Infrastructure For Safe Distance Management On Expressways: Lessons From France For Vietnam

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ABSTRACT

Maintaining a safe distance is a key factor in preventing accidents on expressways. In practice, drivers estimate this distance based on experience, assistance from in-vehicle devices, or support from expressway infrastructure. However, the technical infrastructure on Vietnam's expressways currently remains limited and lacks continuity in supporting safe distance determination. This study evaluates the current state of technical infrastructure supporting safe distance identification on Vietnamese expressways and compares it with the well-developed system in France. The research collects and analyzes domestic and international regulations, technical requirements, and practical implementations. Results show that infrastructures such as lane markings and signs in Vietnam are installed sporadically, without continuous coverage along the expressway, and are mostly absent in tunnels. In contrast, France systematically integrates safe distance support throughout the entire route, using elements like lane markings and blue lights or chevrons, including inside tunnels. Based on these comparisons, the study proposes improvements for Vietnam by integrating safe distance support into existing infrastructures, such as emergency lane markings, and adding visual signals in tunnels. These improvements should be standardized in regulations and circulars and incorporated into driver training programs to enhance implementation effectiveness and reduce accidents related to safe distance issues.

KEYWORDS: Safe distance, Expressway, Regulation, Vietnam, France

1. Introduction

In the context of increasing urbanization and the modernization of transportation systems, expressways play a vital role in enhancing regional connectivity and promoting socio-economic development. As traffic volumes continue to grow, however, the risk of road accidents on expressways also increases significantly. Among the leading causes of serious collisions is the violation of safe following distances, which poses a persistent threat to driver and passenger safety (**Figure 1**). Ensuring adherence to safe distance regulations is therefore a critical component in efforts to improve expressway safety and reduce the frequency and severity of crashes.

Figure 1: Collision on the Dau Giay – Phan Thiet Expressway

(Tư Huynh, 2025)

The term "safe distance" in this study refers to the minimum physical or temporal gap that must be maintained between two vehicles traveling in the same direction to prevent collisions in case of sudden deceleration or emergency braking by the leading vehicle. This distance accounts for the driver's perception-reaction time and vehicle braking capabilities under varying traffic, road, and environmental conditions. The safe distance is a fundamental concept in traffic safety and is commonly quantified by principles such as the "two-second rule," which recommends maintaining a time gap of at least two seconds between vehicles (CR, 2025).

More broadly, road traffic crashes constitute a major global public health concern, claiming approximately 1.19 million lives each year, according to statistics published by the World Health Organization (WHO) in 2023. Alarmingly, 92% of these fatalities occur in low- and middle-income countries, even though these countries possess only about 60% of the world's vehicles. This stark imbalance highlights underlying disparities in road safety infrastructure, law enforcement, and public awareness. In addition to the human toll, road accidents also impose heavy economic burdens - equivalent to around 3% of GDP in most nations. These realities emphasize the urgent need for comprehensive, effective, and equitable traffic safety strategies worldwide (WHO, 2023).

Recent studies have examined safe following distance management on expressways from both theoretical and practical perspectives (Wu and Fu, 2023). They developed a braking process model to quantitatively determine safe distances under varying speeds and road gradients, providing a

scientific basis for infrastructure design. Another study outlined technical requirements for intelligent transportation systems (ITS) supporting connected and automated vehicles, which have been widely implemented in developed countries to assist drivers in maintaining safe distances (Singh and Kim, 2017). Comparative policy research has also revealed substantial gaps in road safety infrastructure, enforcement, and driver behavior between developed and developing nations (Johnny, 2025).

Practical examples underscore the importance of infrastructure-based solutions. The "Zero Fatality Corridor" initiative in India achieved a 52% reduction in fatalities on the Mumbai–Pune Expressway through integrated measures, including improved road markings, enhanced enforcement, and public education (Tewari, 2022). In Europe, the EuroRAP programme has shown that relatively simple infrastructure improvements could save up to 50,000 lives annually and yield economic savings equivalent to 0.5% of GDP (EuroRAP, 2010).

In Vietnam, according to statistics from the Ministry of Public Security, 112 road traffic accidents occurred on expressways during the first seven months of 2024, resulting in 46 fatalities and 82 injuries. Notably, failure to maintain a safe following distance accounted for 5.3% of the total number of accidents (Thái Sơn, 2024). Several studies have pointed to critical shortcomings in expressway infrastructure, such as the absence of emergency lanes and continuous median barriers on two-lane expressways, which heighten collision risks (Đỗ *et al.*, 2025). Although ITS deployment is planned for the entire national expressway network by 2025, current coverage is limited to a small number of routes (Phan, 2025).

In developed countries, ensuring safe following distances on expressways is not solely reliant on driver awareness but is strongly supported by modern technical infrastructure, including advanced traffic management systems and clear road markings (VC20121231, 2013). Meanwhile, in Vietnam, although the expressway network is rapidly expanding and infrastructure measures for maintaining safe distances have been addressed in Regulation No. 38/2024/TT-BGTVT (38/2024/TT-BGTVT, 2024), their implementation remains limited. Moreover, there is still a lack of in-depth studies comparing the safe distance support infrastructure systems between Vietnam and advanced countries, which would serve as a basis for proposing suitable solutions for implementation.

This paper aims to assess the current state of infrastructure supporting safe following distances on expressways in Vietnam. It then compares these findings with advanced models from developed countries to identify best practices and propose improvement strategies. The goal is to enhance the effectiveness of safe distance management in Vietnam's expressway traffic system, thereby reducing accident risks and improving overall road safety.

First, the research methods employed in the study are introduced. Next, the current conditions of safe distance support infrastructure in Vietnam are analyzed. Following that, the system used in France is examined as a representative model of international best practices. A comparative analysis is then conducted between domestic and international approaches to propose effective infrastructure-based solutions for safe distance control on Vietnamese expressways. The paper concludes with a summary of findings and suggestions for future research directions.

2. Method

This research employed a comprehensive and structured data collection approach to ensure both the accuracy and relevance of the findings. A total of 9 national and international technical standards, regulations, and guidelines on road traffic and expressway safety were compiled, with a particular emphasis on those relating to safe following distances. Key documents included QCVN 41:2024/BGTVT – National technical regulation on road signs in Vietnam (QCVN 41:2024/BGTVT, 2024), Circular No. 38/2024/TT-BGTVT of Vietnam – Regulation on speed limits and safe following distances for motor vehicles and special-use vehicles participating in road traffic (38/2024/TT-BGTVT, 2024), French road traffic code on safe distances (R412-12, 2003), French decree of 16 February 1988 concerning approval of amendments to the Interministerial instruction on road signage: Part 7 – Road surface markings (VC20121231, 2013), French interministerial instruction on road signage dated 22 October 1963 (VC20151208, 2015), French decree of 13 June 2022 regarding the modification of road signage (INTS2212512A, 2022), Safety distances in road tunnels in France (CETU, 2011), Driving on the expressway in France (SR, 2025) and New road signs in the French road traffic code (SR, 2022). In addition, 15 peer-reviewed academic articles, conference papers, and other documents were reviewed, focusing on safe following distance management, and comparative infrastructure studies between developed and developing countries. From these sources, the study extracted legal definitions and operational requirements for safe following distances at various speeds and conditions, road marking types and placement rules, signage types and usage frequency, parameters for calculating safe distance.

The safe following distance between vehicles was calculated using the widely accepted "two-second rule," which emphasizes maintaining a minimum time gap to ensure sufficient reaction and braking time. Specifically, the safe distance D is derived by multiplying the vehicle's speed V (expressed in meters per second) by a time interval t of two seconds, i.e., $D = V \times t$. This approach accounts for the driver's perception-reaction time and provides a dynamic safety margin that adapts to varying speeds. However, under adverse operational conditions such as poor weather (rain, fog, snow), challenging terrain (steep gradients, winding roads), reduced visibility (nighttime, dust, smoke), and road surface conditions (wet, icy, or uneven surfaces), the required safe distance should be increased beyond the standard two seconds to allow for longer reaction and braking times. Incorporating these factors ensures enhanced safety margins and better prevents collisions in less favorable driving environments. This time-based method offers a practical and effective means to reduce collision risks under a wide range of normal and adverse conditions and is commonly incorporated into traffic safety

guidelines worldwide (CR, 2025).

A structured comparative analysis was then conducted between Vietnam and France, focusing on technical standards, integration of distance aids with other infrastructure elements. The effectiveness of various infrastructure types was evaluated based on three main criteria: ease of use and operational efficiency, feasibility of implementation, and investment and maintenance costs. Unlike previous studies that have not undertaken direct comparisons of technical infrastructures for safe distance determination between Vietnam and other countries, this study contributes to the field by conducting a detailed comparative analysis of Vietnamese and French standards. Furthermore, a multi-criteria feasibility assessment is employed to ensure that the proposed solutions are both practical and contextually appropriate for implementation in Vietnam.

3. Review of infrastructure supporting safe following distance

This section provides a comprehensive review of the existing infrastructure and regulatory frameworks supporting safe following distances on expressways in Vietnam and France. Detailed descriptions of the types of signs, road markings, and distance reference systems currently in use are presented to establish the technical context. Following this, a comparative analysis is conducted to evaluate differences, advantages, and limitations between the two countries' approaches, and to assess the applicability of the French model in the Vietnamese context. This structure ensures clarity by separating descriptive background information from comparative insights and findings.

3.1. Infrastructure supporting safe following distance on expressways in Vietnam

According to Circular No. 38/2024/TT-BGTVT issued by the Ministry of Transport (38/2024/TT-BGTVT, 2024), a safe distance is the minimum gap between a following vehicle and the vehicle directly ahead in the same lane, ensuring the ability to avoid a collision in case the front vehicle suddenly slows down or stops. Under dry road conditions, with no fog, non-slippery surfaces, flat terrain, straight roads, and clear visibility, the safe distance corresponding to each speed is regulated in **Table 1**.

Table 1: Safe distance corresponding to each speed in Vietnam (38/2024/TT-BGTVT, 2024)

Travel speed (V km/h)	Safe distance (m)
V = 60	35
60 < V ≤ 80	55
80 < V ≤ 100	70
100 < V ≤ 120	100

When driving at speeds below 60 km/h, drivers and operators of special-use vehicles must proactively maintain a safe distance appropriate to the vehicle directly ahead. This distance depends on traffic density and actual road conditions to ensure traffic safety. In conditions of rain, fog, slippery roads, winding terrain, mountain passes, or limited visibility, drivers must maintain a greater safe distance than the value indicated on traffic signs, or the value specified in **Table 1**.

To remind drivers to maintain a safe following distance and to assist them in judging the distance to the vehicle ahead, various traffic signs and road markings are installed along expressways. Firstly, sign No. IE.471 with black text on a fluorescent yellow background and a black border is installed to indicate the required safe following distance (**Figure 2**).

Figure 2: Sign No. IE.471 indicating safe driving distance (QCVN 41:2024/BGTVT, 2024)

The installation of sign IE.471 is mandatory. However, the regulation does not specify the exact location or mandatory number of IE.471 signs on expressways (QCVN 41:2024/BGTVT, 2024). The installation of this sign depends on the assessment of the traffic management authority, based on factors such as:

- The traffic volume and speed of vehicles on the route.
- The geometric characteristics of the road (long straight sections, slopes, curves).
- Areas with frequent accidents or a high risk of collisions.
- Locations before intersections, toll booths, overpasses, and underpasses.

Secondly, marking 7.8 is used to determine the distance on the road, helping drivers know they need to increase the gap to ensure safety with the vehicle ahead (QCVN 41:2024/BGTVT, 2024). This marking is often used on expressways in areas prone to accidents caused by overtaking or rear-end collisions, or in locations with special requirements (**Figure 3**). The markings are in the form of white solid pointed lines running parallel to the centerline of the road. Every 50 meters, a group of markings (2 markings per lane, spaced 5 meters apart lengthwise) is arranged along the road over a length of 200 meters (5 groups of markings per lane).

Thirdly, according to Circular No. 38/2024/TT-BGTVT (38/2024/TT-BGTVT, 2024), when operating a vehicle on the road, drivers must maintain a safe distance from the vehicle directly ahead in the same lane or roadway, moving in the same direction. In areas with a sign indicating the 'Minimum distance between vehicles,' they must maintain a distance not less than the value specified on the sign. Accordingly, the green signs displaying numbers such as 0m, 50m, and 100m serve as distance reference points (**Figure 4**). Drivers rely on these signs to estimate how many meters separate their vehicle from the one in front, allowing them to maintain a safe following distance. These signs may stand alone or be accompanied by road surface markings, both designed to help road users accurately judge the safe distance from their position to the vehicle ahead.

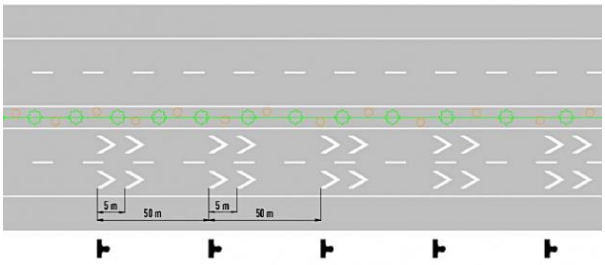

Figure 3: Placement of vehicle distance marking on the road (QCVN 41:2024/BGTVT, 2024)

Figure 4: Safe distance signboard on the Mai Son Expressway (Phạm Hải, 2024)

For the tunnel sections of expressways, the maximum and minimum speeds, as well as the safe following distance for vehicles, are clearly indicated on signs placed outside the tunnel entrance. However, inside the tunnel, there are no infrastructure systems in place to assist drivers in maintaining this safe distance. Drivers must rely entirely on their own experience or the principles they have learned to judge and maintain appropriate spacing.

Vietnam's expressway infrastructure incorporates a combination of regulatory signs, road markings, and distance reference systems to support drivers in maintaining safe following distances. However, these measures only appear locally at specific, high-risk areas of the expressway, rather than being consistently present along its entire length. Circular No. 38/2024/TT-BGTVT and QCVN 41:2024/BGTVT provide the legal and technical basis for these measures. Mandatory signage such as IE.471, vehicle distance markings like 7.8, and green distance reference signs (e.g., 0m, 50m, 100m) play a critical role in enhancing driver awareness and reducing rear-end collisions, particularly in high-risk or complex traffic zones. However, expressway tunnels currently lack infrastructure to help drivers judge and maintain safe distances.

3.2. Infrastructure supporting safe following distance on expressways in France

Within the scope of this study, the infrastructure model supporting safe distance in France is chosen for comparison because the expressway system in this country has been developed for a long time and has extensive experience from practical implementation. The first section of expressway to open was the A1, connecting Lille to Carvin, in 1951. As of now, there are approximately 12,000 kilometers of expressways distributed throughout France (Boluze, 2025).

On the expressway, the speed limit is 130 km/h (110 km/h in rainy or foggy conditions). Certain sections may be limited to 110 km/h or even 90 km/h. In construction zones, it is recommended to reduce speed to 90 or 70 km/h. In exit ramps, at service areas, or toll booths, the speed limit is 70 or 50 km/h (Boluze, 2025).

According to the French road traffic code, when two vehicles are traveling in the same lane, the driver of the following vehicle must maintain a sufficient distance to avoid a collision in the event of sudden deceleration or an abrupt stop by the vehicle ahead. This distance increases with speed and should correspond to the distance traveled in a time interval of at least two seconds. Outside urban areas, if the vehicles or vehicle combinations have a maximum authorized weight exceeding 3.5 tons or a length greater than 7 meters and travel at the same speed, the safety distance must be at least 50 meters. However, these provisions do not apply to military convoys and transports, national police units, or vehicles of civil security instruction and intervention units, which are subject to specific regulations. Additionally, for road infrastructures with particular risks, the authority empowered with police powers may impose greater safety distances between vehicles (R412-12, 2003).

Based on the two-second principle described above, the safe following distance can be expressed as:

Distance (m) = Speed (m/s) x 2s ≈ Speed (km/h) x 0,556

A simplified mental calculation involves taking the tens digit of the speed (in km/h) and multiplying it by 6, so:

Distance ≈ Speed (km/h) x 0,6

Since 0,6 is close to 0,556 from the exact formula, this serves as a convenient rounded approximation (CR, 2025). The corresponding safe following distances for various speed values are presented in the **Table 2**.

Table 2: Safe distance corresponding to each speed in France

Travel speed (V km/h)	Safe distance (m)	
	Exact formula	Memory shortcut
60	33,3	36
80	44,4	48
100	55,6	60
120	66,7	72
130	72,2	78

The infrastructure measures supporting safe distance are mentioned in Decree of February 16, 1988, regarding the approval of amendments to the interministerial instruction on road signage. To help determine the safe distance between vehicles traveling on the expressway, T4-type broken lines are used. This line marks the boundary of the emergency stopping lane on standard sections (excluding access ramps) of expressways and dual carriageways with grade-separated intersections. It consists of white stripes 39 meters long, separated by 13-meter gaps (VC20121231, 2013). The position and characteristics of the T4 road marking are presented in **Figure 5**.

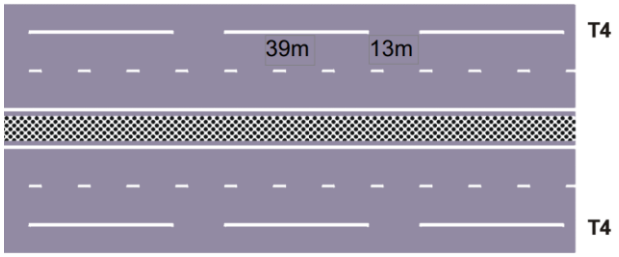

Figure 5: T4 line both separates lanes and helps determine safe following distance (VC20121231, 2013)

On the expressway, to maintain a safe distance when driving at 130 km/h, one must keep a distance of at least two white lines of the T4 emergency lane marking, as illustrated in **Figure 6**. This distance corresponds to approximately 100 meters.

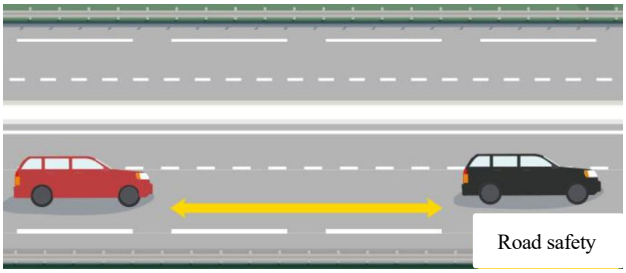

Figure 6: Safe distance equivalent to two white lines of T4 (SR, 2025)

By observing the number of white lines on T4 markings relative to the vehicle ahead, the following vehicle can easily estimate the distance between the two vehicles. Furthermore, the T4 line runs continuously along the entire length of the expressway on both sides, ensuring consistent support for vehicles in maintaining a safe following distance.

Moreover, the reminder signage indicating the spacing that users must maintain between their vehicles is optional. It is provided by signs SR2a, SR2b, and SR2c placed every 300 meters (**Figure 7**). This signage is installed on sections of expressways or dual carriageway roads with grade-separated junctions where the edge marking is of type T4 (VC20151208, 2015).

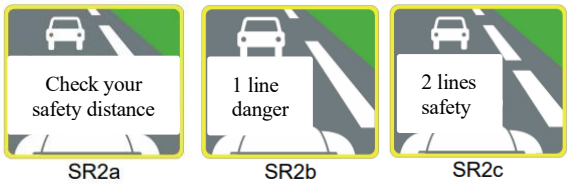

Figure 7: Signs indicating safe driving distance (VC20151208, 2015)

Decree of June 13, 2022 (INTS2212512A, 2022) introduces signs related to safe following distances in tunnels. The required distances in tunnels may exceed those dictated by the general two-second rule. The signage is available in two versions (one showing two cars, and the other showing a car and a truck) designed to alert drivers to maintain adequate spacing (**Figure 8**). Drivers are encouraged to use the blue markers installed within tunnels to judge their distance from the vehicle ahead. In general, maintaining a gap of two blue lights between vehicles is recommended, while heavy goods vehicles may be required to maintain a distance equivalent to three blue lights in certain tunnels. The spacing between the blue markers corresponds to the distance indicated on the traffic sign specifying the required safe following distance before entering the tunnel. For example, in the Mont-Blanc and Fréjus tunnels, the spacing between the blue lights is 150 m (MBF, 2023). The safe distance in tunnels depends on factors such as tunnel geometry, speed limits, vehicle types, safety standards, and past incident experience.

In road tunnels, due to the potentially dramatic consequences of even a minor incident, maintaining a minimum distance between vehicles is a crucial safety measure. Respecting this safety distance not only reduces the number of vehicles inside the tunnel but also helps to smooth traffic flow and significantly lower the risk of accidents. It also encourages drivers to keep a safe distance when stopped. In the event of a fire, the spacing between stationary vehicles offers a significant safety advantage. It allows road users to be more evenly distributed across the available emergency exits. This spacing also helps prevent the fire from spreading from one vehicle to another. Additionally, it makes it easier for emergency and rescue services to access the scene and respond effectively (CETU, 2011).

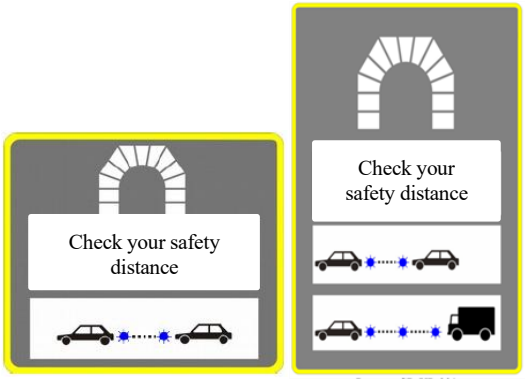

Figure 8: Signs related to safe distances in tunnels (SR, 2022)

To serve as a reminder, regulatory signs placed before tunnel entrances clearly indicate the applicable speed limits and the minimum safe following distance.

In the same way as the blue markers, painted chevrons on the ground can also be used to indicate the applicable safety distance. The chevrons can be used either independently or as a complementary measure to the blue markers (**Figure 9**). When used together, they enhance safety and visibility in road tunnels. In tunnels that are already equipped with blue markers, the chevrons should be placed directly in line with them. This alignment helps to reinforce both the visibility and the complementarity of the two systems, as illustrated in the figure below (CETU, 2011).

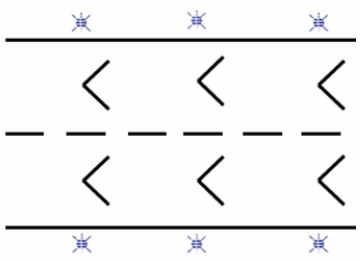

Figure 9: Positioning of chevrons and blue markers (CETU, 2011)

The French model offers a comprehensive and well-established system for maintaining safe following distances on expressways and in tunnels, making it a valuable reference for comparative studies. With a longstanding expressway network exceeding 12,000 kilometers, France integrates a variety of infrastructure and regulatory measures to support safe distances. These include speed-dependent distance rules, the use of T4 road markings to visually aid drivers in estimating gaps, and the deployment of SR-series reminder signs. In tunnels, where risks are heightened, France enforces stricter rules using blue marker lights and, more recently, ground-painted chevrons, which can operate independently or in combination to improve driver awareness. These coordinated measures not only reduce collision risks but also support smoother traffic flow and improved emergency response in critical environments.

3.3. Comparative analysis and applicability to Vietnam

Regulations on the maximum weight and height of vehicles traveling on expressways differ between Vietnam and France. These differences may affect braking performance, visibility, and driving behavior, thereby influencing the determination of safe following distances. However, this study does not delve into a comparison of these factors, focusing instead on roadway infrastructure that assists drivers in perceiving and maintaining an appropriate distance from the vehicle ahead.

Both Vietnam and France have implemented technical infrastructure measures, such as road signs and markings, to assist drivers in maintaining a safe following distance on expressways. However, notable differences exist in terms of continuity, integration, and cost-effectiveness.

In Vietnam, for open-air expressway sections, the infrastructure supporting distance estimation is categorized into three main types: regulatory signs, road surface markings, and distance reference systems. These are deployed locally at specific locations along the expressway rather than consistently throughout the entire route. This discontinuous implementation reduces the system's overall effectiveness, as drivers are left without guidance for long stretches of the expressway. Additionally, these elements are installed independently and are not functionally integrated with other infrastructure components. As a result, the potential for multi-functional use is not fully realized, leading to increased construction and maintenance costs, as well as adding unnecessary complexity to the issue and creating confusion for users.

By contrast, the French model demonstrates a more systematic and cost-efficient approach. In addition to regulatory signage reminding drivers to maintain safe distances, France integrates distance estimation aids directly into the design of emergency lane markings. Specifically, the dashed lines separating the emergency lane serve a dual purpose: delineating the lane and allowing drivers to estimate distance based on the number of line segments between vehicles. This integrated design eliminates the need for additional markings or specialized signs, such as the chevrons markings used in Vietnam, resulting in both operational and financial efficiencies.

In terms of expressway tunnels, Vietnam currently only employs signs outside the tunnel entrance to indicate maximum and minimum speeds, as well as recommended safe distances. Within the tunnel itself, however, there are no visual aids or systems to support distance estimation. In contrast, France utilizes a combination of illuminated blue lights, chevrons markings, or both to help drivers gauge distance inside tunnels. These visual cues provide continuous support and contribute to safer driving conditions in enclosed environments.

Based on this comparative analysis, it is recommended that Vietnam consider enhancing its expressway infrastructure to provide continuous and integrated support for safe distance estimation. On existing open-air expressways, the emergency lane markings currently conforming to Type 3.1a standards (as shown in **Figure 10**) could be redesigned using dashed patterns, following the French approach. This would offer consistent visual cues for distance estimation throughout the expressway without the need for additional signage.

For newly constructed expressways, the adoption of this dual-function lane marking system from the outset would simultaneously fulfill the role of emergency lane separation and distance estimation assistance. This would reduce paint application costs and eliminate the need for standalone distance signs or markings.

Figure 10: Emergency lane and road edge lane markings (Nguyễn Nga, 2023)

Regarding tunnels, it is advisable to retrofit existing tunnels with blue indicator lights or chevrons markings to assist drivers in estimating safe distances. For new tunnels, such features should be incorporated into the design from the beginning. To ensure uniform implementation, these recommendations should be integrated into Vietnam's national technical standards for expressway design. Furthermore, updates to driver training curricula should be made to ensure that all road users are familiar with the new systems and able

to apply them effectively in real-world driving conditions.

4. Conclusions

This study has examined the current state of infrastructure supporting safe following distance identification on Vietnamese expressways and compared it with the more comprehensive and systematic approach used in France. Although Vietnam has introduced several relevant signage and road markings aimed at promoting safe following distances, their deployment is often fragmented and lacks consistency, particularly in tunnels where such markings are scarce or absent. Moreover, existing Vietnamese distance indicators tend to operate independently rather than in coordination with other safety infrastructure elements, which reduces their overall effectiveness and can confuse drivers.

In contrast, France employs a coordinated system that combines enhanced lane markings with illuminated visual aids such as blue lights and chevrons. This integrated approach is applied consistently across all expressway sections, including tunnels, and has proven effective in enhancing driver awareness and compliance with safe distance regulations.

Based on these findings, Vietnam has significant potential to improve road safety by integrating distance indicators into existing infrastructure, such as emergency lane markings, and by installing visual cues in tunnels. These upgrades should be standardized through national regulations and incorporated into driver education and public awareness campaigns to ensure consistency and long-term effectiveness.

Importantly, these improvements are not limited to new road projects but can also be retrofitted into existing expressways, offering a cost-effective way to enhance traffic safety. Implementing such measures would contribute to a more systematic and reliable system that better supports safe driving behavior on Vietnamese expressways.

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