

12th International Conference "Organization and Traffic Safety Management in large cities",
SPbOTSIC-2016, 28-30 September 2016, St. Petersburg, Russia

Traffic Forecasting Model for a Road Section

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Abstract

The paper presents a traffic forecasting model for a road section based on a computer model of the transportation system of a traffic gravity section. Traffic forecasting is an integral part of the process of designing of road facilities, starting from investment feasibility study to developing of working documentation. Determination of transportation and distribution of cars in sections are performed under a set of interrelated factors. Complete and valid consideration of these factors for complex road networks is possible only by means of mathematical models and corresponding software applications. Accuracy and consistency of the forecast determines validity of almost all the main characteristics of the designed object starting from direction of the route and location of connection points to the existing elements of the road network, ending with specific planning solutions for road facilities.

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Peer-review under responsibility of the organizing committee of the 12th International Conference "Organization and Traffic Safety Management in large cities"

Keywords: toll road; transportation model; traffic forecasting; simulation of traffic flows distribution

1. Introduction

Traffic forecasting is an essential element of efficient development of road networks of cities, districts and regions at the national level [Naumova and Zyryanov (2015)]. Development and implementation of a computer model of a transportation system of traffic gravity areas is the basis of traffic forecasting. Simulation of traffic distribution is based on internationally accepted principles of "user equilibrium model". This principle implies that the time spent on a trip depends on traffic at different sections of the road network, and the driver chooses trip routes

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considering the time to be spent. Such approach allows taking into account not only the structure of the road network and distances of different routes, but delays associated with traffic intensity [Federal Road Agency (Rosavtodor) of the Ministry of Transport of the Russian Federation (2003)].

2. Main text

In recent decades, toll roads have become widespread in many countries around the world; their number and length increase. Toll road management systems are also being developed. A lot of developing countries pursue programs of construction of toll roads with private investment, so that positive practice of development and implementation of toll road systems expands.

The paper reveals results of traffic forecasting for the road segment Km 1119 + 500 to Km 1195 + 000 of the road M-4 “Don” where it is planned to establish toll collection points in the nearest future. The project uses the data on traffic intensity, received during surveys conducted by the North Caucasian branch of OAO GIPRODORNII. The simulation area of the survey included the whole territory of the Krasnodar Krai and the Rostov Oblast. The simulation area was divided into separate traffic areas. These areas included territorial units characterized by relatively homogeneous social and economic parameters within such areas. Scheme of traffic intensity forecasting for toll roads and a transportation model structure are shown in Figures 1 and 2.

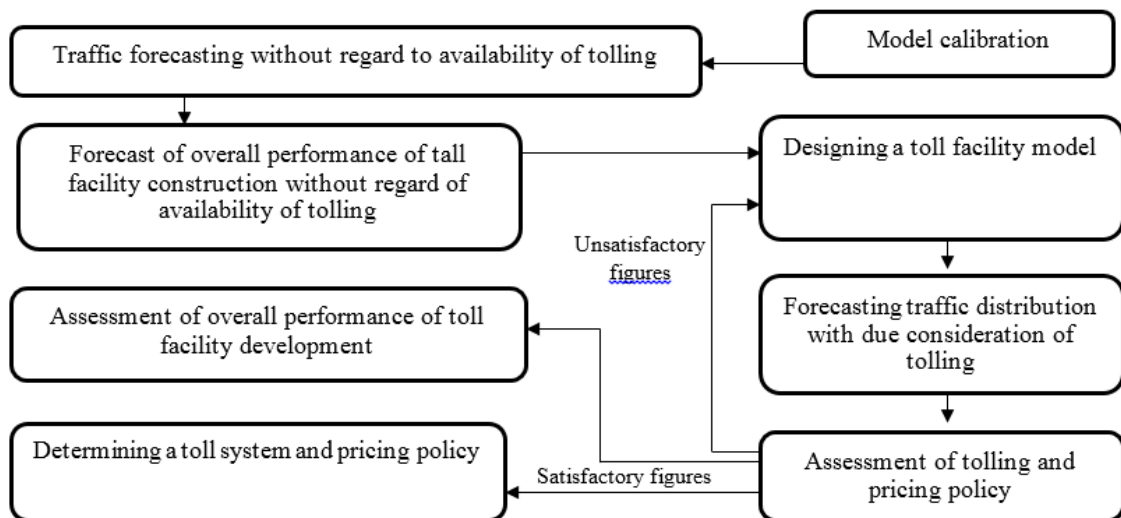


Fig. 1. Scheme of traffic forecasting on toll roads.

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