



THE IMPLEMENTATION AND IMPACT OF ADVANCED TRUCK ESCAPE RAMPS ON SAMRUDDHI MAHAMARG

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Abstract: The review article emphasizes on critical issue of road safety, highlighting the importance of truck escape ramps in preventing accidents involving heavy vehicles. Samruddhi Mahamarg in Maharashtra, India, a key expressway plagued by accidents due to high speeds, brake failures, and adverse weather conditions, the study proposes the implementation of truck escape ramps to mitigate risks basically on this mahamarg. Truck escape ramps, strategically positioned along the highway like Samruddhi Mahamarg, offer emergency stopping areas for out-of-control trucks, potentially saving lives and minimizing injuries. By considering factors like length, gradient, and materials, these ramps aim to effectively slow down and halt heavy vehicles facing emergencies, aligning with broader efforts to enhance road safety infrastructure and reduce accidents. Many developed countries like America, China, Canada, and many more have already implemented this advanced technology of EERs. A survey of all these roads has given a successful margin after applying this technique in preventing accidents on highways. In simple words, this advancement has been implemented globally.

Index Terms – Truck escape ramp, Samruddhi Mahamarg, Emergency Escape Ramp, Accidents.

Introduction

Truck escape ramps are like emergency exits for big trucks on highways. They're special areas designed to help trucks stop safely if their brakes fail or if there's another emergency. If it is to be explained in detail then it needs an imagination of a big truck driving down a steep hill. If something goes wrong and the brakes stop working, the truck could speed out of control, putting everyone on the road in danger. That's where truck escape ramps come in. They're built on the side of the road, usually at the bottom of steep hills, and they give trucks a safe place to stop in an emergency. These ramps use things like sand or gravel to slow down the truck and bring it to a stop without crashing. For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are collected for the period of five years. The time series monthly data is collected on stock prices for sample firms and relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index is taken from yahoo finance. Samruddhi Mahamarg is very important road in India which connects big cities like Nagpur and Mumbai. Lot of people use it every day to travel between these cities. But sadly, there have been many accidents on this road. Trucks have crashed because they were going too fast, or their brakes stopped working, or the driver was too tired, or the weather was bad, or they were carrying too much stuff. These accidents can cause serious injuries and even deaths, and they make the road dangerous for everyone.

So, to make this road safer, new advanced technologies can be implemented like truck escape ramps. These ramps would be like safety nets for trucks. If a truck's brakes fail or something else goes wrong, it can use the ramp to safely stop without causing a big crash. These ramps could save lives and reduce injuries by preventing accidents. They also make the road safer for everyone who uses it, whether they're in a car or driving a truck. It's an important step to make sure that people can travel safely on the Samruddhi Mahamarg. Following complete description of EER is given.

1. EMERGENCY ESCAPE RAMP

A truck escape ramp, also known as an emergency escape ramp, is a designated area on highways and roads designed to provide a safe stopping point for large vehicles, particularly trucks and buses, in case of emergencies such as brake failure or loss of control.

These ramps are strategically placed along roadways to offer a last-resort safety measure for drivers facing critical situations where traditional braking methods may not be sufficient to stop the vehicle safely. There are certain types of EER which is given as follows



Figure 1. Emergency Escape Ramp

2.1 Types of Truck Escape Ramps:

- **Gravity Ramps:** Gravity ramps work by using gravitational forces to slow and stop the runaway truck. Rolling resistance forces do not have a significant role in stopping the vehicle. Additionally, the physical characteristics of gravity ramps are long and steep which is considered costly and inefficient. However, the paved surface of the gravity ramp helps to stop forward motion of the vehicle; it cannot prevent rolling back or jackknifing of the tractor-trailer.
- **Sand Pile:** Sand pile ramps help to slow down and stop the truck with rolling resistance provided by loose, dry sand in, the gravity force on the slope of the surface contributes to the slowing process. Compared to the arrester beds, sand piles are less preferable because of their severe deceleration characteristics and lack of functionality in adverse weather.
- **Mechanical Arrester Bed:** This type of ramps uses mechanical systems like nets, cables, or other devices to catch and stop the vehicle.

Each type of ramp offers a unique mechanism to help bring the vehicle to a safe stop, providing flexibility for implementation based on terrain and space constraints.

2. CUSTOMS OF TRUCK ESCAPE RAMPS:

- This technique provides a designated safety area for large vehicles experiencing emergencies, preventing catastrophic accidents and minimizing damage to property and lives.
- This also serve as a crucial safety net for drivers facing brake failure or other critical situations where immediate stopping action is necessary.

- It helps to reduce the severity of accidents and prevent secondary collisions by offering a controlled environment for vehicles to come to a stop.
- It also enhances overall road safety by mitigating the risks associated with runaway trucks and providing peace of mind for drivers traveling on steep grades or challenging terrain.

3. SAMRUDDHI MAHAMARG

The Samruddhi Mahamarg, a 701-kilometer expressway in Maharashtra, India, linking Nagpur and Mumbai, serves as a vital artery for regional connectivity and economic development. With features like multiple lanes, advanced tolling systems, and rest areas, it aims to streamline travel, reduce congestion, and stimulate economic growth. By enhancing connectivity between major urban centers, industrial zones, and agricultural regions, the expressway facilitates the movement of goods and people, promoting trade, commerce, and tourism. Its construction represents a significant investment in infrastructure, with anticipated benefits including reduced transportation costs, increased efficiency, and job creation along its corridor. Overall, the Samruddhi Mahamarg plays a pivotal role in fostering regional development and improving the quality of life for residents of Maharashtra.

4.1 Causes of Accidents on Samruddhi Mahamarg

- **High speeds:** Excessive speed contributes to loss of vehicle control and increases the severity of accidents.
- **Adverse weather conditions:** Rain, fog, and poor visibility impair driver judgment and increase the likelihood of accidents.
- **Brake failures:** Mechanical issues with brakes pose a significant risk, especially on steep gradients or during prolonged downhill stretches.
- **Driver fatigue:** Long hours of driving lead to decreased concentration and slower reaction times, increasing the risk of accidents.
- **Overloading of vehicles:** Vehicles carrying loads beyond their capacity are prone to mechanical failures and handling issues.
- **Non-adherence to traffic regulations:** Violations such as lane changing without signaling, improper overtaking, and failure to maintain safe distances contribute to accidents.
- **Poor road conditions:** Potholes, uneven surfaces, and inadequate signage increase the risk of accidents, especially at high speeds.
- **Distractions:** Activities like texting, talking on the phone, or adjusting navigation systems divert driver attention from the road, increasing accident risks.

4. BENEFITS OF EER ON SAMRUDDHI MAHAMARG

- **Mitigating accidents:** Emergency escape ramps provide a designated stopping area for vehicles experiencing brake failure or going out of control. By offering a safe alternative to crashing into other vehicles or structures, these ramps can significantly reduce the severity of accidents on the expressway.
- **Preventing secondary collisions:** When a vehicle uses an emergency escape ramp to come to a controlled stop, it reduces the risk of secondary collisions. This helps prevent additional accidents and minimizes the potential for injury or damage to other motorists and property.
- **Enhancing road safety:** The presence of emergency escape ramps enhances overall road safety on the Samruddhi Mahamarg by providing a critical safety measure for drivers facing emergencies. This instills confidence in motorists and promotes safer travel practices, contributing to a reduction in accidents and fatalities.
- **Improving traffic flow:** By preventing accidents and minimizing the time needed to clear inside to fewer disruptions and delays for commuters, improving overall travel efficiency's, emergency escape ramps help maintain smoother traffic flow on the expressway.
- **Cost savings:** Emergency escape ramps can lead to cost savings by reducing the economic impact of accidents, such as medical expenses, vehicle repairs, and traffic congestion-related losses.

Additionally, the prevention of accidents can help minimize infrastructure damage and maintenance costs.

- **Mitigating accidents and reducing fatalities:** Emergency escape ramps provide a designated stopping area for vehicles experiencing brake failure or going out of control. By offering a safe alternative to crashing into other vehicles or structures, these ramps can significantly reduce the severity of accidents on the expressway and help decrease the number of fatalities resulting from such incidents.

5. RESULTS AND DISCUSSION

- Truck escape ramps in Samruddhi Mahamarg are an essential safety feature aimed at preventing the danger of brake failure on heavy bound transport vehicles. These ramps are so designed and well planned that they can minimize the chances of the occurrence of accidents of the trucks running out of control, it is achievable through proper planning of the escape ramps.
- From the findings of our study, some of the important recommendations based on the length, gradient, and kind of construction material required for the escape ramps are presented which will define its efficiency. A comparison of Botswana with comparable road networks around the world validates the effectiveness of well-designed exit lanes to prevent fatalities and offer economic losses due to road mishaps.
- These ramps are likely to improve road safety, promote efficient transport, TRIM1 and improve economic welfare by lowering the burden of costs associated with accidents. For these ramps to reach their full potential, it is important to regulate with the appropriate vehicular and traffic laws, ensure ramps undergo constant checks and maintenance, and educate commercial truck drivers on the safe application of the ramps.
- In conclusion this article it can be deduced that escape ramp for trucks on Samruddhi Mahamarg is an improvement in highway safety. With such constants checked and improved upon these ramps will not only protect the lives of motorists but will also keep a main transport artery of India functioning effectively.
- The installation of these ramps is expected to enhance overall road safety, foster more efficient transportation, and ultimately benefit the economy by reducing accident-related costs. However, for these ramps to achieve their full potential, it is imperative to enforce stringent safety regulations, conduct regular maintenance, and promote awareness among truck drivers regarding their proper use.



Figure 2. Emergency Escape Ramp on Samruddhi Mahamarg

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