

THE FUNCTIONAL PURPOSE AND STRUCTURAL FEATURES OF ROAD
PAVEMENT ELEMENTS IN MODERN HIGHWAY DESIGN

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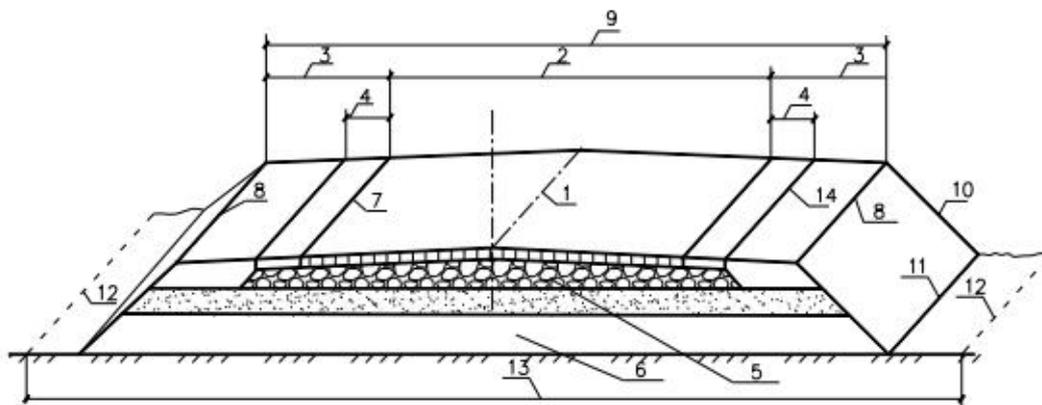
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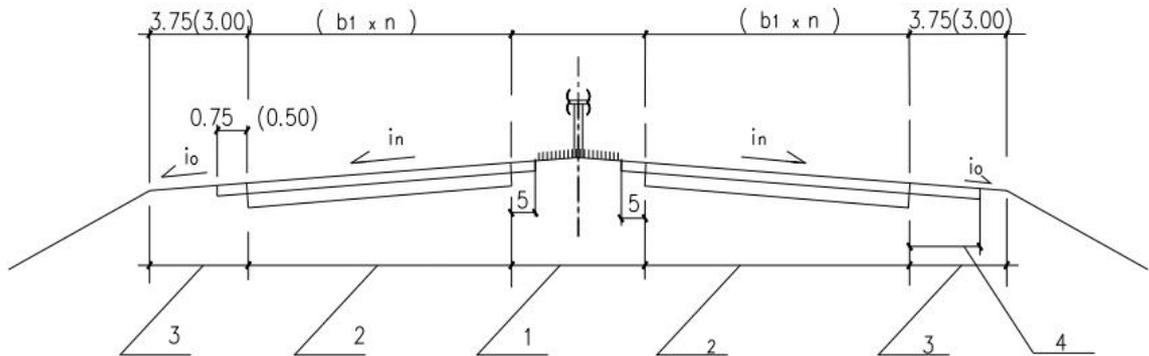
Annotation: This article analyzes the structural features of road pavements and their components, including roadways, sidewalks, reinforcing and dividing strips. On Category I roads, stopping lanes are provided, while roads of Categories II–V are designed with a two-lane carriageway. The paper also describes the geometric elements of the road route, such as horizontal and vertical alignments, with recommended curve radii and gradient values. The study aims to enhance road safety, durability, and operational efficiency through the proper design of road surfaces and alignments.

Keywords: roadway, pavement, sidewalk, dividing strip, cross-section, road alignment, curve radius, gradient, traffic safety.

The road surface includes the roadway, sidewalks, the dividing strip on Category I roads, reinforcing strips on the sidewalks and the dividing strip. On Category I roads, a stop lane is provided along the roadsides. The road surface on roads of categories II-V is designed with a two-lane roadway [1-3]. The cross-section of the road with a two-lane roadway passing through the embankment is shown in Figure 1.



In the transverse profile, roadway 2 and sidewalks 3 are distinguished, which together with the roadway form the road surface 9. The roadway is intended for the movement of vehicles and is bounded by the edges of the roadway 7. Roadsides are necessary for the forced stopping of vehicles. For increased traffic safety, reinforced strips 4 are installed on them [4]. To ensure good transport and operational properties, the roadway should be sufficiently smooth, durable, and rough [5]. Therefore, it is designed as a road surface laid on the ground. On multi-lane highways (Fig. 1.2), a separating strip 1 is introduced between the roadways 2 of the opposite traffic directions, designed to enhance traffic safety [6]. Reinforced strips 5 are provided on the dividing strip. In addition, stopping lanes 4 may be installed on the sidewalk 3 for emergency stopping of vehicles [7].



Road route - the axis of a two-lane highway or the roadway of the right or left lane of a multi-lane road of the I category. The trajectory of the automobile tract is a spatial line. The horizontal projection of the route is the route plan; the vertical is the longitudinal profile [8]. The plan and longitudinal profile of the route consist of straight lines and curves (horizontal and vertical).

Категория дороги	I-а	I-б, I-в, II	III	IV	V
Расчетная скорость (основная), км/ч	140	120	100	80	60
$R_{\text{вып мин}}, \text{ м}$	25 000	15 000	8000	4000	1500
$R_{\text{вог мин}}, \text{ м}$	8000	6000	4000	2500	1500
Уклон $i_{\text{max}}, \%$	40	40	50	60	70

In the course project, vertical curves (convex and concave) of constant curvature with radii R are used. The radii of convex (concave) curves should be taken not less than the recommended ones [9]. Recommended convex curve radii of at least 70,000 m on roads of category I-a and at least 25,000 m on roads of categories I-b-IV, recommended concave curve radius of at least 8,000 m on roads of categories I-IV. The recommended longitudinal slope of the route is 40%. In difficult terrain conditions, to reduce construction costs, it is permissible to reduce them to the minimum permissible values [10,11].

In conclusion, the study highlights the importance of understanding the functional and structural characteristics of road pavement elements in ensuring the safety, durability, and efficiency of modern highways. Each component of the pavement structure—such as the roadway, sidewalks, reinforcing and dividing strips, and stopping lanes—plays a specific role in providing stable and comfortable vehicle movement. The proper design of horizontal and vertical alignments, including the selection of curve radii and longitudinal gradients, significantly influences traffic safety and driving comfort. Adherence to recommended design standards allows engineers to reduce road wear, minimize accident risks, and enhance overall transport performance. Furthermore, considering the category of the road when determining pavement structure ensures an optimal balance between construction costs and long-term operational reliability. The research emphasizes that the integration of engineering precision, modern materials, and adaptive design principles is essential for building sustainable and efficient road networks that meet current and future transportation needs. Thus, a comprehensive approach to road pavement

design serves as a foundation for improving national transport infrastructure and supporting economic development.

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