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Application of Geoinformation Technologies for the Transportation Demand Estimation

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Abstract

One of topic issues in estimating transportation demands deals with gathering baseline data and development of transportation models subject to special trips generators, which include large objects of population gathering. Study of characteristics describing operation of such objects in conjunction with application of geoinformation databases can significantly improve the quality of transportation simulation and estimation of transportation demand in the area of special trips generators.

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Keywords: transportation planning; transportation simulation; estimation of transportation demand; estimated transportation districts; special trips generators; generation of site visits; geoinformation databases

1. Main text

Development of activities on traffic management requires solutions on some transportation issues at the stage of transportation planning; one of the main challenges is estimating the transportation demand at the network level. The most common problem facing Russian engineers at the stage of transportation planning and simulation deals with the lack of updated source data required to evaluate the total volume of correspondence originating and disappearing in the target transportation areas. Another modern aspect is appearance of special focuses of population gatherings according to cultural and social purposes. In this regard, the modern transportation planning requires

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consideration of several types of target transportation districts. Comparing to the Soviet period, when forecasting correspondence was carried out primarily on the basis of labor correspondence, and given characteristics of residential, commercial and industrial areas, now a lot of large commercial facilities have been open while more and more citizens use their own cars, which led to additional traffic loads on the urban traffic network. The working mode of such facilities is different from residential or commercial areas.

Thus, there appears a necessity to take into account special transportation districts ("transportation analysis zone — TAZ") in Russian transportation planning; these districts differ in the nature of daily distribution of trips to them in comparison with the total distribution of trips of citizens and have clear morning and evening rush hours (special trips generators).

Special trips generators require classification of design transportation districts into basic, special (may comprise individual objects and groups of related objects similar in terms of total trips generation to major transportation districts), or enlarged (areas of high business activity; development of such areas should focus on using public transport) [Casello and Smith (2006), State department of highways and public transportation (1975)].

Thus, the following matters should be considered by traffic engineers:

- way of description (mode of operation, daily distribution of trips, separation between public and individual transports) and simulation of special design transportation districts;
- way to collect the baseline data to simulate details of transportation model (macro-, meso- and micro-levels) for different cases.

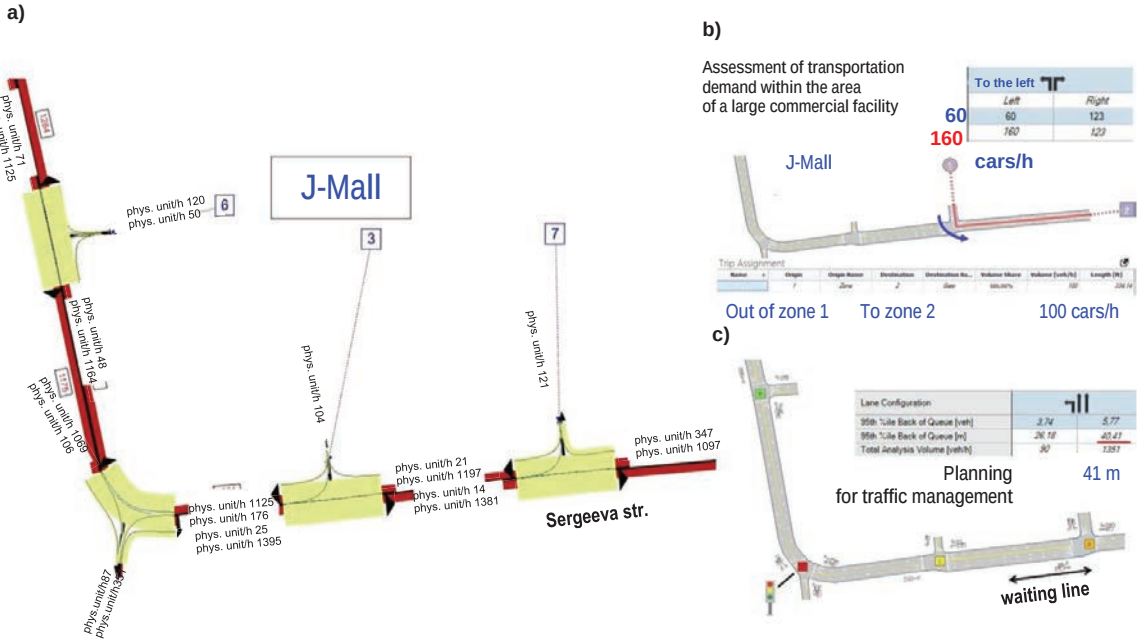

Fig. 1. An example of evaluation of transportation demand and choice of planning decisions in the area of a designed large-scale commercial facility: a) development of local transportation model (VISUM); b) analysis of distribution of flows on the models of quality assessment of traffic organization (VISTRO); c) selection of planning decisions for access areas of the object (VISTRO).

Figure 1 shows an example of a task chain for transportation planning, starting from development of a local model of the road network for the site with a designed large-scale commercial facility, assessment of distribution of traffic flows within the facility site, and selection of planning decisions to access points of the investigated object.

Another example showing the importance of studying the mode of special trips generators (which include military, medical and educational institutions, as well as large commercial objects and any other urban areas under

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