

Doctoral dissertation titled: "The impact of the bus stop location and traffic conditions on the reinforcement length of the road surface construction"

M.Eng. Przemysław Gardas

West Pomeranian University of Technology in Szczecin Faculty of Civil Engineering and Architecture,
Department of Roads and Bridges, Szczecin March 2017

ABSTRACT

The condition of the road surface at bus stops and lay-bys has been a problem over the years for urban managers responsible for their maintenance. In the 90s, many Polish cities introduced a modernized fleet characterized by significantly different parameters. An increase was also observed in the surface degradation rate of the bus stop areas. Since 1999, the (DoRaB) has conducted periodic research on the condition of road surfaces. Since 2009, the author of the dissertation has conducted the evaluation of the road surface conditions, along with cyclical research on bus traffic conditions in the area of bus stops and lay-bys. This dissertation is a compilation of the research.

As part of the research analysis, the author conducted a review of foreign design guidelines for stops and lay-bys, as well as guidelines regarding the adoption of reinforced surface construction. With reference to the Polish guidelines, the review of the design guidelines covered studies dating from the 50s up to the present day.

The main objective of the research was to outline places of increased impact of horizontal forces resulting from braking or moving after stops and eventually presenting their location convergence with identified damages and deformation of the road surface. The broad spectrum of research and its multistage nature required the development of a unified methodology for measuring time, speed, delays and acceleration along bus routes in the area of bus stops and lay-bys. The research covered dozens of bus stops and lay-bys, along which measurements were taken of dozens of buses travelling through several designated sections. Analysis and statistical inference were used to estimate the length of the increased impact of horizontal forces on the road surface. The analysis of the research results showed from the measurement stages, of the need for a separate examination of traffic conditions at bus stops and lay-bys, depending on their location relative to the nearest intersection. An important proposal also required taking into account various kinds of intersections. In this respect, it is the first time attempts have been made to estimate the length of intensified traffic at the stretch of the road surface in the area of bus stops and lay-bys.

The statistical inference performed confirms that the length of the increased impact of horizontal forces on the road surface depends on the location of the bus stop relative to the nearest intersection, type and cross-section of the adjacent roadway.

Przemysław Gardas