

Black Spots and Remedies for Black Spots on Transportation Routes in Hai Phong, Vietnam

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ABSTRACT: Traffic accidents have long been a threat to human life, causing serious consequences. Traffic accidents are always linked to transportation and are now becoming a social problem that every country and region is facing. Therefore, every locality and every country must implement solutions to reduce and gradually eliminate traffic accidents. These solutions include technical measures, vehicle management, and the awareness of road users.

KEYWORDS: Traffic Safety; Black spots; Traffic accidents

I. INTRODUCTION

1. Overview of the road traffic accident situation in Vietnam:

In Vietnam, road traffic accidents are divided into three types:

- Category 1: Minor traffic accidents - these are accidents with less damage than the serious traffic accidents listed below.
- Category 2: Serious traffic accidents – these are traffic accidents that result in the death of 1 or 2 people; cause health injuries to 1 to 4 people with an injury rate of 31% or more per person; or cause health injuries to many people with an injury rate of less than 31% per person but a total injury rate of over 41% for all victims.
- Category 3: Particularly serious traffic accidents – these are traffic accidents that result in the death of 3 or more people; or those that result in the death of 2 people and have consequences falling under one of the levels of Category 2...

According to statistics, in 2025 the number of traffic accidents and fatalities decreased compared to 2024, but the number of serious accidents increased.

Traffic accidents mainly occur on national highways (35%) and within urban areas (31%). Motorcycles are the primary means of transportation involved in accidents (accounting for nearly 70%). And up to 40% of accidents occur between 6 PM and midnight.

There are many causes of traffic accidents, but they can be broadly categorized into three main reasons:

- Disadvantages of roads and the environment: due to poor initial road design, failing to meet traffic safety requirements; sometimes the initial design meets the requirements, but after a period of operation, traffic demands change and become more stringent, rendering the current structure inadequate...
- Defects and damage to vehicles and means of transport participating in traffic.
- Traffic violations: manifested through driving behaviors such as exceeding the speed limit, failing to yield, reckless overtaking, lack of concentration leading to failure to see and properly assess traffic situations; using alcohol while driving, etc.

2. Perspectives on traffic accident hotspots

According to Vietnamese standards, a traffic accident black spot (or simply black spot) is an area on a road where, according to statistics from the last three years, accidents frequently occur, with an average of two or more serious accidents per year.

According to the definition in traffic safety studies from other countries: a traffic accident black spot on a national highway is a section of highway, in any part of the road with a maximum length of 100m, that has at least 4 traffic accidents resulting in injuries within a 4-year period.

Black spots form and exist due to a combination of factors:

- Environmental factors affecting roads: These are reflected in the design, construction, and maintenance phases of the road network.
- Driving conditions: Road surface roughness and vehicle speed.
- Human factors in traffic participation: The health of traffic participants, their awareness and driving skills.

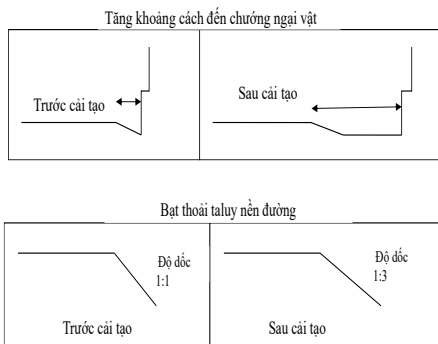
And finally, there must be a special spot on the road: a place where traffic accidents have occurred frequently, causing loss of life and property.

3. Some solutions to address traffic black spots on national highways.

Solutions to address traffic black spots include technical solutions (improving road quality) and solutions related to improving the awareness and skills of road users.

3.1, Improving the road surface:

Road surface improvement can involve localized widening of a section of road or improvements to the entire route.



This improvement should be based on the current terrain conditions, minimizing impact on existing buildings and houses in the vicinity. Road widening should be carried out in areas near intersections, schools, etc.

3.2. Add traffic lights, signs, protective barriers, median strips, and corrugated iron roofing:



Additional signage according to Vietnam road regulations



Road markings comply with QCVN 41:2012

3.3 . Measures to reduce vehicle speed:

Vehicle speed is a significant factor in traffic accidents. Therefore, reducing vehicle speed in necessary areas will contribute to reducing traffic accidents. Speed reduction is achieved through the installation of speed-reducing structures on the road surface such as speed bumps, speed reducers, speed reduction plates, etc., combined with traffic signs.



Rubber speed bumps



Speed humps made of asphalt

3.4. Improving the intersection:

At intersections with high traffic density, the intersection can be improved by using at-grade or grade-separated interchanges.



Different level intersection



At-level intersection (roundabout)

A grade-separated intersection is necessary when traffic volume is very high and traffic directions are intertwined.

At-grade intersections: Depending on the traffic volume and the composition of traffic participants,

intersections can be constructed with traffic islands, traffic lights, or simply signs and road markings. In addition to the measures mentioned above to limit and eliminate traffic black spots, we need to implement other measures simultaneously, such as: promoting traffic safety education, strengthening vehicle inspections, enforcing road traffic laws, and improving medical facilities and resources.

4. Some traffic hotspots in Hai Phong and solutions to address them.

Currently, there are quite a few traffic black spots in Hai Phong. Typical examples include intersections on National Highways 10 and 5, and Route 353...



Quan Toan intersection – National Highway 10



356 Dinh Vu Street

These areas with potential traffic safety risks often have high traffic density, deteriorated road surfaces with potholes and uneven surfaces; and missing or malfunctioning road markings, signs, and traffic lights, making accidents more likely.

Along with inherent traffic safety risks, tractor-trailer trucks are also identified as a major potential culprit in causing traffic safety disruptions (42.3% of fatal traffic accidents in the first six months of 2023 involved tractor-trailer trucks). Currently, the number of tractor-trailer trucks in Hai Phong is approximately 17,000, while the traffic infrastructure has not met the demand. Furthermore, when driving in the city, some drivers still speed, take corners without proper observation, or use mobile phones while operating the vehicle. Meanwhile, many electric bicycle and motorbike riders lack awareness when participating in traffic. Therefore, traffic accidents are increasing. Some solutions to address and eliminate traffic black spots in Hai Phong.

At intersections with high traffic density, the city has invested in building overpasses to reduce conflicts between different traffic directions.



BigC – Le Hong Phong overpass

Furthermore, for sections of road that are degraded or whose scale does not meet the current traffic volume, the chosen solution is to invest in upgrading and expanding them. The addition of traffic lights, lane markings, and speed bumps has also contributed to reducing traffic accidents. Besides these technical solutions, authorities have also intensified inspections and enforcement against vehicles exhibiting behaviors that pose a potential risk of traffic accidents, such as: driving in the wrong lane, overloading, and driving under the influence of drugs.



Treating wheel ruts



Renovate and upgrade National Highway 10

Enhancing the effectiveness of disseminating legal information and educating road users, especially truck drivers, on traffic safety regulations needs to be prioritized and implemented comprehensively.

CONCLUSIONS

With these measures, Hai Phong has successfully reduced traffic accidents and completely eliminated traffic black spots. This work has contributed to building Hai Phong's image as a

dynamic, civilized, and modern port city in the eyes of friends and investors.

REFERENCES

- [1]. M. Sajjad Hasan¹, Jawad Hussain Research Scholar, Department of Civil Engineering, UET Taxila, Pakistan Professor, Department of Civil Engineering, UET Taxila, Pakistan Accident : Analysis and Method Comparison of Finding Black Spots on M-(Lahore-Islamabad) Motorway, Pakistan
- [2]. Hafeez & M. A. Kamal: Accidents Black Spots On Highways And Their Low Cost Remedial Measures
- [3]. K Elena, E Sergei, R Jaroslaw - Architecture and Engineering, 2020: potential for improving the procedure of inspecting road traffic accident black spots
- [4]. Jinfen Zhang, Chengpeng Wan, Di Zang: A two-stage black-spot identification model for inland waterway transportation
- [5]. Huy Huu Nguyen, Pichai Taneeranaon: Safety-Potential-Based Black Spot Safety Management Approach: A Case Study in Ho Chi Minh City
- [6]. Gashaw Fekadu, Prof. Emer T. Quezon: Identification of Road Traffic Accident Blackspot locations and its countermeasures in Oromia Region, East Wollega Zone
- [7]. Sanath A H Post Graduate Student, Ramaiah University of Applied Science, Bangalore, Karnataka, India. Prioritization of black spots in east bangalore & improvements of geometrics to black spot in outer ring road
- [8]. Nicole S. Ngo, Krishna Anand. Affordable transportation access to treatment for opioid use disorder
- [9]. J Sun, GR Lovegrove, P Eng, E Boozarjomehri... Effectiveness of transferred community-based, macro-level collision prediction models in road safety improvement
- [10]. Ren C, Liping, - Ottawa, Ontario, Canada – 2003. Identifying blackspots at highway-rail grade crossing in canada