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Surveying of Traffic Congestions on Arterial Roads of Kyiv City

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Abstract

It's represented the result of survey performed by department of airports and highways reconstruction of National Aviation University. The traffic congestions on arterial roads of Kyiv was analyzed on the base of the survey performed.

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Keywords: Street network, traffic flow, traffic congestion, traffic congestion level, average monthly traffic congestion index, traffic capacity

1. Actuality of the subject matter

Effective street network functioning in any human settlement must meet the requirements of all traffic participants: transport vehicle's drivers, passengers, pedestrians, bicyclists, traffic managers, and local public authority. In other words, the main purpose of proper city street network operation is to satisfy in the best way the demands of citizen in transport services. The solution of such type questions depends mainly from ability to ensure convenient and safety conditions for traffic.

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2. Problem solution

The main technique to make the of street network operation effective is to find, study and analyze the reasons and points on the arterial roads where deterioration of traffic conditions including congestions takes place [1]. The street network of Kyiv was selected to conduct experimental investigations of such kind.

Deterioration of traffic conditions in Kyiv began in the middle 90s of past century. The first congestions occurred in central part of city while middle and peripheral ones had certain traffic capacity reserve to pass by the traffic jam areas.

But at the beginning of 2000s, the number of motor vehicles became grow rapidly and it had caused in middle part of city as well. For the last 10 years the traffic situation along the arterial roads of Kyiv has begun to get worse and traffic congestions are already formed in peripheral city areas even.

The last has complicated the traffic on a new complexity level. That means that it was possible earlier to pass by the traffic jam in the central part of the city or local traffic congestion in its middle area just through other streets with free traffic. But now there can be situations when traffic congestion covers the whole city street network.

According to the Master plan of city development for Kyiv and its suburban area by the year 2025, the total length of its arterial roads must be increased by 1.4 times. That makes it possible to use their traffic capacity more effectively and avoid road congestion.

The arterial road system of Kyiv, despite its low development level, contains over 100 transport hubs. As a rule, hubs cause the traffic density increase in neighboring arterial roads up to traffic congestion level sometimes. That's why, the experimental studies of arterial road network state are necessary to analyze further the transport situation within the street network of Kyiv.

The traffic congestion surveys in Kyiv street network were carried out on the department of airports and highways reconstruction of National Aviation University from November 2014 to May 2016.

The traffic congestions were studied within the central, middle and peripheral zones of Kyiv street network, Fig. 1 [2]:

- Central zone (inside the closed curve including the European square–the Lvivska square–the Peremoga square–the "Ukraine" palace–the Lesi Ukrayinky square–the Slavy square–the European square);
- Middle zone (bounded by transport hubs: the Sevastopolska square–the Moskovska square–the Lybidska square–the Paton bridge–the Darnytska square–Gagarina street–Bratislavska street, Vatutina avenue–Moskovskyi bridge–Moskovskyi avenue–Olena Teliga street–Dovzhenko street–V. Getmana street–Chokolivskyi boulevard–the Sevastopolska square);
- Peripheral zone (located outside the closed curve of middle zone boundary).

December represents the most complicated month of traffic congestion period. The average monthly traffic congestion index at that time amounts to 4.6 due to pre-holiday rush. The lowest traffic congestion level corresponds to July, August and January due to summer and winter holidays. The average monthly traffic congestion index at that time amounts to 2.2. The distribution of average monthly traffic congestion on the streets of Kyiv during a day is represented on Fig. 2. The summer investigations were carried out in June–August 2015, and winter investigations were carried out from December 2015 to February 2016.

The longest traffic congestions occurred in 2015 year are the following:

- on the 5-th of February at 09.40 (9.4 km long one from beginning of Brest–Lytovsky highway then along Peremogy avenue up to at-grade intersection with Mykola Vasylenko street);
- on the 5-th of February at 10.30 (10.4 km long one from at-grade intersection of Olzhycha street and Oleny Teligy street then along Moskovsky avenue and general Vatutin avenue up to At-Grade Intersection with Volodymyr Mayakovsky avenue);
- on the 20-th of March at 10.30 (10.7 km long one from grade separation of Borshchagivska street and Vadym Getman street then along Oleksandr Dovzhenko street, Oleny Teligy street and Moskovsky avenue up to Moskovsky bridge).