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The Importance of Development in Laboratory Diagnosis at the Intersection

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***Abstract*—**Intersection is a critical area on a highway which is a place of conflict points and congestion due to the meeting of two or more roads. Conflicts that occur at the intersection include diverging, merging, weaving, and crossing. To deal with these conflicts, a crossing control system is needed, at a plot of intersection there are two control systems namely signal intersections and non-signalized intersections. The control system at a plot of intersection can affect the intersection performance. In Indonesia there are still many intersections with poor intersection performance. In analyzing the parameters to measure the performance of a plot of intersection in Indonesia, it is guided by the 1997 Indonesian Road Capacity Manual. For this reason, this study aims to develop laboratory diagnostics at plot intersections to analyze parameters that can affect the performance of an intersection. The research method used is *research and development*. The laboratory diagnosis includes anamnesis, differential diagnosis, inspection, diagnosis, prognosis, specimens, analysis and sample data analysts. It is expected that this research can encourage the development and application of laboratory diagnostics at a plot of intersection in Indonesia so that intersections can function optimally.

***Keywords*—**Intersection, laboratory diagnostic, control systems, Indonesia.

I. Background

INTERSECTIONS are an integral part of the road network. The intersection can be defined as a critical area on a highway which is a place of conflict points and congestion due to the meeting of two or more roads [11]. Intersection is the most important part of the road network system, which in general the junction capacity can be controlled by controlling the volume of traffic in the network system. In principle, the intersection is a meeting of two or more road networks [3]. Road intersections can be defined as general areas where two or more roads join or intersect, including road and roadside facilities for traffic movements within them [1]. Making intersections at a location aims to create efficient mobility. Efficient mobility in this case means to look for the closest and fastest distance. In general there are three types of intersections, namely plot intersections, line separators without ramps, and interchange (interchanges). In the road network, there are many plot intersections where the driver must decide to walk straight or turn and change direction to reach a destination. Therefore, it can create conflicts including diverging, merging, weaving, and crossing.

The intersection on the highway is different from the intersection of air, sea and rail traffic. At the intersection of the highway there is a plot of intersection causing a crossing conflict which is not found in the air, sea and rail traffic network. To deal with traffic conflicts, a crossing control system is needed. There are two control systems at the intersection, namely signal intersections and non-signalized intersections. The control system at a plot of intersection can affect the performance of an intersection. The performance of an intersection can be seen from the delay and the capacity of the intersection [15].

In Indonesia analyzing the parameters to measure the performance of a plot of intersection is guided by the Indonesian Road Capacity Manual 1997. For this reason, the aim of this study is to optimize the plot intersection function by developing laboratory diagnostics at a plot. It is to findout parameters that can affect the performance of an intersection.

II. Research Methodology

The research method used is *research and development* as it will develop diagnosis in laboratory at a plot of intersection. Research and development aims to develop and to produce valid research products through cyclic and repetitive processes or steps such as field testing, product revision, and final products that are in accordance with the objectives of this study [5].

III. Junction in Indonesia

Intersections are vertices on the road network where the intersections and trajectories of vehicles intersect. Traffic on each crossing leg uses the road space at the intersection together with other traffic [2]. Judging from the shape there are two types of intersections, namely:

1. Meeting or crossing a level road, is a meeting of two or more roads in a plot (not mutually arranged).
2. Meeting or crossroads is not a plot, is an intersection where two or more road segments meet each other not in one field but one segment is above or below the other road segment [7].

Generally road junction is a transportation node that is formed from several approaches, where the flow of vehicles from various directions meet and scatter.

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In the transportation system there are three kinds of road meetings, namely one level meetings (*at grade intersection*), meetings not as large as (*interchange*), and crossing of roads (*grade separation without ramps*) [8].

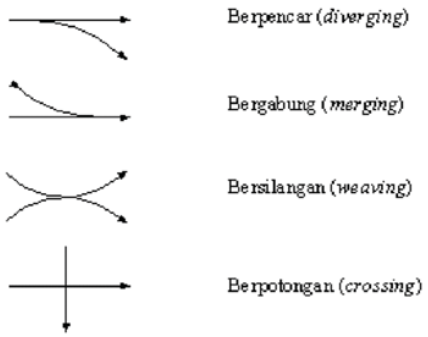

Fig. 1 Image of Transfer of Vehicle Motion [9]

A. Intersection

Intersection is a meeting point where various roads or ends of the road direct traffic into the lane that is contrary to other traffic, such as intersections on city roads. This intersection has the same height or elevation. Good crossing planning will produce good operational quality such as service level, delay time, queue length and capacity. In more detail, plot intersections can be distinguished as follows.

1.Priority Intersection

Small traffic flow occurs in a priority intersection. Controlling movement of traffic at the intersection can be achieved with priority control. For instance, vehicles on minor roads giving way to vehicles on major roads. Traffic flow priorities can be designed to put a stop sign, to give way, to yield or go slowly on minor roads.

2. Signalized Intersections

To usse three-color lights (green-yellow-red) is applied to separate trajectories from conflicting traffic movements in the time dimension.

3. Rotary Intersections/Roundabout

Roundabout or island in the middle of an intersection can act as a controller, divider, guider for a one-way rotating traffic system. In this way the crossing motion disappears and is replaced by a braid motion. Drivers who enter the roundabout must give priority to the vehicle on the right side. The main purpose of roundabout is to serve continuous movements, but this depends on the capacity and area used.

B. Non Plot Intersection

This intersection is a junction where the roads is placed at a different height.

IV. Development in Laboratory Diagnosis in the Intersection

Laboratory diagnosis at plot intersection is a form of analysis of the situation as well as descriptive intersection conditions. Laboratory diagnosis comes from two words namely diagnosis and laboratory which means diagnosing with a laboratory device. The contents of the diagnosis are anamnesis, differential diagnosis, inspection, diagnosis and prognosis. The contents of the laboratory are specimen, reagent and analysis of sample data. Development in laboratory diagnostics at a plot of intersection is intended to optimize the function of an intersection. Development in laboratory diagnostics at the intersection of the field includes:

A. Anamnesis

Anamnesis is the opening door or bridge to build the relationship between doctors and patients so that they can develop openness and cooperation from patients for the next stages of examination [12]. In general, about 60-70% of the possibility of a correct diagnosis can be established only with the correct history diagnosis can be interpreted [13]. Anamnesis of intersection is an activity in finding a history of a plot of intersection. Anamnesis is conducted to find out information, including the reason for a plot of intersection at a location. Results history can be obtained using topographic data, hydrology, geology, accessibility and climate. Topographic data includes information on area height, sea depth, relief, hydrography, vegetation, transport and toponymy of a region. Hydrological elements include data on rivers, lakes and coastlines. Geological data contains information, such as regional situations, interpretations and geological imagery. “Accessibility is a potential measure or ease of people to achieve goals on a trip.

The characteristics of the transportation system are determined by accessibility. Accessibility gives influence to several locations of activities or land use. The location of activities also has an influence on travel patterns for carrying out daily activities. This pattern of travel then affects the transportation network and will also influence the overall transportation system” [14]. Data taken from the climate are temperature, wind pressure and humidity. One of the intersections in Tegal Regency, Central Java, Indonesia that we used as a survey site to observe and analyze the condition of the intersection is Mejasem intersection. From the results of the anamnesis, it is known that the intersection of Mejasem are made with the aim of creating efficient traffic movements between zones of the region. The efficient movement is to find the closest and fastest distance in making traffic movements between zones of the region. The traffic movement covers cars, motorbikes and public transportation. The motorcycle dominates traffic movements in Mejasem intersection.

B. Differential Diagnosis

After obtaining the results of a anamnesis of intersection, the differential diagnosis is then performed at the intersection of the plot. Differential diagnosis at a plot is intended to reduce the scope of diagnosis. Geometric intersection design is that all types of intersections are considered to have sufficient sideburns and sidewalks, and are placed in urban areas with moderate side barriers. Based on the geometric design there are four intersections and three intersections with different lanes. Movement intersection design that is all turning movements are

considered permissible and some turning movements are movements that continuously turn left directly.

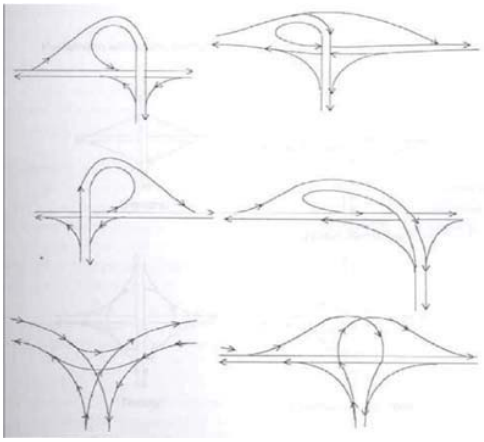

Fig. 2 Examples of Foot-Many Intersections and Roundabouts [9]

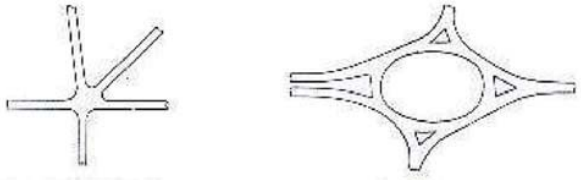

Fig. 3 The meeting is not a plot [9]

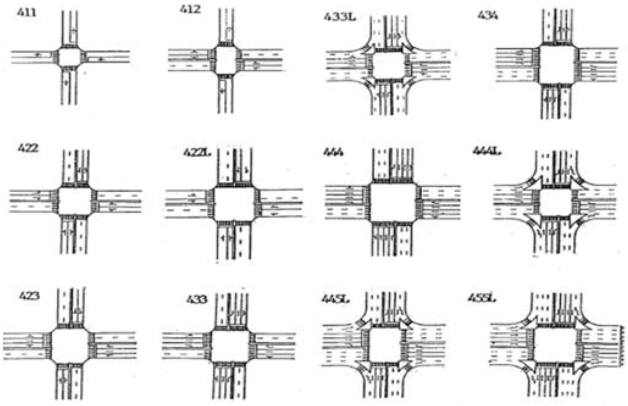

Fig. 4 The types of intersections of three arms [4]

Mejasem intersections are designed to create efficient movement between zones of the region. Movements between zones include social movements. Social movements are movements that occur due to social factors. The movements include movement to work, to shop and go to school. The activity is carried out routinely and continuously; thus, it generates routine and continuous traffic movements between zones of the region.

C. Inspection

The definition of inspection is: "A systematic process to obtain and evaluate evidence in an objective manner regarding statements about economic events, with the aim of establishing a level of conformity between the statement and the criteria set, and delivering the results to interested users" [10]. Inspection at a plot of intersection is intended to find out the signs and symptoms that exist in an intersection. Signs at the intersection can be known by making observations. Observation is the inspection done by looking at what is at the intersection. The results of observations at Mejasem intersection, namely the volume of vehicles, increased dramatically during peak hours. This happened because all activities in the form of departing and returning from work, shopping and school took place simultaneously at the same hour, thus increasing the movement of traffic at Mejasem intersection. While symptoms can be known without observing. The symptom that occurs when there is a traffic movement at Mejasem intersection is the driving behavior of motorized vehicles that are not in accordance with the rules.

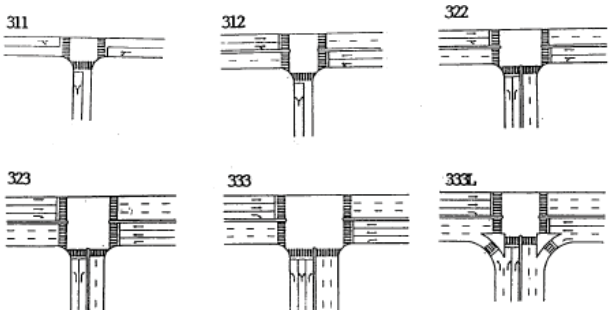

Fig. 5 The types of intersections of four arms [4]

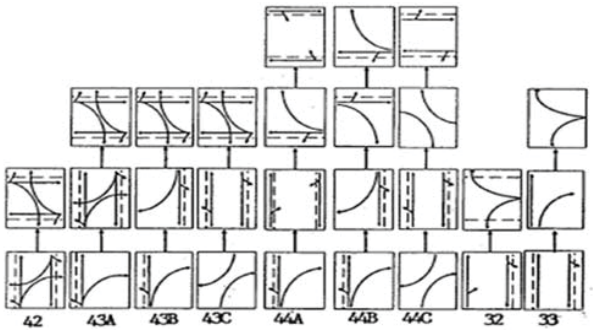

Fig. 6 The types of signal phase plan [6]

D. Making a Diagnosis

Diagnosis can be done using laboratory results. The device to get the first laboratory result is specimen. Specimen is whether the sampling method is correct or not. Factors that influence the correctness of the sampling method include weather, days and hours of sampling. Weather has an effect due to sampling, When the weather is raining, the result will be different from taking samples during sunny weather. Then the sampling day can affect the correctness of the sampling method because the sampling on weekdays will be different from taking samples on holidays. The hours at sampling can also affect the method of sampling, because sampling at peak hours will be different from sampling when peak off.

The second device in getting laboratory results is reagent. Reagent is a matter that affects the quality of the sample. An example of reagent when sampling at a plot of intersection is the value of the vehicle passenger car unit. Determination of the value of Passenger Car Unit vehicles will affect the quality of samples taken at a plot of intersection. Laboratory results can also be influenced by the third device, namely analysis of sample data. After getting the sample data at a plot of intersection, the final step is analyzing sample data. Analysis of incorrect sample data will be very influential on laboratory results, for this reason the analysis of sample data must be carried out correctly in order to obtain maximum laboratory results.

E. Recommendation

Recommendations are given to overcome the problems that occur at a plot of intersection. An example of a recommendation at Mejasem intersection is the installation of a Traffic lamp to overcome the conflict that occurred at Mejasem intersection. Installation of the Traffic lamp at Mejasem intersection can reduce conflicts that occur due to traffic movements between zones of the region. In addition to the installation of the Traffic lamp, improvements can also be made to the geometric intersection to reduce the conflict at the intersection of the plot.

F. Prognosis

Prognosis is a negative effect due to giving recommendations. The prognosis of the installation of a Traffic lamp at Mejasem intersection is congestion. It means that the installation of the Traffic lamp at the Martial Arts intersection can indeed overcome the traffic conflicts, however, at the same time, it can cause new problems, namely congestion. Geometric design improvements can cause problems in the road network..

V. Conclusion

Development Steps in Laboratory Diagnosis at the intersection is a systematic step that serves as a guide for researchers. These steps are carried out in stages to get maximum and quality results. So that Development in Laboratory Diagnosis at the Intersection can optimize the function of intersection in Indonesia.

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