عنوان مقاله:

Optimization of Horizontal Road Alignment Based on Parameters Affecting its Cost and Lifespan Using Genetic Algorithm

نویسندگان:

Saeid Aftabi Hossein - Ph.D, Department of Civil Engineering, Payame Noor University (PNU), P.O. Box ۱۹۳۹۵-۳۶۹۷, Tehran, Iran

Kamran Rahimov - Assistant Professor, Department of Civil Engineering, Payame Noor University (PNU), P.O. Box ۱۹۳۹۵-۳۶۹۷, Tehran, Iran

خلاصه مقاله:

This paper presents an approach for the optimization of horizontal road alignment with a focus on parameters affecting its cost and lifespan. The study area is the Bandar-e Anzali ۱۶Km bypass highway, situated in north Iran, which holds significant economic, cultural, and environmental importance. The goal is to find the efficient and cost-effective alignment that adheres to design standards. The proposed methodology employs a multi-objective optimization technique using genetic algorithms in MATLAB. Various cost parameters, safety indicators, and environmental constraints are considered as decision variables to formulate the target performance. The genetic algorithm efficiently explores the design space, providing optimal solutions that fulfill all requirements and constraints. The output model ensures a balanced and practical approach to road design. The route design data was collected and the important variables affecting the route design were determined. Then, the optimal balance was evaluated using the genetic algorithms method. After analyzing the generated data, we propose the optimal horizontal alignment as the final recommended option, with four horizontal arcs and a length of ۱۴.۹۹km. The results demonstrate the effectiveness of the genetic algorithm-based method in achieving an optimal alignment for the Bandar-e Anzali bypass highway. The proposed solution reduces road construction costs and enhances safety while considering environmental impacts. This study highlights the importance of considering multiple parameters and utilizing advanced optimization techniques to achieve sustainable and cost-effective road designs. The proposed approach provides decision-makers with valuable tools to explore a wide range of design options and select the favorable alignment for construction.

کلمات کلیدی:

Road Geometric Design, Horizontal alignment optimization, Safety Considerations, Environmental Impact, Genetic Algorithm

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