Abstract

Intersections are needed in order to arrange the qualified traffic flow in urban areas. These intersections have to be signalized with the purpose of satisfying the traffic demand and providing high safety. The reason of signalizing the intersections is to avoid the flows from different ways being in the intersection simultaneously. Thus, signalizing of the intersection is extremely significant for making the human life easier and ensuring the safety. Besides, there are many parameters influencing on the intersection design. Some of these parameters have mutual interactions.

The vehicles in the traffic flow do not usually use the determined signalized green intervals. They use the time interval called as *the effective green time* instead of this. The effective green time is the time interval in which the traffic movement uses the intersection efficiently. Furthermore, it is shown in the researches done before that the effective green time is different from the signaled green time. This difference was termed as *the green time differences* in those researches. The green time differences arise in general due to these reasons which are the crossing time of entering vehicle, the crossing time of clearing vehicle, the saturation headway and the cumulated headway difference of the first entering vehicle waiting in the queue.

It was detected in advance that the green time differences have different values under different conditions. Some of their causes have not been analysed in the past. Certain factors affect on the required parameters in order to calculate the green time difference. One of these factors defined as the signaled green time was investigated in the scope of this thesis. In other words, the effects of the signaled green time on the green time differences were researched. Besides, the factors which influence on the interdependencies between the signaled green times and the green time differences were also surveyed.

Firstly, lots of literatures were reviewed before determining the interdependencies between the signaled green times and the green time differences. Referring to the literature reviews, the concept of the green time differences were clarified. Then, the site observations are made in eight different intersections of a German city, Darmstadt. In order to make comparisons among the site observations, all observed intersections were chosen so that each of them has a different signalled green time. Since saturated intersections are required to reach meaningful datas, the observations were made at peak hours. Therefore the stop line observations are made via video recordings. After that, the meaningful and reliable datas were reached with the manual analysises of these records via some softwares.

As a result of the manual analysises, it was revealed that the signalled green time and the green time differences relate to each other linearly. It is proved that long green time differences occur in the intersections with short signaled green times, especially having 10 s-15 s signalled green times. On the other hand, short green time differences were observed in the intersections with longer signalled green times. In addition, the changes of the green time differences in the intersections having longer signalled green times were smaller and it is supposed that this value tends to become constant after a period of time. For instance, the signalled green time difference of two observed intersections was 10 s, on the other hand, the green time difference was 3 s. However, the signalled green time difference of another two observed intersections was 40 s, on the other hand, the green time difference was 2 s.

The main reason for having different green time differences in the intersections with different signalled green times is to observe different crossing times of clearing vehicles in that intersections. It is surveyed that the drivers tend to use the yellow interval much longer in the intersections having short signalled green times. Therefore, the linear relation between signalled green time and green time difference derives from the different crossing times of clearing vehicles. In contrast, it is observed that there is no linear relation between the start-up lost time and the signalled green time. Because, those intersections have similar start-up lost time values. Thus, the start–up lost time does not change in case of different signalled green times and also it does not affect on diversifying the green time differences.

This thesis not only represents the analysises on the interdependencies between the signalled green time and the green time difference and the potential causes of this relationship exhaustively, but also forms the basis for the further researches on this topic. This thesis concludes with some recommendations for the methodology of site observations and the focus of further researches.