

Use of Traffic Lights in the Organization of Movement

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ABSTRACT

In this article, it can be emphasized that such an approach to the road system of our Republic allows for the creation of an adaptable and economical system of traffic management in a short period of time in large cities, which corresponds to the world technical level and the modern traditions of the development of urban infrastructure.

Traffic lights are light signaling devices that are used to control the passage of vehicles on certain sections of the road. The sequence of exchange of traffic lights used in Uzbekistan is adopted according to GOST 25695-83, which corresponds to the requirements of the International Convention on Road Signs and Signals. Signals are exchanged in the following sequence: red-red-yellow with green-yellow-red. It is allowed to switch signals as follows: red-green-yellow-red or red-yellow green-yellow. Sometimes it is possible to turn the green signal off and on before it changes. The following basic concepts are used to calculate the traffic light object:

Tact is the flashing of a certain signal or two signals (for example, green or red yellow) at a traffic light.

The main tact is the signal of the traffic light, the movement of vehicles in any direction is allowed.

Auxiliary or intermediate tact - on the signal of a traffic light, vehicles are prepared for movement in any direction.

Period - the length of the tact burning (time, for example $t_q=25$ s, $t_{ya}=21$ s, $t_s=4$ s).

Phase - the sum of the main and auxiliary periods (t_{ya} , t_s)

The cycle is the sum of all periods ($t_{ya} + t_q + t_s$)

Traffic lights can be described in two ways, i.e. according to their functional designation and constructive implementation.

According to their functional designation, traffic lights are divided into:

- For vehicles and pedestrians.

According to the constructive implementation:

- one-section, two-section, three-section, three-section with an additional section.

Traffic control with the help of traffic lights is determined by analyzing traffic jams at the intersection. Getting stuck at an intersection depends on the volume of traffic on the intersection and how the traffic light works.

The control mode determines the switching order of some periods and phases. Traffic lights can be controlled manually or automatically. When the traffic light is controlled automatically, special mechanisms are installed on it. Manually controlled traffic lights are used in some cases, for example, to eliminate traffic jams. If they work in a given mode before the change of traffic lights, then such traffic lights are called fixed mode.

It is advisable to use fixed mode traffic lights when the total traffic volume at the intersection is 750-800 vehicles per hour. It is recommended to install a one-section flashing yellow traffic light at a speed of 400-750 av/h. If the amount of traffic is less than 400 v/h, it is not appropriate to control the traffic using traffic lights. A modern way of controlling traffic lights is automatic control (adaptive), which is called variable mode control. In this mode, depending on the amount, the time of the green signal may decrease or increase. Information about vehicles approaching the intersection is obtained using detectors installed at a distance of 20-40 m from the stop line. For automatic control of traffic lights in variable mode, the following mode is often used:

$$t_{\min} \leq t_3 \leq t_{\max}$$

t_{\min} - the value is calculated in such a way that, as a result, the vehicle is able to leave the intersection. In other words, it is the time when a vehicle that has crossed the stop line, but at this moment the traffic light signal changes, can clear the intersection without causing damage to vehicles moving in the other direction. If there is no traffic in a given direction, the traffic light signal changes after the time t_{\min} has expired. In most cases, $t_{\min} = 3-5$ s is taken, during which the vehicle travels the distance from the sensor to the center of the intersection, if the next vehicle passes in less than 3-5 s, the traffic light the signal does not change. But if there is a gap of more than 3-5 seconds in a certain direction, then the signal of the traffic light changes in the traffic flow. If the time t_{\min} falls within the traffic interval and continuous movement is observed, then the traffic light signal changes again after the time t_{\max} has expired. Adaptive traffic lights at controlled intersections

Type 1 traffic lights are used to control traffic in all directions at intersections. Traffic lights of this type are allowed to be installed before railway crossings, at crossings of tram and trolleybus tracks, and in narrow sections of the roadway. Type 2 traffic lights are used to control traffic in a certain direction. The direction of movement is indicated by an arrow on the lens of the traffic light. In the direction indicated by the arrow, the traffic flow does not cross or merge with other traffic flows (including pedestrian flows). In such management, a separate traffic light is installed for each direction. In cases where the visibility of traffic light signals of the first type is impaired (for example, on multi-lane roads, trucks stopped in front of the "stop line" on the right side of the direction) to return the traffic light signal 3- types of traffic lights are used. They are

supposed to be installed at the crossing of the bicycle path to control the movement of cyclists. Traffic lights of the 4th type are used to control traffic at certain times at the beginning of reversible lanes. Traffic lights of the 5th type are used to control the traffic of trams, as well as buses and trolleybuses moving only on specially allocated lanes without conflict. Traffic lights of the 6th type will be installed at railway crossings, on sliding (sliding) bridges, at crossings with ferries, and at places where special vehicles enter the roads. Type 7 traffic lights are used at uncontrolled intersections or pedestrian crossings. Traffic lights of the 8th type are installed in the territory of enterprises and organizations for traffic management and in narrow areas of the roadway. 1st and 2nd type pedestrian traffic lights will be installed to control pedestrian traffic. Types 1 and 2 traffic lights and pedestrian traffic lights are installed when at least one of the following 4 conditions is met. The first condition. Traffic volume of vehicles (total) for 8 hours on a working weekday. Second condition. If the amount of movement (total) for 8 hours on a working weekday is not less than:

- 600 units/hour for two directions of the main road (1000 units/hour for roads with a dividing line);
- 150 pedestrians cross the traffic section in the most loaded direction every hour of the 8th hour.

In settlements with a population of less than 10,000 people, 70% of conditions 1 and 2 are met.

Third condition. When the norms of each of the first and second conditions are fulfilled at the same time by 80% or more.

The fourth condition. If at least three accidents have occurred at the intersection in the last 12 months, and these accidents could have been prevented by installing traffic lights (for example, collisions of oncoming vehicles or pedestrians, etc.). When the norms of the first or second condition are 80% or more. Types of green signal: green pointer on a black background - allows movement in the direction of the pointer; if the pointer is facing down - it allows movement in the lane where the traffic light is located: the signal in the form of a silhouette of a walking person allows movement of pedestrians; A green flashing signal indicates that the authorization cycle is over and the yellow light is on. A green indicator in the secondary section of the traffic light allows movement in the direction the indicator is pointing, regardless of the main traffic signal. In this case, the red signal of the main traffic light deprives the drivers moving in the direction of the green indicator from the right of way. Even if the green section of the main traffic light is on, the off section prohibits movement in the direction the pointer is pointing. Permission to move public transport depends on the combination of upper and lower signals of special traffic lights. If the lower signal is turned off, movement is prohibited in all directions.

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