

## Accident Analysis of Blackspot on Nawale Bridge

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**Abstract** The Navale Bridge located on National Highway 48 in Pune is considered one of the major accident-prone locations (black spots) in the region. A black spot is a road location where a large number of accidents occur frequently due to various road and traffic conditions. This study focuses on analysing the causes of accidents at Navale Bridge and suggesting possible safety improvements.

The main reasons for accidents at this location include heavy traffic congestion, sharp road curvature, high vehicle speed, poor lane discipline, and sudden merging of vehicles. The bridge is also used by a large number of heavy vehicles travelling between Mumbai and Satara, which increases traffic pressure and accident risk. In addition, insufficient traffic control measures, inadequate warning signs, and driver negligence also contribute to accidents.

The analysis of this black spot helps to understand the major safety issues and highlights the need for proper traffic management. Measures such as better road signage, speed control, lane markings, installation of traffic signals, and strict enforcement of traffic rules can help reduce accidents. Improving road design and creating awareness among drivers can also play an important role in increasing road safety.

In conclusion, the accident analysis of Navale Bridge shows that proper engineering measures and traffic management strategies are necessary to reduce accidents and improve the safety of road users.

### 1.INTRODUCTION

Road transportation is one of the most important modes of transport in India. It plays a major role in the movement of people and goods from one place to another. With the rapid growth of population, urbanization, and the increase in the number of vehicles, road traffic has increased significantly in many cities. Due to this heavy traffic, the number of road accidents has also increased. Road accidents not only cause damage to property but also result in serious injuries and loss of human life. Therefore, it is necessary to study accident-prone locations and take preventive measures to improve road safety.

A road accident black spot is a particular location on a road where accidents occur frequently over a period of time. These locations usually have some problems related to road design, traffic movement, visibility, or driver behavior. Identifying and analyzing these black spots helps engineers and traffic authorities understand the causes of accidents and take corrective measures to reduce them.

One such accident-prone location in Maharashtra is the Navale Bridge located in Pune. The bridge is situated on the busy National Highway 48, which connects major cities such as Mumbai, Pune, and Satara. This highway carries a large amount of traffic every day, including private vehicles, buses, trucks, and other heavy vehicles. Because of this heavy traffic flow, the Navale Bridge area has become one of the well-known accident black spots in the region.

The location of Navale Bridge plays an important role in traffic movement around Pune city. It acts as a major entry and exit point for vehicles traveling on the Mumbai-Bangalore highway. However, due to certain geometric features of the road, sudden merging of traffic, and high speed of vehicles, accidents frequently occur at this location. Many drivers lose control of their vehicles while descending towards the bridge, which leads to collisions, especially involving heavy vehicles.

Another major reason for accidents at Navale Bridge is the large volume of traffic during peak hours. Vehicles coming from different directions merge at this point, which creates congestion and confusion among drivers. The presence of heavy trucks and buses further increases the risk of accidents. Sometimes drivers do not follow lane discipline, which results in sudden lane changes and crashes.

Poor traffic management and lack of proper road safety measures also contribute to accidents at this location. In some cases, drivers may not notice warning signs or may drive at high speed despite the risky road conditions. Night-time visibility, weather conditions such as rain, and driver fatigue can also increase the chances of accidents.

These factors make Navale Bridge a critical point that requires detailed study and proper safety planning.

Accident analysis of black spots is very important in civil engineering and traffic engineering. By studying accident records, traffic flow patterns, and road conditions, engineers can identify the main causes of accidents. This analysis helps in planning suitable engineering solutions such as improving road geometry, installing speed breakers, providing proper signage, improving lighting, and implementing traffic control measures.

The main aim of studying the accident black spot at Navale Bridge is to understand the reasons behind frequent accidents and suggest possible improvements for road safety. Through this study, it becomes possible to identify the problems related to road design, traffic movement, and driver behavior. Once these problems are identified, appropriate corrective actions can be recommended to reduce accidents and ensure safe travel for road users.

Road safety is a shared responsibility of government authorities, traffic police, engineers, and road users. Authorities are responsible for maintaining road infrastructure and implementing traffic regulations, while drivers must follow traffic rules and drive responsibly. Awareness programs and strict enforcement of traffic laws can also help in reducing accidents at such black spots.

In recent years, the government and traffic authorities have taken several steps to identify and improve accident-prone locations across the country. The study of black spots like Navale Bridge helps in planning better road infrastructure and implementing effective safety measures. Such studies are also useful for students and engineers to understand real-life traffic problems and develop practical solutions.

In conclusion, Navale Bridge in Pune is an important location that experiences a high number of road accidents due to heavy traffic, road design issues, and driver behavior. Studying this black spot helps in identifying the causes of accidents and developing strategies to improve road safety. Proper planning, engineering improvements, and responsible driving can significantly reduce accidents and ensure safer transportation for everyone

## 2.1 Meteorology



## 2.2 Present Investigation

### 1. General

The present investigation focuses on the study and analysis of accidents occurring at the black spot located at Navale Bridge in Pune. This location experiences frequent road accidents due to heavy traffic flow, high vehicle speed, and road design conditions. The purpose of this investigation is to identify the main causes of accidents and suggest possible safety improvements.

The study includes collection of road inventory data, traffic volume study, accident data collection, and analysis of the data to understand the accident pattern at this location.

### 2. Location

Navale Bridge is situated on the busy National Highway 48, which connects major cities such as Mumbai, Pune, and Satara. It acts as an important entry point to Pune

city and carries a large number of vehicles including private cars, buses, and heavy trucks. Due to the sloping road section and merging traffic near the bridge, the location has become one of the well-known accident-prone areas in Pune.

### 3. Road Inventory Data

Road inventory data provides detailed information about the physical condition and geometric features of the road. At Navale Bridge, the road consists of multiple lanes with a concrete bridge structure and approach roads. The road section includes curves, slopes, and merging traffic lanes which sometimes create difficulties for drivers. The study of road inventory includes parameters such as road width, number of lanes, road surface condition, traffic signs, lighting, and drainage system. These factors play an important role in road safety and accident occurrence.

### 4. Traffic Studies

Traffic studies were conducted to understand the volume and type of vehicles passing through Navale Bridge. The highway carries a mixture of traffic such as two-wheelers, cars, buses, trucks, and other heavy vehicles. During peak hours, traffic congestion is commonly observed due to high vehicle movement. Heavy vehicles travelling between major cities use this highway frequently, which increases traffic density and accident risk. Traffic volume studies help in understanding the traffic pattern and planning suitable traffic control measures.

### 5. Collection of Accident Data

Accident data for this study is collected from police records, traffic department reports, and other available sources. The collected data includes information about the number of accidents, type of vehicles involved, time of accident, and possible causes. The data also includes details about fatal accidents, minor accidents, and property damage accidents occurring at Navale Bridge over a specific period of time. This information is important for identifying accident trends and understanding the seriousness of the problem.

### 6. Analysis of Data

After collecting the required data, the information is analyzed to determine the major causes of accidents at this black spot. The analysis shows that overspeeding,

heavy traffic, poor lane discipline, and sudden merging of vehicles are the main reasons for accidents. In addition, lack of proper warning signs, insufficient lighting, and driver negligence also contribute to accident occurrence. By studying these factors, suitable safety measures such as speed control, improved road signage, better lighting, and strict traffic rule enforcement can be recommended.

Overall, the present investigation helps in understanding the accident situation at Navale Bridge and provides useful information for improving road safety at this important highway location.

### 3.3 Joint Influence of Road Conditions on Traffic Safety

The road conditions at Navale Bridge in Pune have a strong influence on traffic safety. Factors such as road geometry, surface condition, slope, visibility, and traffic volume together affect the occurrence of accidents. When these factors are not properly maintained, the chances of road accidents increase.

At Navale Bridge, the presence of a sloping road, heavy traffic flow, and merging vehicles from different directions creates a complex traffic situation on National Highway 48. Poor lane discipline, high speed of vehicles, and limited reaction time for drivers further increase accident risk. In addition, inadequate road signs, insufficient lighting, and sudden braking of heavy vehicles also contribute to unsafe conditions.

Therefore, the combined effect of road design, traffic movement, and driver behavior influences traffic safety at this location. Improving road conditions, providing proper signage, and controlling vehicle speed can help reduce accidents and improve overall road safety.

Year	No. of Accidents
2020	453
2021	388
2022	459
2023	200
2024	235
2025	260

#### 1. Fatal Accident

A fatal accident is a road accident in which one or more persons die due to injuries caused by the accident. These accidents are very serious and usually occur because of high speed, collision with heavy vehicles, or loss of vehicle control.

#### 2. Major Injury Accident

A major injury accident is an accident in which the victim receives serious injuries such as fractures, head injuries,

or severe body damage. The injured person usually requires hospital treatment and may remain admitted for a long time.

**3. Minor Injury Accident**

A minor injury accident is an accident in which the victim suffers small injuries like cuts, bruises, or minor wounds. The injuries are not very serious and usually require only basic medical treatment.

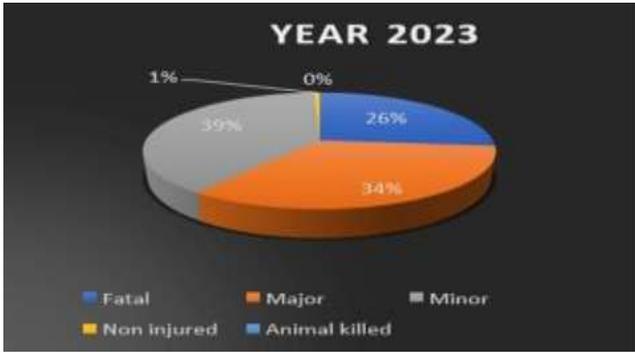
**4. Non-Injured Accident**

A non-injured accident is an accident where vehicles or property are damaged but no person is injured. These accidents may include small vehicle collisions or damage to road structures.

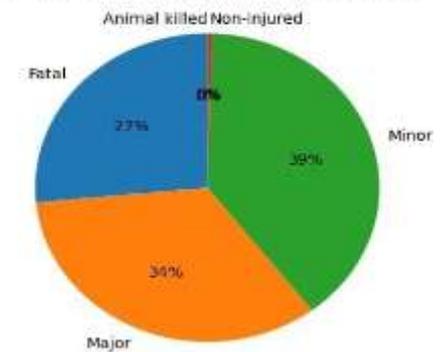
**5. Animal Killed Accident**

An animal killed accident is a type of road accident in which a vehicle hits an animal on the road, causing the death of the animal. Such accidents often occur in areas where animals suddenly cross the road.

YEAR	TYPE	NO ACCIDENT
	FATAL	61
	MAJOR	80
2024	MINOR	92
	NON INJURED	2
	ANIMAL KILLED	0



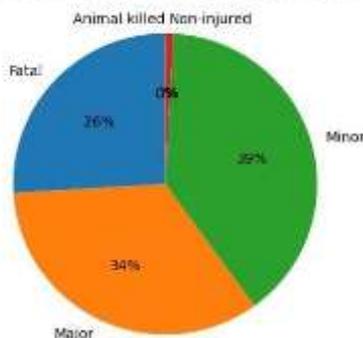
YEAR 2025 - Accident Distribution (Total 260)



YEAR	TYPE	NO ACCIDENT
2023	Fatal	44
	Major	56
	Minor	65
	Non injured	1
	Animal killed	0

YEAR	TYPE	NO ACCIDENT
	FATAL	69
	MAJOR	88
2025	MINOR	102
	NON INJURED	1
	ANIMAL KILLED	0

YEAR 2024 - Accident Distribution (Total 235)



### Causes of Road Accidents

1. Over-speeding of vehicles on the highway near the bridge.
2. Sharp curve and slope near Navale Bridge which reduces vehicle control.
3. Heavy traffic congestion, especially trucks and buses.
4. Poor lane discipline and sudden lane changing by drivers.
5. Driver negligence such as using mobile phones while driving.
6. Drunk driving during night time.
7. Poor visibility at night due to inadequate street lighting.
8. Sudden braking because of traffic jams or obstacles.
9. Road condition issues like potholes or uneven surface.
10. Lack of proper traffic signs and warning boards.

### Prevent Road accident

- Install proper warning and speed limit signboards.
- Improve street lighting on the road.
- Provide speed breakers or rumble strips near the black spot.
- Maintain proper road markings and lane dividers.
- Repair damaged road surfaces regularly.
- Install CCTV cameras for traffic monitoring.
- Deploy traffic police during peak hours.
- Create separate lanes for heavy vehicles.
- Improve drainage to avoid water on the road.
- Conduct road safety awareness for drivers.

### Conclusion

The study of the black spot at Navale Bridge shows that this location has a high number of road accidents due to several combined factors. Major reasons include heavy traffic flow on National Highway 48, steep road gradient near the bridge, high vehicle speed, sudden lane changes, and lack of proper traffic discipline. Many heavy vehicles such as trucks and buses lose control while descending the slope, which increases the risk of collisions.

From the accident data analysis between recent years, it is observed that accidents are frequent

during peak traffic hours and at night due to poor visibility and driver negligence. Insufficient warning signs, improper lane management, and limited enforcement of traffic rules also contribute to the problem.

To reduce accidents at this black spot, several measures should be implemented. These include improving road signage, installing speed control measures, providing better street lighting, creating separate lanes for heavy vehicles, and increasing traffic police monitoring. Public awareness about safe driving and strict enforcement of speed limits can also help reduce accident rates.

In conclusion, the accident problem at Navale Bridge can be minimized through proper traffic management, engineering improvements, and driver awareness. Implementing these safety measures will help improve road safety and reduce the number of accidents at this critical black spot.

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