

Determining the critical length in upgrade two-lane highways

Dr. Khaled Shihabi*

Abstract

Critical Lengths of Grade is the length of graded road that a vehicle can pass without significant reduction in its speed. (i.e. reduction should not exceed 15 km/hr). If the length of upgraded road exceeds the critical length, an additional lane must be added for decelerating heavy trucks (this lane is called climbing lane). Codes give the critical length by charts or tables depending on specific speed. For example, 110 km/h speed is considered as entering in AASHTO code. Therefore, it's necessary that determining the value of critical length by general and simple relationship. In this research, a relationship was obtained depending on the main principles of dynamics. Also, the derived formula was evaluated.

Keywords: Critical length-Climbing lane- Maximum grade- Standard truck.

For the paper in Arabic see pages (129–137).

* Lecturer at international university of science and technology (IUST)- Engineering Faculty- Civil and Environment department.

References:

1. AASHTO (American Association of State Highway and Transportation Officials). A policy on Geometric Design of Highway and streets, Washington, DC. AASHTO 6th edition, 2011.
2. Fred L. Mannering, Walter P. Kilareski, and Scott S. Washburn. "Principles of Highway Engineering and Traffic Analysis", John Wiley & Sons, Inc., 5th edition, 2013.
3. Lester A. Hoel, Nicholas J. Garber, and Adel W. Sadek. "Transportation Infrastructure Engineering, A Multimodal Integration", Cengage Learning, SI edition, 2011.
4. Lester A. Hoel and Nicholas J. Garber. "Traffic and Highway Engineering", Cengage Learning, SI edition, 2010.
5. R.C. Hibbeler. "Engineering Mechanics Statics and Dynamics", Pearson Prentice Hall, 12th edition in SI units, 200
6. NCHRP, (NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM). Review of Truck Characteristics as Factors in Roadway Design, WASHINGTON, D.C. Transportation Research Board 2003.