

The Evaluation and Strategy for Freight Transport Move Route to Support the Dumai City Master Plan

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Abstract

Dumai is an industrial city whose movement depends on land transportation, therefore the impacts are road damage, congestion and an imbalance facility and infrastructure. The research aims to prepare an integrated and sustainable freight transportation Master Plan Documents. The data used in this research are road network data, traffic and maps of existing freight transport routes in existing conditions. Therefore, the result will be obtained performance and road network modeling. The result indicated that all of routes existing condition have been Degree of Saturation less than 0.85 and are not congested. However, forecasts for 5 and 0 years show that the degree of Saturation is approaching less than 0.85 and must be anticipated immediately, such as Lubuk Gaung Industrial like a change route from Cut Nyak Dien to Parit Kitang, Pelindo Dumai from Putri Tuhuh to Gatot Soebroto road.

Key words : Freight Transport Master Plan, Degree of Saturation, Route.

1. INTRODUCTION

The Dumai Government has continue to implement development programs in the transportation sector, including maintenance and development, which not only includes land transportation but also sea and air networks, as well as starting to pioneer a railway system. Even though progress in road construction has reduced regional isolation, the main problem that arises is the need to organize vehicle movements both inside and outside the city, because of its negative impact on road damage, congestion, and even accidents. The increase in human needs, which include primary, secondary, and tertiary needs, directly results in increased mobility of goods, which requires planned and integrated distribution. This problem is exacerbated by the fact that Dumai is an industrial city whose mobilization activities still rely heavily on land routes, causing an imbalance between the growth of freight transport facilities and infrastructure.

Therefore, to support Dumai as an industrial city, the government needs to prepare a freight Transportation Master Plan. It must include the preparation of heavy vehicle routes that meet various requirements in accordance with government regulations 43/1993, such as transportation needs, road classes, level of road safety and service, availability of freight transport terminals, general spatial plan, and environmental sustainability. It will contain strategies, policies, and plans for developing infrastructure and freight transportation service systems to achieve the goals of better connectivity, efficiency, and transportation security.

The purpose of preparing the Goods Transportation Master Plan Document is to determine the route that heavy vehicles will take to the industrial area location. Therefore, the resulting output is a road network map for heavy vehicles that is integrated, unified, and sustainable.

2. LITERATURE REVIEW

The Indonesia Road Capacity Guidelines (2023) have units for calculating traffic (pcu/hour). by equating these units, all types of vehicles surveyed will be converted into Passenger Car Equivalent Values (EMP). It vary based on road type such as 2/2 TT, and 4/2 T, and influenced traffic volume total.

Table 1. Passenger Car Equivalent Values Type 2/2 TT

Road Type	Traffic Volume (Vehicle/hours)	EMP _{LV}	EMP _{MC} (Track)	
			$L \leq 6m$	$L > 6m$
2/2 -TT	< 1800	1.3	0.5	0.4
	≥ 1800	1.2	1.2	0.25

Table 2. Passenger Car Equivalent Values

Road Type	Traffic Volume (Vehicle/hours)	EMP _{LV}	EMP _{MC}
4/2-T or 2/1	< 1050	1.3	0.4
	≥ 1050	1.2	0.25
6/2-T or 3/1	< 1100	1.3	0.4
8/2-T or 4/1	≥ 1100	1.2	0.25

The next important aspect are the analysis of roads performance with level of service. It's a value whether the road is good or bad. Level of Service have been clasification A until F, from free flow to traffic jams by using degree of saturation values. If it's more than 1,00 indicated that a long queue, low speed, and side friction.

Legality in preparing this document refers to several regulations, are Constitution Number 22 of 2009, the Government regulations 43 of 1993, Number 74 of 2014, Minister of Transportation Regulation Number 60 of 2019, and reinforced by specific regional regulations, Dumai Mayor Regulation Number 95 of 2023 concerning freight Transport Operations.

3. METODOLOGY

The aim of preparing a freight Transportation Master Plan is to ensure that the movement of heavy vehicles runs smoothly, safely, comfortably and efficiently. The activity include data collection (traffic volume and location interviews); analysis; modeling and planning of road networks, therefore that the generation and attraction of freight transport can be generated every 15 minutes for 40 hours.

4. RESULT AND DISCUSSION

4.1. Existing Conditions

Gatot Subroto and Soekarno Hatta is a location of research has been type of roads 2/2 TT and 4/2 T. The Table of Geometrics follow :

Table 3. The Existing Geometric Conditions

No	Name of Roads	Roads Status	Type of Roads	Ws (m)		LB (m)	SF Class	W (m)	WL (m)	
				Left	Right				Left	Right
1	Gatot Subroto	National	2/2 TT	1.8	2.28	2.04	Currently	7	3.5	3.5
2	Tambusai/Perwira	National	4/2 T	1.5	1.5	1.5	Low	14	7	7
3	Soekarno-Hatta	National	4/2 T	2.5	1.8	2.15	Currently	14	7	7
4	Arifin Ahmad	National	2/2 TT	2.5	3.3	2.9	Currently	7	3.5	3.5
5	Cut Nyak Dien	Province	2/2 TT	0	0	0	Currently	6	3	3

4.2. The Analysis of Roads Performance and Route Plan

The analysis of Soekarno-Hatta's performance roads indicated the highest Degree of Saturation. The Analysis of Soekarno-Hatta performance roads indicated that the highest Degree of Saturation as high as 0.35, or not jam conditions. The following table shows capacity, performance, and level of service.

Table 4. The capacity, performance, and level of service

Data / Days	Capacity						Road Performance			
	$C = C_0 \times FCL \times FCPA \times FCHS \times FCUK$						Q (smp/jam)	Dj	Information	
	C_0 (smp/jam)	Capacity Factor				C			M/TM	LoS
Sunday	1700	1.00	1.00	0.96	0.86	5614	1161	0.21	TM	B
Mondays	1700	1.00	1.00	0.96	0.86	5614	1325	0.24	TM	B
Tuesday	1700	1.00	1.00	0.96	0.86	5614	1535	0.27	TM	B
Friday	1700	1.00	1.00	0.96	0.86	5614	1954	0.35	TM	B

The Moving of freight transport routes by using modeling aims to anticipate future conditions. The movement design such as Figures 1 and 2, and Table 5.

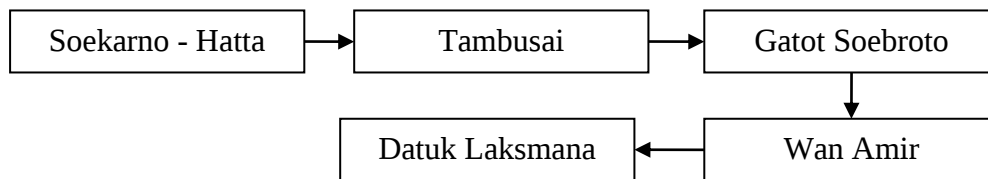


Figure 1. The Movement Design to Pelindo Dumai Area



Figure 2. The Movement Design to Lubuk Gaung Industrial Area

Table 5. The result of analysis performance after change of route

Name of Road	Capacity						Road Performance			
	$C = C_0 \times FCL \times FCPA \times FCHS \times FCUK$						Q (smp/jam)	Dj	Information	
	C_0 (smp/jam)	Capacity Factor				C			M/TM	LoS
Cut Nyak Dien	2800	1.00	1.00	0.94	0.86	2264	980	0.43	TM	B
Gatot Soebroto	2800	1.08	1.00	0.96	0.86	2497	718	0.29	TM	B

5. CONCLUSION

5.1. The Analysis of Existing

Based on the analysis results, it was concluded that the Degree of Saturation value was less than 0.85, therefore the road was still in the non-congested category. However, it was

predicted that in the next 5 and 10 years there will be an increase in the value of DJ. So, the Dumai city government must have prepared anticipation for the future.

5.2. Rekomendate Route

Based on the results of the analysis in the previous section, two recommendations need to be made quickly and urgently.

1. The Movement Design for the Pelindo Dumai Area.
2. The Movement Design to Lubuk Gaung Industrial Area.

6. UCAPAN TERIMAKASIH

The researcher would like to thank the Dumai City Government through the Department of Transportation for conducting this study; hopefully, the results of this study can be used to meet the needs and progress of those in need.

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