

# Underground Railway Safety Analysis: A Case of Pune Metro

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**Abstract**— Currently a days urban growth and traffic are the intense issues of town development thanks to development of urbanization. Underground Railroad plays a vital role in urban transport, that helps to attenuate traffic problems. due to the additional accidents of Underground Railroad, the analysis of Underground Railroad safety plays the necessary role for the urban public safety analysis. This paper reveals the security state of affairs of Pune underground Line one from the rider safety, instrumentality and surroundings, and management factors, through a series of form surveys. With the results, the security issues and therefore the designing ways are used more for Pune underground Line one. The analysis includes a reference worth for Underground Railroad designing and construction and plays a serious role for up urban public safety.

**Index Terms**— Underground Railroad safety, Traffic, Pune underground Line one.

## INTRODUCTION

Due to speedy development of urbanization, environmental issues are will increase. the event of underground house is that the effective mode to boost urban functions, improve the urban surroundings, and save intensive land use. Urban public traffic safety is a vital for guaranteeing town security. and therefore, the Underground Railroad is relatively quick. Since 2009, there are over a hundred Underground Railroad safety accidents as well as hearth, shutdown, terrorist attacks. per the connected literature, the analysis of urban railway safety centred on the security accident analysis, the security influencing factors analysis, etc. The subway systems are smart resolution to any variety of nature and unreal hazards. Besides these,

subways may be related to a spread of health and safety hazards that would have an effect on each passengers and transit staff, enclosed physical, biological, chemical, psychosocial, and coercion. the security influencing factors discuss with natural, social, and political, economic, cultural, etc, and therefore the instrumentality operation and management is that the necessary issue. Among these form methodologies combined with alternative ways is that the main study methodology for the security management. To good the underground safety management and warning system is that the necessary measures of urban peace enhancements that is the common goal of connected analysis. The research show that the most ways are as well as strengthen the notice of public safety, up the techniques and facilities construction, enhancing the Underground Railroad safety maintenance.

This paper aims to look at the Underground Railroad safety of Pune underground line one supported a series of field visit and form surveys, as well as the rider safety, instrumentality and surroundings, and factors analysis of subway safety. and therefore, the current issues of Underground Railroad safety of underground are analysed, and therefore the ways are argued for Underground Railroad construction and management to enhance safety.

### 1.1 Purpose and Objectives of the Research-

1. To reveal issues of safety of Pune underground from the rider safety purpose of read, equipment and management issue.
2. To provide effective management for guaranteeing a security operation of Underground Railroad and preventing the occurrence of accidents by victimization advance Techniques.

3. To provide effective safety management of workers.

#### 1.2 Scope of Investigation-

Underground Construction in Pune is featured by giant scale, high speed, long construction amount, advanced operation and frustrating things concerning project safety. numerous accidents leading to serious social impact and large economic loss. that the investigation of Advance safety techniques and facilities use for Underground Railroad construction is crucial for improvement and Implementation of appropriate choice for safety at Pune underground Line.

### II.RELATED WORK

Niraj Sharma (2013), critical problems associated with underground rail comes are mentioned, that directly or indirectly have an effect on its execution, viability (technical additionally as financial) and conjointly justification vis-à-vis alternative public transportation systems.

W N Deulkar (2015) critically reviews and analyzes the choice creating systems behind the projected Pune underground rail system and its careful project report and exposes several weaknesses in each. The careful project report suffers from several serious method and analytical errors. This analysis and skill from alternative cities suggest that cities are more and more seeking single giant, huge budget solutions to their urban transport issues while not exploring the numerous less complicated, cheaper, and more practical choices that are on the market.

Matthew Bilson (2018) provides a comprehensive approach to rail system ventilation rehabilitation considering hearth potential, ventilation performance, and overall fire-life safety risk.

sculpturer He (2016) making associate innovative network operations management system, strengthening the management foundation, making plans to market operation capability, enhancing security risk management and instrumentality quality management, developing a crisis promotion response, and applying info technology.

Guo Rong (2016) reveals the security state of affairs of Harbin underground Line one in China from the rider safety consciousness, instrumentality and surroundings, and management factors, through a series of subjective form surveys. With the results, the

security issues and therefore the relevancy designing ways are place forward for Harbin underground Line one.

#### 2.1 METHODOLOGY

1. Form survey of workers concerning safety provision and what downside they face at website and zone.
2. Study of actual enforced advance Techniques in construction for safety purpose.
3. Case study on Advance Construction Techniques use for underground safety management
4. From the result, provide the acceptable suggestion of advance technology use for safety management for Pune underground Line once it's beneath construction and when construction.

The purpose of form style is to review this issue and therefore the factors of Underground Railroad safety. supported results of connected analysis on the

Underground Railroad safety, the form includes:

1. Basic info of website
2. Experience and safety awareness of interviewee.
3. Space and facilities of underground railway.
4. Management and services of workers.

### III.CASE STUDY

It had been in 2016 once the Union cupboard gave a low ahead for the development of phase-I of the Pune railroad.

1. Line I- the road I of the pune railroad covers a distance of sixteen.65 klick running between pimpri Chinchwad to Swargate( nine elevated stations and six underground stations).Recently PCMC approved the careful Project Report for extention of route to nigdi(4.5km).
2. Line II- the road II of the pune railroad can run between Vanaz and Ramwadi (14.7km, sixteen stations fully Elevated)
3. Line III- the road III of pune railroad made in two phases- Hinjewadi to Balewadi and Balewadi to Shivajinagar

The Pune railroad underground line runs from Shiwajinagar to Swargate (98.2 km).

Use of TBM -

The work started with the big TBM being flagged off to start out execution of its task from Agriculture

school grounds in Pune railroad underground line. the big TBM that has commenced work can dig at associate degree approximate depth of between sixty-five feet to one hundred feet below surface. This large TBM has massive length of regarding 279feet, together with backup frame. whereas the cutter head will the boring and machine moves ahead – it's multiple hands that at the same time place C formed concrete sections throughout the tunnel.

### 3.1THE FACTORS ANALYSIS OF SUBWAY SAFETY

#### Signalling and train management

Metro carries sizable amount of passengers at a really shut headway requiring a really high level of safety social control and dependability. At a similar time, significant investment in infrastructure and wheeled vehicle necessitates optimisation of its capability to supply the simplest services to the general public. These needs of the railroad area unit planned to be achieved by adopting ATP (Automatic Train Protection) and ATS (Automatic Train Supervision) signal systems. Automatic Train Operation (ATO) are going to be else.

#### Telecommunication

The telecom system acts because the communication backbone for signal systems and alternative systems like SCADA, AFC, etc and provides telecommunication services to fulfil operational and body needs of railroad network.

The telecommunication facilities planned area unit useful in meeting the necessities for

1. Supplementing the signal system for economical train operation.
2. Exchange of info
3. economical management throughout emergencies
4. traveller system

The planned communication system fulfils the subsequent requirements:

- help to coach control
- Maintenance management
- Emergency management
- Station to station dedicated communication
- work

- traveller Announcement System and traveller info and show System inside the station and from Central management to every station.
- Train Destination Indicator
- Instant online Radio Communication between Central management and Moving trains and maintenance personnel.
- information Channels for signal, SCADA, Automatic Fare assortment, etc

#### Rolling Stock

Rolling stock for Pune railroad has been chosen supported the subsequent criteria:

- established instrumentality with high dependability
- traveller feature
- Energy potency
- lightweight weight instrumentality and coach body
- Optimized scheduled speed
- aesthetically pleasing Interior and Exterior
- Low Life cycle value
- Flexibility to fulfil increase in traffic

#### Ventilation and Air conditioning system

The underground stations of the railroad passageway area unit in-built a confined area. an outsized range of passengers occupy concourse halls and therefore the platforms, particularly at the height hours. The platform and concourse areas have a restricted access from outside and do not have natural ventilation. it is so, essential to supply forced ventilation within the stations and within the tunnel. for the aim of: -

- activity contemporary air for the physiological wants of passengers and therefore the authority's staff.
- Removing body heat, unpleasant odours and harmful gases like greenhouse gas exhaled throughout breathing.
- Removing great quantity of warmth dissipated by the train instrumentality like traction motors, braking units, compressors mounted below the under-frame, lights and fans within the coaches, A/c units etc.
- Removing vapour and fumes from the battery and warmth emitted by lightweight fittings, water coolers, Escalators, Fare Gates etc. operating within the stations.

#### Controlling and Monitoring

For the underground stations, the management and observance of station services and systems like station air-conditioning, ventilation to plant rooms, lighting, pumping systems, lifts & Escalators, etc shall be performed at Station room (SCR). However, the operation and management of Tunnel Ventilation moreover as Smoke Management system can unremarkably be done through OCC. of these systems shall be equipped with automatic, manual, native and remote operation modes. The alarms and signals from the instrumentality.

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#### IV.CONCLUSION

This paper analyzes the protection state of affairs of Pune railroad Line one throughout construction and plenty of facilities planned for future. And it is ended that Underground Railroad questions of safety can minimize by rising public safety awareness and strengthening the subway security management. as a result of if public have corrected data regarding safety facilities then solely, they get edges of it.

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