	0,000
12	08:40-09:40	1100,8	22,3	49,28	21,402	1,927	1	-0,019	0	28,872	458,027	3,714	0,000
13	08:50-09:50	1115,8	22,3	50,06	21,741	2,266	1	-0,020	0	29,308	472,651	5,135	0,000
14	09:00-10:00	1096,9	23,8	46,13	20,034	0,559	1	0,008	0	27,571	401,361	0,313	0,000
15	09:10-10:10	1120,8	23,4	47,84	20,777	1,303	1	0,002	0	28,459	431,699	1,697	0,000
16	09:30-10:30	1096,9	22,9	47,87	20,789	1,315	1	-0,008	0	28,276	432,189	1,728	0,000
17	09:40-10:40	1083,3	23,6	45,83	19,905	0,431	1	0,006	0	27,341	396,214	0,185	0,000
18	09:50-10:50	1083,9	23,6	45,96	19,961	0,486	1	0,005	0	27,398	398,431	0,236	0,000
19	10:00-11:00	1088,4	22,9	47,88	20,794	1,320	1	-0,007	0	28,293	432,395	1,741	0,000
20	10:10-11:10	1102,8	22,8	48,38	21,013	1,539	1	-0,010	0	28,531	441,561	2,368	0,000
21	10:20-11:20	1086,4	23,5	46,26	20,092	0,618	1	0,003	0	27,542	403,697	0,382	0,000
22	10:30-11:30	1060,8	23,6	44,90	19,502	0,027	1	0,005	0	26,783	380,324	0,001	0,000
23	10:50-11:50	1074,8	23,4	45,92	19,941	0,467	1	0,001	0	27,307	397,658	0,218	0,000
24	11:00-12:00	1075,6	23,8	45,18	19,621	0,146	1	0,009	0	27,012	384,968	0,021	0,000
25	11:10-12:10	1110,8	22,4	49,57	21,526	2,052	1	-0,017	0	29,070	463,386	4,210	0,000
26	11:20-12:20	1139,9	21,8	52,20	22,669	3,195	1	-0,029	0	30,359	513,900	10,207	0,001
27	11:30-12:30	1131,1	21,6	52,47	22,787	3,312	1	-0,034	0	30,389	519,236	10,971	0,001
28	11:40-12:40	1133,9	22,8	49,77	21,616	2,141	1	-0,010	0	29,346	467,247	4,586	0,000
29	11:50-12:50	1139,3	22,8	49,96	21,699	2,224	1	-0,010	0	29,467	470,838	4,948	0,000
30	13:00-14:00	1034,1	22,9	45,25	19,653	0,179	1	-0,009	0	26,707	386,257	0,032	0,000
31	13:10-14:10	1052,4	23,3	45,08	19,579	0,105	1	0,000	0	26,788	383,341	0,011	0,000
32	13:20-14:20	1083,3	23,0	47,09	20,450	0,975	1	-0,006	0	27,849	418,188	0,951	0,000
33	13:30-14:30	1090,9	23,8	45,80	19,893	0,418	1	0,009	0	27,390	395,712	0,175	0,000
34	13:40-14:40	1122,8	24,1	46,62	20,246	0,771	1	0,014	0	27,974	409,887	0,595	0,000
35	14:00-15:00	1058,9	23,4	45,27	19,662	0,187	1	0,001	0	26,918	386,586	0,035	0,000
36	14:10-15:10	1051,1	23,5	44,82	19,466	-0,008	1	0,002	0	26,672	378,932	0,000	0,000
37	14:20-15:20	1029,9	23,3	44,23	19,208	-0,267	1	-0,001	0	26,260	368,942	0,071	0,000
38	14:30-15:30	1056,9	23,6	44,72	19,420	-0,055	1	0,006	0	26,675	377,130	0,003	0,000
39	15:20-16:20	1030,6	23,2	44,35	19,263	-0,211	1	-0,002	0	26,317	371,073	0,045	0,000
40	15:30-16:30	1038,9	23,3	44,58	19,362	-0,112	1	-0,001	0	26,477	374,905	0,013	0,000
41	15:40-16:40	998,9	24,0	41,71	18,113	-1,362	1	0,011	0	24,984	328,071	1,854	0,000
42	15:50-16:50	972,8	24,0	40,61	17,638	-1,836	1	0,011	0	24,329	311,109	3,372	0,000
43	16:00-17:00	939,4	23,6	39,86	17,312	-2,163	1	0,004	0	23,757	299,696	4,678	0,000
44	16:10-17:10	1018,1	24,1	42,31	18,375	-1,099	1	0,013	0	25,383	337,645	1,209	0,000
45	16:20-17:20	1072,4	23,8	45,07	19,574	0,100	1	0,009	0	26,943	383,147	0,010	0,000
46	16:40-17:40	1213,4	22,9	52,92	22,981	3,507	1	-0,007	0	31,264	528,142	12,298	0,000
47	16:50-17:50	1273,4	22,8	55,82	24,242	4,767	1	-0,010	0	32,925	587,672	22,729	0,000
48	17:00-18:00	1268,9	22,4	56,68	24,615	5,141	1	-0,018	0	33,231	605,915	26,428	0,000
49	17:10-18:10	1296,9	20,6	62,87	27,304	7,829	1	-0,053	0	35,890	745,508	61,301	0,003
50	17:20-18:20	1267,4	19,8	64,06	27,822	8,348	1	-0,072	-1	36,066	774,065	69,681	0,005
51	17:30-18:30	1253,9	21,5	58,23	25,289	5,814	1	-0,035	0	33,713	639,519	33,805	0,001
52	17:40-18:40	1239,1	20,9	59,20	25,711	6,237	1	-0,047	0	33,959	661,078	38,899	0,002
53	18:00-19:00	1199,1	20,9	57,33	24,899	5,425	1	-0,047	0	32,878	619,967	29,427	0,002
		jumlah	1239	2377	1032,149	0,000	73	0,000	-5	1406,673	21049,788	949,198	0,034
		rata-rata	23,3698	44,8411	19,475		1						

4.3.4 Recapitulation of Traffic Characteristics Without Barriers

Table 4. 6 Recapitulation of Traffic Characteristics Without Barriers

Variable	Unit	Model		
		Greenshield	Greenberg	Underwood
• Maximum Volume (Qmax)	junior high school/hour	1642,707	607,399	14936.874
• Free speed (Vf)	km/hour	29,181	40,496	29,874
• Maximum speed (Vm)	km/hour	14,590	4,539	11,011
• Kepadatan maksimum (Dj)	smp/km	225,177	7493,483	500
• Koefisien determinan (r2)	-	0,878	0,801	0,860

Figure 4. 2 Graph of the relationship of the three velocity-density equations



4.4 Veteran's Path Calculation with Obstacles

4.4.1 Greenshields Method with Barriers

Table 4. 7 Linear Regression Data for Greenberg's Method (There are Barriers)

No.	Waktu	Volume (F)	Kecepatan y = (S)	Kepadatan x = (D) = (F) / -m	1	2	3	4	2x4	1x3	1x1	2x2	4x4
					0,4343.x	0,4343x-x	log y	log x-y					
1	06:50-07:50	639,5	20,9	30,55	13,267	-14,0134	1	0,0718	-1	17,523	176,0042	196,3760	0,0052
2	07:00-08:00	723,5	22,1	32,67	14,190	-13,0903	1	0,0962	-1	19,088	201,3488	171,3569	0,0092
3	07:10-08:10	869,0	22,2	39,27	17,057	-10,2230	1	0,0963	-1	22,948	290,9433	104,5101	0,0093
4	07:20-08:20	943,4	22,8	41,35	17,969	-9,3204	1	0,1091	-1	24,393	322,5504	86,8897	0,0119
5	07:30-08:30	1016,6	20,6	49,24	21,385	-5,8948	1	0,0658	0	28,119	457,3298	34,7488	0,0043
6	07:40-08:40	981,8	19,4	50,49	21,929	-5,3539	1	0,0388	0	28,259	480,7574	28,6942	0,0018
7	07:50-08:50	1026,4	18,8	54,69	23,756	-3,5303	1	0,0244	0	30,244	564,0538	12,4628	0,0006
8	08:00-09:00	1000,6	18,3	54,58	23,704	-3,5756	1	0,0142	0	29,944	561,9012	12,7851	0,0002
9	08:10-09:10	1040,1	17,8	58,35	25,332	-1,9477	1	0,0051	0	31,696	641,7292	3,7934	0,0000
10	08:30-09:30	1075,0	18,4	58,50	25,400	-1,8741	1	0,0356	0	32,120	645,4592	3,5121	0,0010
11	08:40-09:40	1155,8	18,5	62,45	27,123	-0,1570	1	0,0183	0	34,374	735,6634	0,0246	0,0003
12	08:50-09:50	1181,9	17,8	66,55	28,903	1,6229	1	0,0004	0	36,113	835,3639	2,6339	0,0000
13	09:00-10:00	1177,9	17,3	67,95	29,511	2,2305	1	-0,0102	0	36,560	870,8788	4,9753	0,0001
14	09:10-10:10	1153,3	16,6	69,55	30,207	2,9268	1	-0,0295	0	36,841	912,443	8,5649	0,0009
15	09:30-10:30	1109,1	18,8	58,96	25,608	-1,6718	1	0,0253	0	32,635	655,785	2,7949	0,0006
16	09:40-10:40	1077,8	19,3	55,82	24,243	-3,0378	1	0,0367	0	31,169	587,6881	9,2282	0,0013
17	09:50-10:50	1021,1	20,5	49,98	21,706	-5,5741	1	0,0621	0	28,459	471,1498	31,0706	0,0039
18	10:00-11:00	1003,4	19,9	50,41	21,901	-5,3789	1	0,0497	0	28,445	479,6611	28,9327	0,0025
19	10:10-11:10	1004,9	19,7	51,09	22,189	-5,0908	1	0,0446	0	28,706	492,2329	25,9464	0,0020
20	10:20-11:20	1050,3	18,9	62,31	27,060	-0,2199	1	-0,0223	0	33,196	732,2515	0,0484	0,0005
21	10:30-11:30	1085,6	16,8	64,30	27,965	0,6851	1	-0,0230	0	34,287	782,0618	0,4696	0,0005
22	10:40-11:40	1060,0	16,9	62,64	27,206	-0,0736	1	-0,0203	0	33,429	740,1821	0,0054	0,0004
23	10:50-11:50	1052,6	18,4	57,10	24,799	-2,4609	1	0,0166	0	31,388	614,997	6,1551	0,0003
24	11:00-12:00	1038,6	19,4	53,47	23,222	-4,0585	1	0,0303	0	29,917	539,2401	16,4717	0,0015
25	11:10-12:10	1039,4	19,7	52,74	22,907	-4,3738	1	0,0456	0	29,655	524,7078	19,1282	0,0021
26	11:20-12:20	1041,6	20,1	51,95	22,560	-4,7198	1	0,0531	0	29,377	508,9685	22,2765	0,0028
27	11:30-12:30	1056,1	18,9	56,02	24,332	-2,9485	1	0,0263	0	31,032	592,0278	8,6934	0,0007
28	11:40-12:40	1101,1	18,5	59,62	25,891	-1,3887	1	0,0175	0	32,792	670,3658	1,9284	0,0003
29	11:50-12:50	1153,8	18,1	63,79	27,709	0,4259	1	0,0083	0	34,836	767,6238	0,1814	0,0001
30	12:00-13:00	1120,6	17,5	64,02	27,805	0,5252	1	-0,0060	0	34,565	773,1317	0,2758	0,0000
31	12:10-13:10	1125,8	17,0	66,15	28,729	1,4489	1	-0,0181	0	35,363	825,3567	2,0994	0,0003
32	12:20-13:20	1104,3	16,6	71,26	30,950	3,6695	1	-0,0285	0	37,771	957,8942	13,4673	0,0008
33	12:40-13:40	1082,1	15,6	75,93	32,975	5,6949	1	-0,0567	0	39,317	1087,352	32,4323	0,0032
34	12:50-13:50	1114,9	14,8	75,30	32,704	5,4240	1	-0,0786	0	38,278	1069,554	29,4192	0,0062
35	13:00-14:00	1092,8	16,2	67,36	29,252	1,9723	1	-0,0389	0	35,400	855,7018	3,8900	0,0015
36	13:10-14:10	1063,8	16,4	64,87	28,173	0,8928	1	-0,0343	0	34,225	793,7088	0,7970	0,0012
37	13:20-14:20	1033,3	17,0	60,74	26,378	-0,9019	1	-0,0183	0	32,465	695,8101	0,8134	0,0003
38	13:30-14:30	1021,1	18,0	56,61	24,593	-2,6870	1	0,0071	0	30,892	604,818	7,2201	0,0000
39	13:40-14:40	1044,5	19,4	53,97	23,439	-3,8415	1	0,0370	0	30,164	549,3677	14,7570	0,0014
40	13:50-14:50	1076,4	19,4	55,51	24,108	-3,1742	1	0,0386	0	31,040	581,0559	10,0752	0,0015

No.	Waktu	Volume (F)	Kecepatan y = (S)	Kepadatan x = (D) = (F) / -m	1	2	3	4	2x4	1x3	1x1	2x2	4x4
					0,4343.x	0,4343x-x	log y	log x-y					
41	14:00-15:00	11016	18,3	61,37	26,652	-0,6294	1	-0,0099	0	35,518	710,3066	0,3948	0,0001
42	14:10-15:10	1002,1	19,5	50,52	24,545	-2,7346	1	0,0410	0	31,665	602,4811	7,4785	0,0017
43	14:20-15:20	1004,6	19,1	57,84	25,120	-2,1605	1	0,0310	0	32,178	630,9952	4,6676	0,0010
44	14:30-15:30	1004,9	19,4	50,99	24,315	-2,9648	1	0,0352	0	31,302	591,2347	8,7898	0,0013
45	14:40-15:40	1000,6	19,4	55,59	24,141	-3,1394	1	0,0398	0	31,110	582,7715	9,8569	0,0016
46	14:50-15:50	1044,8	20,5	50,90	22,107	-5,1730	1	0,0432	0	29,011	488,7222	26,7601	0,0040
47	15:00-16:00	1040,8	17,4	59,89	26,009	-1,2713	1	-0,0090	0	32,252	676,4577	1,6162	0,0001
48	15:10-16:10	1045,1	17,2	60,76	26,387	-0,8935	1	-0,0138	0	32,602	696,2508	0,7984	0,0002
49	15:20-16:20	1054,9	19,2	60,15	26,122	-1,1577	1	0,0343	0	33,524	682,3762	1,3404	0,0012
50	15:30-16:30	1130,6	19,4	58,02	25,545	-1,7354	1	0,0378	0	32,872	652,5296	3,0117	0,0014
51	15:40-16:40	1082,3	19,3	61,26	26,606	-0,6739	1	0,0365	0	34,203	707,8904	0,4541	0,0013
52	15:50-16:50	1057,9	21,3	54,28	23,576	-3,7045	1	0,0799	0	31,332	555,8082	13,7236	0,0064
53	16:00-17:00	1030,4	21,2	55,12	23,937	-3,3433	1	0,0778	0	31,757	572,9801	11,1782	0,0060
54	16:10-17:10	1048,4	18,9	60,28	26,180	-1,1004	1	0,0278	0	33,426	685,3745	1,2109	0,0008
55	16:20-17:20	1213,8	18,4	65,95	28,643	1,3625	1	0,0158	0	36,238	820,396	1,856	0,0003
56	16:30-17:30	1098,1	18,4	65,89	28,231	0,9508	1	0,0165	0	35,728	796,971	0,904	0,0003
57	16:40-17:40	1048,4	17,7	70,49	30,574	3,2941	1	-0,0003	0	38,381	934,782	10,851	0,0000
58	16:50-17:50	1261,4	16,3	77,59	33,696	6,4197	1	-0,0380	0	40,808	1135,402	41,181	0,0014
59	17:00-18:00	1227,6	13,6	97,66	42,413	15,1332	1	-0,1157	-2	48,068	1798,885	229,013	0,0134
60	17:10-18:10	1339,8	13,8	96,85	42,063	14,7825	1	-0,1081	-2	47,990	1769,261	218,523	0,0117
61	17:20-18:20	1377,4	11,3	121,67	45,024	17,7438	1	-0,1257	-2	50,560	2027,150	314,843	0,0158
62	17:30-18:30	1351,8	12,1	111,84	48,574	21,2938	1	-0,1661	-4	52,602	2359,418	453,424	0,0276
63	17:40-18:40	1341,8	11,2	101,88	44,247	16,9671	1	-0,1295	-2	49,598	1957,815	287,880	0,0168
64	17:50-18:50	1200,6	15,1	80,14	34,806	7,5244	1	-0,0706	-1	41,010	1211,354	56,617	0,0050
65	18:00-19:00	1180,9	15,1	78,66	34,138	6,8576	1	-0,0694	-1	40,273	1165,404	47,031	0,0048
66	18:10-19:10	1022,8	15,7	73,38	31,870	4,5898	1	-0,0528	0	38,121	1015,691	21,067	0,0028
67	18:20-19:20	1175,8	17,3	67,93	29,503	2,2234	1	-0,0198	0	36,532	870,453	4,943	0,0001
68	18:30-19:30	1264,6	17,6	68,54	29,765	2,4852	1	-0,0041	0	37,356	885,969	6,176	0,0000
69	18:40-19:40	1247,1	17,3	71,92	31,235	3,9554	1	-0,0103	0	38,702	975,654	15,645	0,0001
70	18:50-19:50	1176,6	15,8	74,74	32,374	5,0935	1	-0,0509	0	38,791	1048,047	25,943	0,0026
71	19:00-20:00	1161,9	14,8	78,52	34,015	6,7351	1	-0,0778	-1	39,842	1157,032	45,381	0,0060
72	19:10-20:10	1136,3	14,3	79,61	34,573	7,2926	1	-0,0945	-1	39,916	1195,287	53,186	0,0089
73	19:20-20:20	1060,1	15,2	69,83	30,329	3,0488	1	-0,0678	0	35,927	919,839	9,295	0,0046
74	19:30-20:30	1054,5	15,4	66,42	28,848	1,5676	1	-0,0410	0	34,274	832,191	2,457	0,0017
75	19:40-20:40	1052,4	17,1	61,76	26,797	-0,4827	1	-0,0172	0	33,012	718,101	0,233	0,0003
76	19:50-20:50	1039,6	18,8	55,46	24,082	-3,2188	1	0,0243	0	30,637	579,899	10,387	0,0006
77	20:00-21:00	1012,4	19,4	52,29	22,711	-4,5693	1	0,0378	0	29,227	515,778	20,879	0,0014
78	20:10-21:10	1013,9	18,5	54,72	23,765	-3,5146	1	0,0188	0	30,131	564,797	12,353	0,0004
79	20:20-21:20	967,8	17,7	54,71	23,762	-3,5186	1	-0,0015	0	29,645	564,619	12,379	0,0000
80	20:30-21:30	914,9	17,1	53,37	23,177	-4,1031	1	-0,0149	0	28,403	537,171	16,838	0,0002
81	20:40-21:40	987,3	17,8	48,07	21,137	-6,1427	1	0,0018	0	26,441	446,788	37,735	0,0000
		jumlah	1440	5888	2209,682	0	101	0	-24	2735,565	63288,520	3008,093	0,2360
		rata-rata		72,678	27,280		1						

4.4.2 Calculation Gr*eenberg* with Barriers

Table 4. 8 Linear Regression Data for Greenberg's Method with Barriers

No.	Waktu	Volume (F)	Kecepatan y = (S)	Kepadatan x = (D) = (F) / (S)	1 ln(x)	2 y-y	3 ln(x)-x	2x3	(y-y)2	3x3 (ln(x)-x)2	ln(x).y	1x1 (ln(x))2
1	06:50-07:50	639,5	20,9	30,55	3,42	3	-0,70	-2,13	9	0	71,577	11,691
2	07:00-08:00	723,5	22,1	32,67	3,49	4	-0,63	-2,69	18	0	77,200	12,156
3	07:10-08:10	869,9	22,2	39,27	3,67	4	-0,45	-1,91	18	0	81,303	13,473
4	07:20-08:20	943,4	22,8	41,35	3,72	5	-0,39	-1,95	24	0	84,917	13,854
5	07:30-08:30	1016,6	20,6	49,24	3,90	3	-0,22	-0,61	8	0	80,449	15,184
6	07:40-08:40	981,8	19,4	50,49	3,92	2	-0,19	-0,31	2	0	76,262	15,380
7	07:50-08:50	1026,4	18,8	54,69	4,00	1	-0,12	-0,10	1	0	75,109	16,013
8	08:00-09:00	1000,6	18,3	54,58	4,00	0	-0,12	-0,05	0	0	73,324	15,997
9	08:10-09:10	1040,1	17,8	58,33	4,07	0	-0,05	0,00	0	0	72,505	16,533
10	08:30-09:30	1075,9	18,4	58,50	4,07	1	-0,05	-0,02	0	0	74,839	16,557
11	08:40-09:40	1155,8	18,5	62,45	4,13	1	0,02	0,01	0	0	76,512	17,093
12	08:50-09:50	1181,9	17,8	66,55	4,20	0	0,08	-0,01	0	0	74,555	17,623
13	09:00-10:00	1177,8	17,3	67,95	4,22	-1	0,10	-0,06	0	0	73,123	17,798
14	09:10-10:10	1153,3	16,6	69,55	4,24	-1	0,13	-0,16	2	0	70,339	17,995
15	09:30-10:30	1109,1	18,8	58,96	4,08	1	-0,04	-0,04	1	0	76,686	16,621
16	09:40-10:40	1077,8	19,3	55,82	4,02	1	-0,09	-0,14	2	0	77,660	16,177
17	09:50-10:50	1023,1	20,5	49,98	3,91	3	-0,21	-0,53	7	0	80,073	15,301
18	10:00-11:00	1003,4	19,9	50,43	3,92	2	-0,20	-0,40	4	0	78,012	15,371
19	10:10-11:10	1004,9	19,7	51,09	3,93	2	-0,18	-0,33	3	0	77,378	15,472
20	10:20-11:20	1050,3	16,9	62,31	4,13	-1	0,02	-0,02	1	0	69,651	17,074
21	10:30-11:30	1083,6	16,8	64,39	4,16	-1	0,05	-0,05	1	0	70,089	17,347
22	10:40-11:40	1060,8	16,9	62,64	4,14	-1	0,02	-0,02	1	0	70,061	17,119
23	10:50-11:50	1052,8	18,4	57,10	4,04	1	-0,07	-0,04	0	0	74,574	16,361
24	11:00-12:00	1038,6	19,4	53,47	3,98	2	-0,14	-0,21	2	0	77,292	15,833
25	11:10-12:10	1039,4	19,7	52,74	3,97	2	-0,15	-0,28	3	0	78,149	15,725
26	11:20-12:20	1041,6	20,1	51,95	3,95	2	-0,17	-0,36	5	0	79,208	15,604
27	11:30-12:30	1056,3	18,9	56,02	4,03	1	-0,09	-0,09	1	0	75,901	16,207
28	11:40-12:40	1101,3	18,5	59,62	4,09	1	-0,03	-0,02	0	0	75,515	16,711
29	11:50-12:50	1153,8	18,1	63,79	4,16	0	0,04	0,01	0	0	75,158	17,270
30	12:00-13:00	1120,6	17,5	64,02	4,16	0	0,04	-0,02	0	0	72,800	17,299
31	12:10-13:10	1125,8	17,0	66,15	4,19	-1	0,08	-0,06	1	0	71,340	17,572
32	12:20-13:20	1184,3	16,6	71,26	4,27	-1	0,15	-0,19	2	0	70,900	18,202
33	12:40-13:40	1182,3	15,6	75,93	4,33	-2	0,21	-0,49	5	0	67,420	18,747
34	12:50-13:50	1114,9	14,8	75,30	4,32	-3	0,20	-0,63	9	0	63,985	18,676
35	13:00-14:00	1092,8	16,2	67,36	4,21	-2	0,09	-0,15	3	0	68,303	17,724
36	13:10-14:10	1063,8	16,4	64,87	4,17	-1	0,06	-0,08	2	0	68,422	17,409
37	13:20-14:20	1033,3	17,0	60,74	4,11	-1	-0,01	0,01	1	0	69,862	16,864
38	13:30-14:30	1021,3	18,0	56,63	4,04	0	-0,08	-0,01	0	0	72,799	16,293
39	13:40-14:40	1044,9	19,4	53,97	3,99	1	-0,13	-0,19	2	0	77,224	15,907
40	13:50-14:50	1076,4	19,4	55,51	4,02	2	-0,10	-0,15	2	0	77,894	16,132
41	14:00-15:00	1110,6	18,1	61,37	4,12	0	0,00	0,00	0	0	74,506	16,949
42	14:10-15:10	1102,1	19,5	56,52	4,03	2	-0,08	-0,13	3	0	78,675	16,278
43	14:20-15:20	1104,4	19,1	57,84	4,06	1	-0,06	-0,07	1	0	77,481	16,465
44	14:30-15:30	1084,9	19,4	55,99	4,03	2	-0,09	-0,14	2	0	78,000	16,202
45	14:40-15:40	1080,6	19,4	55,59	4,02	2	-0,10	-0,15	2	0	78,111	16,144
46	14:50-15:50	1044,8	20,5	50,90	3,93	3	-0,19	-0,49	7	0	80,661	15,444
47	15:00-16:00	1040,8	17,4	59,89	4,09	0	-0,02	0,01	0	0	71,123	16,748
48	15:10-16:10	1045,1	17,2	60,76	4,11	-1	-0,01	0,01	0	0	70,645	16,866
49	15:20-16:20	1154,9	19,2	60,15	4,10	1	-0,02	-0,03	2	0	78,665	16,784
50	15:30-16:30	1138,6	19,4	58,82	4,07	1	-0,04	-0,06	2	0	78,874	16,601
51	15:40-16:40	1182,3	19,3	61,26	4,12	1	0,00	0,00	2	0	79,416	16,935
52	15:50-16:50	1157,9	21,3	54,28	3,99	3	-0,12	-0,42	12	0	85,201	15,954
53	16:00-17:00	1169,4	21,2	55,12	4,01	3	-0,11	-0,36	11	0	85,071	16,076
54	16:10-17:10	1140,4	18,9	60,28	4,10	1	-0,02	-0,02	1	0	77,549	16,802
55	16:20-17:20	1213,8	18,4	65,95	4,19	1	0,07	0,04	0	0	77,094	17,547
56	16:30-17:30	1198,1	18,4	65,00	4,17	1	0,06	0,03	0	0	76,942	17,426
57	16:40-17:40	1248,4	17,7	70,40	4,25	0	0,14	-0,02	0	0	75,443	18,098
58	16:50-17:50	1261,4	16,3	77,59	4,35	-2	0,23	-0,38	3	0	70,747	18,935
59	17:00-18:00	1327,6	13,6	97,66	4,58	-4	0,46	-1,99	18	0	62,281	20,990
60	17:10-18:10	1339,8	13,8	96,85	4,57	-4	0,46	-1,85	16	0	63,261	20,914
61	17:20-18:20	1377,4	13,3	103,67	4,64	-5	0,52	-2,41	21	0	61,666	21,541
62	17:30-18:30	1353,8	12,1	111,84	4,72	-6	0,60	-3,47	33	0	57,095	22,251
63	17:40-18:40	1341,8	13,2	101,88	4,62	-5	0,51	-2,39	22	0	60,894	21,380
64	17:50-18:50	1208,6	15,1	80,14	4,38	-3	0,27	-0,75	8	0	66,112	19,217
65	18:00-19:00	1188,9	15,1	78,60	4,36	-3	0,25	-0,68	8	0	66,014	19,048
66	18:10-19:10	1152,8	15,7	73,38	4,30	-2	0,18	-0,39	5	0	67,482	18,453
67	18:20-19:20	1175,8	17,3	67,93	4,22	-1	0,10	-0,06	0	0	73,013	17,796
68	18:30-19:30	1204,6	17,6	68,54	4,23	0	0,11	-0,03	0	0	74,301	17,871
69	18:40-19:40	1247,1	17,3	71,92	4,28	-1	0,16	-0,09	0	0	74,138	18,281
70	18:50-19:50	1176,6	15,8	74,54	4,31	-2	0,19	-0,41	4	0	68,052	18,588
71	19:00-20:00	1161,9	14,8	78,32	4,36	-3	0,24	-0,74	9	0	64,695	19,017
72	19:10-20:10	1136,3	14,3	79,61	4,38	-4	0,26	-0,94	13	0	62,477	19,159
73	19:20-20:20	1060,1	15,2	69,83	4,25	-3	0,13	-0,35	7	0	64,458	18,030
74	19:30-20:30	1024,3	15,4	66,42	4,20	-2	0,08	-0,20	6	0	64,705	17,607
75	19:40-20:40	1052,4	17,1	61,70	4,12	-1	0,01	0,00	1	0	70,313	16,994
76	19:50-20:50	1039,6	18,8	55,40	4,01	1	-0,10	-0,09	1	0	75,335	16,117
77	20:00-21:00	1012,4	19,4	52,29	3,96	1	-0,16	-0,24	2	0	76,609	15,657
78	20:10-21:10	1013,9	18,5	54,72	4,00	1	-0,11	-0,07	0	0	74,159	16,018
79	20:20-21:20	967,6	17,7	54,71	4,00	0	-0,11	0,02	0	0	70,778	16,017
80	20:00-21:00	914,9	17,1	53,37	3,98	-1	-0,14	0,10	1	0	68,187	15,818
81	20:40-21:40	867,3	17,8	48,67	3,89	0	-0,23	0,01	0	0	69,230	15,094
		jumlah	1448	5088	333	0	0	-34	370	4	5927,826	1376,473
		rata-rata	17,878	62,814	4,117							

4.4.3 Underwood's Calculation with Barriers

Table 4. 9 Regression Data for Underwood Model with Constraint

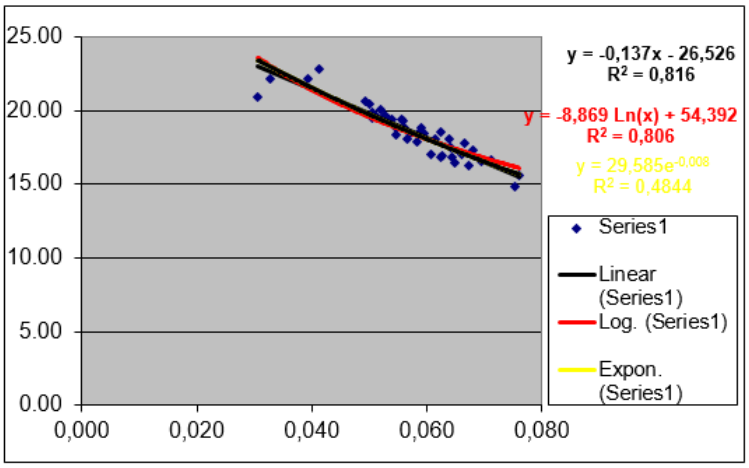
No.	*Waktu*	*Volume* (F)	*Kecepatan* y = (S)	*Kepadatan* x = (D) = (F) / (S)	1 0,4343.x	2 0,4343x-x	3 log y	4 log y-y	2x4	1x3	1x1	2x2	4x4
1	06:50-07:50	639,5	20,9	30,55	13,267	-14,0134	1	0,0718	-1	17,523	176,0042	196,3760	0,0052
2	07:00-08:00	723,5	22,1	32,67	14,190	-13,0903	1	0,0962	-1	19,088	201,3488	171,3569	0,0092
3	07:10-08:10	869,9	22,2	39,27	17,057	-10,2230	1	0,0963	-1	22,948	290,9433	104,5101	0,0093
4	07:20-08:20	943,4	22,8	41,35	17,960	-9,3204	1	0,1091	-1	24,393	322,5504	86,8697	0,0119
5	07:30-08:30	1016,6	20,6	49,24	21,385	-5,8948	1	0,0658	0	28,118	457,3296	34,7488	0,0043
6	07:40-08:40	981,8	19,4	50,49	21,926	-5,3539	1	0,0398	0	28,259	480,7574	28,6642	0,0016
7	07:50-08:50	1026,4	18,8	54,69	23,750	-3,5303	1	0,0244	0	30,244	564,0538	12,4628	0,0006
8	08:00-09:00	1000,6	18,3	54,58	23,704	-3,5756	1	0,0142	0	29,944	561,9012	12,7851	0,0002
9	08:10-09:10	1040,1	17,8	58,33	25,332	-1,9477	1	0,0021	0	31,696	641,7292	3,7936	0,0000
10	08:30-09:30	1075,9	18,4	58,50	25,406	-1,8741	1	0,0156	0	32,129	645,4662	3,5121	0,0002
11	08:40-09:40	1155,8	18,5	62,45	27,123	-0,1570	1	0,0183	0	34,374	735,6634	0,0246	0,0003
12	08:50-09:50	1181,9	17,8	66,55	28,903	1,6229	1	0,0004	0	36,113	835,3839	2,6339	0,0000
13	09:00-10:00	1177,8	17,3	67,95	29,511	2,2305	1	-0,0102	0	36,560	870,8768	4,9753	0,0001
14	09:10-10:10	1153,3	16,6	69,55	30,207	2,9266	1	-0,0295	0	36,841	912,443	8,5649	0,0009
15	09:30-10:30	1109,1	18,8	58,96	25,608	-1,6718	1	0,0253	0	32,635	655,785	2,7949	0,0006
16	09:40-10:40	1077,8	19,3	55,82	24,242	-3,0378	1	0,0367	0	31,169	587,6881	9,2282	0,0013
17	09:50-10:50	1023,1	20,5	49,98	21,706	-5,5741	1	0,0621	0	28,459	471,1498	31,0706	0,0039
18	10:00-11:00	1003,4	19,9	50,43	21,901	-5,3789	1	0,0497	0	28,445	479,6611	28,9327	0,0025
19	10:10-11:10	1004,9	19,7	51,09	22,186	-5,0938	1	0,0448	0	28,706	492,2329	25,9464	0,0020
20	10:20-11:20	1050,3	16,9	62,31	27,060	-0,2199	1	-0,0223	0	33,196	732,2515	0,0484	0,0005
21	10:30-11:30	1083,6	16,8	64,39	27,965	0,6853	1	-0,0230	0	34,287	782,0616	0,4696	0,0005
22	10:40-11:40	1060,8	16,9	62,64	27,206	-0,0738	1	-0,0203	0	33,429	740,1821	0,0054	0,0004
23	10:50-11:50	1052,8	18,4	57,10	24,799	-2,4809	1	0,0166	0	31,388	614,997	6,1551	0,0003
24	11:00-12:00	1038,6	19,4	53,47	23,222	-4,0585	1	0,0393	0	29,917	539,2401	16,4717	0,0015
25	11:10-12:10	1039,4	19,7	52,74	22,907	-4,3736	1	0,0456	0	29,655	524,7078	19,1282	0,0021
26	11:20-12:20	1041,6	20,1	51,95	22,560	-4,7198	1	0,0531	0	29,377	508,9665	22,2765	0,0028
27	11:30-12:30	1056,3	18,9	56,02	24,332	-2,9485	1	0,0263	0	31,032	592,0278	8,6934	0,0007
28	11:40-12:40	1101,3	18,5	59,62	25,891	-1,3887	1	0,0175	0	32,792	670,3658	1,9284	0,0003
29	11:50-12:50	1153,8	18,1	63,79	27,706	0,4259	1	0,0083	0	34,836	767,6238	0,1814	0,0001
30	12:00-13:00	1120,6	17,5	64,02	27,805	0,5252	1	-0,0060	0	34,565	773,1317	0,2758	0,0000
31	12:10-13:10	1125,8	17,0	66,15	28,729	1,4489	1	-0,0181	0	35,363	825,3567	2,0994	0,0003
32	12:20-13:20	1184,3	16,6	71,26	30,950	3,6698	1	-0,0285	0	37,777	957,8942	13,4673	0,0008
33	12:40-13:40	1182,3	15,6	75,93	32,975	5,6949	1	-0,0567	0	39,317	1087,352	32,4323	0,0032
34	12:50-13:50	1114,9	14,8	75,30	32,704	5,4240	1	-0,0786	0	38,278	1069,554	29,4192	0,0062
35	13:00-14:00	1092,8	16,2	67,36	29,252	1,9723	1	-0,0389	0	35,400	855,7018	3,8900	0,0015
36	13:10-14:10	1063,8	16,4	64,87	28,173	0,8928	1	-0,0343	0	34,225	793,7088	0,7970	0,0012
37	13:20-14:20	1033,3	17,0	60,74	26,378	-0,9019	1	-0,0183	0	32,465	695,8101	0,8134	0,0003
38	13:30-14:30	1021,3	18,0	56,63	24,593	-2,6870	1	0,0071	0	30,892	604,818	7,2201	0,0000
39	13:40-14:40	1044,9	19,4	53,97	23,439	-3,8415	1	0,0379	0	30,164	549,3677	14,7570	0,0014
40	13:50-14:50	1076,4	19,4	55,51	24,106	-3,1742	1	0,0386	0	31,040	581,0959	10,0752	0,0015
41	14:00-15:00	1110,6	18,1	61,37	26,652	-0,6284	1	0,0086	0	33,518	710,3096	0,3949	0,0001
42	14:10-15:10	1102,1	19,5	56,52	24,545	-2,7346	1	0,0410	0	31,665	602,4811	7,4780	0,0017
43	14:20-15:20	1104,4	19,1	57,84	25,120	-2,1605	1	0,0319	0	32,176	630,9952	4,6676	0,0010
44	14:30-15:30	1084,9	19,4	55,99	24,315	-2,9648	1	0,0382	0	31,302	591,2347	8,7898	0,0015
45	14:40-15:40	1080,6	19,4	55,59	24,141	-3,1394	1	0,0396	0	31,110	582,7715	9,8560	0,0016
46	14:50-15:50	1044,8	20,5	50,90	22,107	-5,1730	1	0,0632	0	29,011	488,7222	26,7601	0,0040
47	15:00-16:00	1040,8	17,4	59,89	26,009	-1,2713	1	-0,0090	0	32,252	676,4577	1,6162	0,0001
48	15:10-16:10	1045,1	17,2	60,76	26,387	-0,8935	1	-0,0135	0	32,602	696,2508	0,7984	0,0002
49	15:20-16:20	1154,9	19,2	60,15	26,122	-1,1577	1	0,0343	0	33,524	682,3762	1,3404	0,0012
50	15:30-16:30	1138,6	19,4	58,82	25,545	-1,7354	1	0,0378	0	32,872	652,5296	3,0117	0,0014
51	15:40-16:40	1182,3	19,3	61,26	26,606	-0,6739	1	0,0365	0	34,203	707,8904	0,4541	0,0013
52	15:50-16:50	1157,9	21,3	54,28	23,576	-3,7045	1	0,0799	0	31,332	555,8062	13,7236	0,0064
53	16:00-17:00	1169,4	21,2	55,12	23,937	-3,3431	1	0,0776	0	31,757	572,9801	11,1762	0,0060
54	16:10-17:10	1140,4	18,9	60,28	26,180	-1,1004	1	0,0278	0	33,429	685,3745	1,2109	0,0008
55	16:20-17:20	1213,8	18,4	65,95	28,643	1,3625	1	0,0158	0	36,230	820,396	1,856	0,0003
56	16:30-17:30	1198,1	18,4	65,00	28,231	0,9506	1	0,0165	0	35,728	796,971	0,904	0,0003
57	16:40-17:40	1248,4	17,7	70,40	30,574	3,2941	1	-0,0003	0	38,181	934,782	10,851	0,0000
58	16:50-17:50	1261,4	16,3	77,59	33,696	6,4157	1	-0,0380	0	40,808	1135,402	41,161	0,0014
59	17:00-18:00	1327,6	13,6	97,66	42,413	15,1332	1	-0,1157	-2	48,069	1798,885	229,013	0,0134
60	17:10-18:10	1339,8	13,8	96,85	42,063	14,7825	1	-0,1081	-2	47,990	1769,261	218,523	0,0117
61	17:20-18:20	1377,4	13,3	103,67	45,024	17,7438	1	-0,1257	-2	50,580	2027,150	314,843	0,0158
62	17:30-18:30	1353,8	12,1	111,84	48,574	21,2938	1	-0,1661	-4	52,602	2359,418	453,424	0,0276
63	17:40-18:40	1341,8	13,2	101,88	44,247	16,9671	1	-0,1295	-2	49,538	1957,815	287,883	0,0168
64	17:50-18:50	1208,6	15,1	80,14	34,805	7,5244	1	-0,0706	-1	41,015	1211,354	56,617	0,0050
65	18:00-19:00	1188,9	15,1	78,60	34,138	6,8579	1	-0,0694	0	40,273	1165,404	47,031	0,0048
66	18:10-19:10	1152,8	15,7	73,38	31,870	4,5898	1	-0,0529	0	38,121	1015,691	21,067	0,0028
67	18:20-19:20	1175,8	17,3	67,93	29,503	2,2234	1	-0,0108	0	36,532	870,453	4,943	0,0001
68	18:30-19:30	1204,6	17,6	68,54	29,765	2,4852	1	-0,0041	0	37,056	885,969	6,176	0,0000
69	18:40-19:40	1247,1	17,3	71,92	31,235	3,9554	1	-0,0100	0	38,702	975,654	15,645	0,0001
70	18:50-19:50	1176,6	15,8	74,54	32,374	5,0935	1	-0,0508	0	38,791	1048,047	25,943	0,0026
71	19:00-20:00	1161,9	14,8	78,32	34,015	6,7351	1	-0,0778	-1	39,842	1157,032	45,361	0,0060
72	19:10-20:10	1136,3	14,3	79,61	34,573	7,2928	1	-0,0945	-1	39,916	1195,287	53,186	0,0089
73	19:20-20:20	1060,1	15,2	69,83	30,329	3,0488	1	-0,0678	0	35,827	919,839	9,295	0,0046
74	19:30-20:30	1024,3	15,4	66,42	28,848	1,5676	1	-0,0610	0	34,274	832,191	2,457	0,0037
75	19:40-20:40	1052,4	17,1	61,70	26,797	-0,4827	1	-0,0172	0	33,012	718,101	0,233	0,0003
76	19:50-20:50	1039,6	18,8	55,40	24,060	-3,2198	1	0,0243	0	30,637	578,899	10,367	0,0006
77	20:00-21:00	1012,4	19,4	52,29	22,711	-4,5693	1	0,0379	0	29,227	515,778	20,879	0,0014
78	20:10-21:10	1013,9	18,5	54,72	23,765	-3,5146	1	0,0188	0	30,131	564,797	12,353	0,0004
79	20:20-21:20	967,6	17,7	54,71	23,762	-3,5184	1	-0,0015	0	29,645	564,619	12,379	0,0000
80	20:30-21:30	914,9	17,1	53,37	23,177	-4,1031	1	-0,0149	0	28,603	537,171	16,836	0,0002
81	20:40-21:40	867,3	17,8	48,67	21,137	-6,1427	1	0,0018	0	26,441	446,788	37,733	0,0000
		jumlah	1448	5088	2209,687	0	101	0	-24	2735,565	63288,520	3008,093	0,2360
		rata-rata	17,878	62,814	27,280		1						

4.4.4 Traffic Characteristics Recapitulation with Barriers

Table 4.20 Recapitulation of Traffic characteristics with Barriers

Variable	Unit	Model		
		Greenshield	Greenberg	Underwood
• Maximum Volume (Qmax)	junior high school/hour	277,692	1503,403	3245.033
• Free speed (Vf)	km/hour	26.526	54,392	70.56
• Maximum speed (Vm)	km/hour	13,263	8.869	25,960
• Maximum density (Dj)	junior high school/km	192,664	460.734	125
• Coefficient of determinant (r2)	-	0.816	0.806	0.844

Figure 4.3 Graph of the Relationship of the Three Velocity Equations – Density with Distraction



4.5 The Effect of Obstacles on Traffic Characteristics

Table 4. 11 Recapitulation of Traffic characteristics with Barriers

Traffic Characteristics	Unit	No Barriers	With Barriers
Maximum Volume (Qmax)	junior high school/hour	1642,707	277,692
Maximum Speed (Vm)	km/hour	14.59	13,263
Maximum Density (Dj)	junior high school/km	225,177	192,664

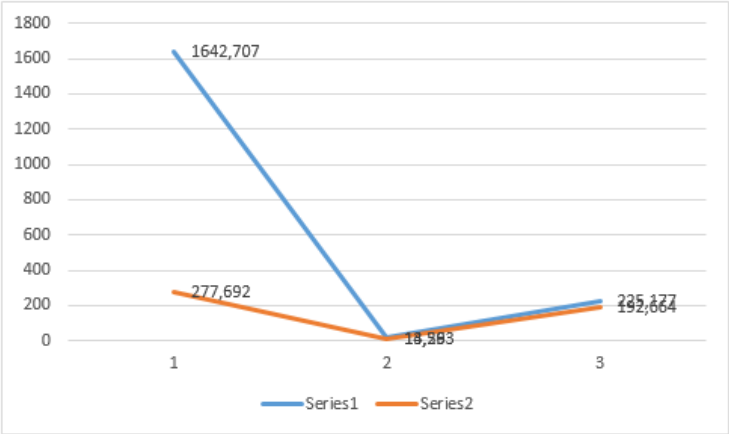


Figure 4.3 Graph of the Effect of Barriers on Traffic Characteristics

From the graph, it can be seen that the volume and density of traffic will increase along with the number of obstacles. This also affects the speed which will be smaller along with the number of obstacles that occur.

5. CONCLUSIONS

Based on the results of the research and discussion, the following conclusions can be drawn:

a. The performance of Jalan Veteran in Banjarmasin in the condition that there are no parking vehicles on the road has a volume of 1642,707 pcu/hour, a maximum speed of 14.59 km/hour and a maximum density of 255,177 pcu/km.
b. The performance of Jalan Veteran in Banjarmasin city when there are vehicles parked on the road has a volume of 277,692 pcu/hour, a maximum speed of 13.263 km/hour and a maximum density of 192,664 pcu/km.
c. Vehicle parking on the road to the performance of the Veterans Road section results in a lower maximum speed compared to the performance of the veteran road section if there are no parking vehicles on the road..

As material for further research, it is recommended as follows:

a. To be more careful in processing data
b. To be more careful when conducting a traffic survey in the field.

REFERENCES

Agung I Gusti, (2000). Simple Statistical Analysis for Decision Making" Population, 11(2). ISNN : 0853-0262

Directorate GeneralHighways (1997). Indonesian Road Capacity Manual (MKJI). Jakarta: Bina Karya.

DGCommunicationLand. 1998. Guidelines for Planning and Operation of Parking Facilities. Jakarta: Ministry of Transportation.

Hendra Gunawan, M., Purnawan, M., 1998, Relationship of Speed, Volume and Traffic Density Parameters in Padang Municipality. Symposium of Higher Education Transportation Studies Forum, East Hall ITB, 3 December 1998.

McShane, WR, Roess, RP, and Prassas, ES, 1990, Traffic Engineering, 1st ed., Prentice Hall, Inc., Englewood Cliffs, New Jersey.

Miro, F.1997. Bandung City Transportation System: Bandung: Tarsito Bandung.

Regulation of the Minister of Transportation Number: KM 14. 2006. Traffic Management and Engineering on the Road.

Radam IF, Mulyono AT, Setiadji BH (2015). Influence of Service Factors in TheModel*of Public Transport Mode: A Banjarmasin-Banjarbaru Route Case Study*.*International Journal for Traffic and Transport Engineering*. Vol 5(2): 111.

Sudjana, M., 1983, Techniques of Regression and Correlation Analysis. Bandung: Tarsito, Bandung.

Warpani, S. 1990. Planning a Transportation System. Bandung: ITB Publisher.