ಕರ್ನಾಟಕ ವಿಧಾನ ಪರಿಷತ್ತು

1 ಚುಕ್ಕೆ ಗುರುತಿನ ಪ್ರಶ್ನೆ ಸಂಖ್ಯೆ : 525

2 ಸದಸ್ಯರ ಹೆಸರು : ಶ್ರೀ ಸಿ.ಟಿ. ರವಿ (ವಿಧಾನ ಸಭಾ ಕ್ಷೇತ್ರದಿಂದ ಚುನಾಯಿತರಾದವರು)

3 ಉತ್ತರಿಸುವ ದಿನಾಂಕ : 14–08–2025

4 ಉತ್ತರಿಸುವವರು : ಉಪ ಮುಖ್ಯಮಂತ್ರಿಗಳು

ಕ್ರ.ಸಂ	ಪ್ರಶ್ನೆ	ಉತ್ತರ
ಅ)	ಬೆಂಗಳೂರು ನಗರದಲ್ಲಿ ಭೂಗತ ಸುರಂಗ ರಸ್ತೆ ನಿರ್ಮಾಣಕ್ಕೆ ಸಚಿವ ಸಂಪುಟ ಅನುಮೋದನೆ ನೀಡಿದೆಯೇ; ಯೋಜನೆಗೆ ಡಿ.ಪಿ.ಆರ್ ಸಿದ್ಧಪಡಿಸಲು ಯಾವ ಸಂಸ್ಥೆಗೆ ನೀಡಲಾಗಿದೆ; ಈ ಸಂಸ್ಥೆಗೆ ನೀಡಿರುವ ಹಣಎಷ್ಟು; ಸಂಸ್ಥೆ ವರದಿ ಸಲ್ಲಿಸಿದೆಯೇ; ವರದಿಯ ಪ್ರಮುಖ ಅಂಶಗಳೇನು;	• ಹೌದು. • ಡಿಪಿಆರ್ ಸಿದ್ಧಪಡಿಸಲು ಟೆಂಡರ್ ಕರೆದು ಮೆ॥ ರೋಡಿಕ್ ಕನ್ಸಲ್‌ಟೆಂಟ್ಸ್ ಪ್ರೈವೇಟ್ ಲಿಮಿಟೆಡ್, ನವದೆಹಲಿ ರವರಿಗೆ ವಹಿಸಲಾಗಿದೆ. • ಉತ್ತರ – ದಕ್ಷಿಣ ಕಾರಿಡಾರ್ ಯೋಜನೆಯ ಡಿ.ಪಿ.ಆರ್ ತಯಾರಿಸಲು ರೂ.9.45 ಕೋಟಿಗಳಿಗೆ ಹಾಗೂ ಪೂರ್ವ – ಪಶ್ಚಿಮ ಕಾರಿಡಾರ್ ಯೋಜನೆಗೆ ಡಿ.ಪಿ.ಆರ್ ತಯಾರಿಸಲು ರೂ.9.89 ಕೋಟಿಗಳಿಗೆ ಕರಾರು ಒಪ್ಪಂದ ಮಾಡಿಕೊಳ್ಳಲಾಗಿದೆ. • ಯೋಜನೆಯ ವರದಿಯ ಪ್ರಮುಖ ಅಂಶಗಳನ್ನು **ಅನುಬಂಧ–1** ರಲ್ಲಿ ನೀಡಿದೆ.
ಆ)	ಯೋಜನೆಗೆ ಅಗತ್ಯವಿರುವ ಸರ್ಕಾರಿ ಭೂಮಿ ಲಭ್ಯವಿದೆಯೇ; ಖಾಸಗಿ ಭೂಮಿ ಸ್ವಾಧೀನಪಡಿಸಿಕೊಳ್ಳುವ ಅಗತ್ಯತೆ ಇದೆಯೇ; ಖಾಸಗಿ ಭೂಮಿಗೆ ನಿಗದಿಪಡಿಸಿರುವ ಭೂ ಪರಿಹಾರ ಮೊತ್ತ ಎಷ್ಟು; ಭೂ ಸ್ವಾಧೀನ ಪ್ರಕ್ರಿಯೆ ಯಾವ ಹಂತದಲ್ಲಿದೆ;	• ಸದರಿ ಯೋಜನೆಗೆ ಶೇ.80 ರಷ್ಟು ಸರ್ಕಾರದ ಭೂಮಿಗಳನ್ನೇ ಆಯ್ದುಕೊಳ್ಳಲಾಗಿದ್ದು, ಒಟ್ಟು 05 Inter Change ಗಳ ಪೈಕಿ 04 ಜಾಗಗಳಲ್ಲಿ ಸರ್ಕಾರದ ವಿವಿಧ ಇಲಾಖೆಗಳ ಭೂಮಿಯನ್ನು ಗುರುತಿಸಲಾಗಿದೆ. ಉಳಿಕೆ 01 ಜಾಗವು St. John Hospital ಒಡೆತನಕ್ಕೆ ಸೇರಿದ ಖಾಸಗಿ ಜಮೀನನ್ನು ಗುರುತಿಸಲಾಗಿದೆ. • ಪ್ರಸ್ತುತ ಸರ್ವೇ ಕಾರ್ಯ ಪ್ರಗತಿಯಲ್ಲಿದ್ದು, ಖಾಸಗಿ ಭೂಮಿಗೆ ಟಿ.ಡಿ.ಆರ್ ನಿಯಮಗಳನ್ವಯ ಭೂಸ್ವಾಧೀನ ಪಡಿಸಿಕೊಳ್ಳಲು ಕ್ರಮವಹಿಸಲಾಗುತ್ತದೆ. • ಖಾಸಗಿ ಸ್ವತ್ತಿನ ಮಾಲೀಕರು ಟಿ.ಡಿ.ಆರ್. ಗೆ ಒಪ್ಪದಿದ್ದ ಪ್ರಕರಣಗಳಲ್ಲಿ ನಗದು ಪರಿಹಾರ ನೀಡುವ ಮೂಲಕ ಭೂಸ್ವಾಧೀನಪಡಿಸಿಕೊಳ್ಳಲು ರೂ.800.00 ಕೋಟಿಗಳನ್ನು ಕಾಯ್ದಿರಿಸಲಾಗಿದೆ.

ಇ)	ಯೋಜನೆಯಿಂದ ಪರಿಸರದ ಮೇಲೆ ಆಗುವ ಪರಿಣಾಮಗಳ ಕುರಿತು ಅಧ್ಯಯನ ನಡೆದಿದೆಯೇ; ಯೋಜನೆಗೆ ಮಣ್ಣಿನ ಪರೀಕ್ಷೆ ಆಗಿದೆಯೇ; (ವಿವರ ನೀಡುವುದು)	• ಭಾರತ ಸರ್ಕಾರದ ಪರಿಸರ ಮತ್ತು ಅರಣ್ಯ ಮಂತ್ರಾಲಯವು ಹೊರಡಿಸಿರುವ 2006 ರ ಅಧಿಸೂಚನೆ ಅನುಸಾರ, ಪ್ರಸ್ತಾಪಿತ ವಾಹನ ಸುರಂಗ ಮಾರ್ಗ ಯೋಜನೆಯ ವಿಸ್ತೃತ ಯೋಜನಾ ವರದಿಗೆ ಅನ್ವಯಿಸುವುದಿಲ್ಲವೆಂದು ಕೇಂದ್ರ ಸರ್ಕಾರದ ಪರಿಸರ ಮತ್ತು ಅರಣ್ಯ ಮಂತ್ರಾಲಯ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆಯ 7(f) ಅನುಸಾರ ಇಂತಹ ಯೋಜನೆಗಳಿಗೆ ವಿನಾಯಿತಿ ನೀಡಲಾಗಿದೆ ಎಂದು ಸದಸ್ಯ ಕಾರ್ಯದರ್ಶಿಗಳು, State level Environmental Impact Assessment Agency (SEIAA) ಸಂಸ್ಥೆಯವರು ದಿನಾಂಕ:26-11-2024 ರ ಪತ್ರದಲ್ಲಿ ವರದಿ ಮಾಡಿರುತ್ತಾರೆ. ಪ್ರತಿಯನ್ನು **ಅನುಬಂಧ-2** ರಲ್ಲಿ ಒದಗಿಸಿದೆ. • ಮಣ್ಣಿನ ಪರೀಕ್ಷೆಯನ್ನು ಮಾಡಲಾಗಿರುತ್ತದೆ.
ಈ)	ಡಿ.ಪಿ.ಆರ್. ಅನ್ವಯ ಯೋಜನೆಯ ಅಂದಾಜು ವೆಚ್ಚ ಎಷ್ಟು; ಪ್ರತಿ ಕಿ.ಮಿ ಸುರಂಗ ರಸ್ತೆ ನಿರ್ಮಾಣಕ್ಕೆ ಆಗುವ ವೆಚ್ಚ ಎಷ್ಟು; ಯೋಜನೆಗೆ ಅಗತ್ಯವಿರುವ ಹಣವನ್ನು ಯಾವ ಮೂಲದಿಂದ ಸಂಗ್ರಹಿಸಲಾಗುವುದು; ಸರ್ಕಾರ ಬಿಡುಗಡೆ ಮಾಡಿರುವ ಹಣ ಎಷ್ಟು;	• ಡಿ.ಪಿ.ಆರ್. ಅನ್ವಯ ಉತ್ತರ-ದಕ್ಷಿಣ ಸುರಂಗ ಮಾರ್ಗ ಯೋಜನೆಯ ಅಂದಾಜು ವೆಚ್ಚ ರೂ.17780.00 ಕೋಟಿಗಳು. • ಪ್ರತಿ ಕಿ.ಮೀಗೆ ರೂ.531.00 ಕೋಟಿಗಳು (ಜಿ.ಎಸ್.ಟಿ ಒಳಗೊಂಡಂತೆ) ವೆಚ್ಚವಾಗುತ್ತದೆ. ಜೋಡಿ ಸುರಂಗ (ದ್ವಿಪಥ / Twin Tube Tunnel) ಮಾರ್ಗಕ್ಕೆ ರೂ.1062.00 ಕೋಟಿಗಳು ಆಗುತ್ತದೆ. • ಸದರಿ ಸುರಂಗ ಮಾರ್ಗ ಯೋಜನೆಗೆ ಅಗತ್ಯವಿರುವ ಹಣವನ್ನು ಕರ್ನಾಟಕ ಸರ್ಕಾರದ ಗ್ಯಾರಂಟಿ ಆಧಾರದ ಮೇಲೆ, ಹುಡ್ಕೋ ವತಿಯಿಂದ ಸಾಲದ ರೂಪದಲ್ಲಿ ಸಂಗ್ರಹಿಸಲಾಗುವುದು. ಈ ಯೋಜನೆಯನ್ನು ಸುಧಾರಿತ ಆಧಾರದಲ್ಲಿ ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಅನುಮೋದನೆ ನೀಡಲಾಗಿದ್ದು, ಶೇ.60% ರಷ್ಟನ್ನು ಖಾಸಗಿ ಪಾಲುದಾರರು ಹೂಡಿಕೆ ಮಾಡುತ್ತಿದ್ದು, ಶೇ.40% ರಷ್ಟು ಮೊತ್ತವನ್ನು ಸರ್ಕಾರವು ವೆಚ್ಚ ಮಾಡಬೇಕಾಗಿರುತ್ತದೆ. ಸದರಿ ವೆಚ್ಚವನ್ನು ಮೆ.ಹುಡ್ಕೋ ಸಂಸ್ಥೆಯವರಿಂದ ರೂ.9303.66 ಕೋಟಿಗಳು ಶೇ. 8.95 ರಷ್ಟು ಬಡ್ಡಿ ದರದಲ್ಲಿ ಸಾಲದ ನೆರವನ್ನು ಪಡೆಯಲು ಉದ್ದೇಶಿಸಲಾಗಿದೆ. • ಈವರೆಗೂ ಡಿ.ಪಿ.ಆರ್ ತಯಾರಿಕೆಗಾಗಿ ಮಾತ್ರ ಹಣ ವೆಚ್ಚ ಮಾಡಲಾಗಿದೆ.

ಊ)	ಸುರಂಗ ರಸ್ತೆ ನಿರ್ಮಾಣಕ್ಕೆ ಟೆಂಡರ್ ಕರೆಯಲಾಗಿದೆಯೇ; ಟೆಂಡರ್ ಪ್ರಕ್ರಿಯೆ ಯಾವ ಹಂತದಲ್ಲಿದೆ? (ಯೋಜನೆಯ ಹಾಲಿ ಸ್ಥಿತಿ ಗತಿ ವಿವರ ನೀಡುವುದು)	• ಟೆಂಡರ್ ಆಹ್ವಾನಿಸಲಾಗಿದೆ. • ಟೆಂಡರ್ ಸಲ್ಲಿಸಲು ದಿನಾಂಕ: 23.09.2025 ರವರೆಗೆ ಅವಕಾಶ ನೀಡಲಾಗಿದೆ. ಸದರಿ ಟೆಂಡರ್‌ಗೆ ಪ್ರೀಬಿಡ್ ದಿನಾಂಕ: 04.08.2025 ರಂದು ನಡೆಸಲಾಗಿದ್ದು, ಹಲವಾರು ಸಂಸ್ಥೆಗಳಿಂದ ಭಾಗವಹಿಸುವಿಕೆ ಬಗ್ಗೆ ಆಸಕ್ತಿ ವ್ಯಕ್ತವಾಗಿರುತ್ತದೆ. • ಟೆಂಡರ್ ಮೊತ್ತ ನಮೂದಿಸುವ ಪ್ರಕ್ರಿಯೆ ಜಾರಿಯಲ್ಲಿರುತ್ತದೆ. • ಭೂಸ್ವಾಧೀನ ಪ್ರಕ್ರಿಯೆ ಜಾರಿಯಲ್ಲಿರುತ್ತದೆ. • ಮರಗಳ ತೆರೆವು ಮತ್ತು ಸ್ಥಳಾಂತರದ ಬಗ್ಗೆ ಯೋಜನೆಯನ್ನು ರೂಪಿಸಲಾಗುತ್ತಿರುತ್ತದೆ. • ಹುಡ್ಕೋ ಸಂಸ್ಥೆಯು ಈಗಾಗಲೇ ಸಾಲ ಮಂಜೂರಾತಿಯನ್ನು ನೀಡಿದ್ದು, ಪ್ರಕ್ರಿಯೆ ಜಾರಿಯಲ್ಲಿರುತ್ತದೆ. • ಸಂಚಾರ ಬದಲಾವಣೆ ಮತ್ತು ಬದಲಿ ಮಾರ್ಗಯೋಜನೆ ರೂಪಿಸುವ ಕ್ರಮ ಜಾರಿಯಲ್ಲಿರುತ್ತದೆ. • ಸುರಂಗ ಮಾರ್ಗ ನಿರ್ಮಾಣದಿಂದ ಹೊರಬರಬಹುದಾದ ತ್ಯಾಜ್ಯ ವಿಲೇವಾರಿ ಯೋಜನೆ ಜಾರಿಯಲ್ಲಿರುತ್ತದೆ.

ನಅಇ 370 ಎಂಎನ್‌ವೈ 2025

(ಡಿ.ಕೆ. ಶಿವಕುಮಾರ್)
ಉಪ ಮುಖ್ಯಮಂತ್ರಿ

ವಿ.ವಿ. ಪುಟ್ಟೆ ಗುರುತಿನ ಪ್ರಶ್ನೆ ಸಂಖ್ಯೆ - 525 ಅನುಬಂಧ - 1

1. Introduction and Background

1.1 Project Background and Context

The proposed tunnel alignment spans crucial parts of Bengaluru, connecting Hebbal Junction in the north to Silk Board Junction in the south. This alignment traverses major commercial, residential, and institutional zones, providing seamless connectivity for commuters. The tunnel project will significantly reduce travel times, enhance road safety, and offer an alternative to the heavily congested surface roads.

Bengaluru's population has grown dramatically, and the city now ranks among the top metropolitan areas in the country, both in terms of population and in terms of economic activity. The city has undergone rapid urbanization and has transformed into one of the fastest growing economic centers of the world which has attracted millions of job-seeking individuals from different part of countries and world.

However, the city road networks have not seen major improvements either in terms existing roadway capacity or creation of new road networks to reduce traffic congestion. Bengaluru City has a total registered vehicle count of approximately 1 crore vehicles in 2023, vehicles have grown at an average growth rate of 8% over the past 10 years. Increasing traffic volume and its associated adverse impacts on traffic congestion and noise pollution is a key problem in Bengaluru. Without the intervention of planned construction to decongest the traffic hot spots along with promotion public transport/metro the situation is likely to deteriorate further.

Due to poor level of services (mostly section in LOS 'F') of the present route of North - South corridor, the passenger travelling from North to South part & vice versa for work trip & travel trip faces huge congestion during travel. This leads to an increase in VOC (vehicle operation cost) & VOT (Value of time cost) accumulating higher economical loss.

For decongestion of the Bengaluru city, BBMP had earlier assigned the work of "Consultancy services for preparation of Comprehensive Bengaluru city road infrastructure plan to decongest traffic and to prepare comprehensive traffic management plan for proposal of vehicular tunnel / Grade separator /Road widening in selected corridors in the State of Karnataka" to M/S Altinok Consulting Engineering Inc. In Jv With M/S Lion Engineering Consultants Pvt. Limited.

Altinok Consulting Engineering come up with the plan to decongest which identified North South corridor as the high traffic density corridor of the

Bangaluru city among other routes. The decongestion of North-South corridor has been suggested in the feasibility study by providing underground tunnel from Hebbal to Silk Board. The major problem statement identified in feasibility studies are as under,

- In peak hours and even most of the day the traffic runs at an average speed of 15-20 Kmph
- The Level of Service is between LOS-E and LOS-F i.e., 15 to 20 Kmph resulting in huge loss of fuel
- The city roads have exhausted their lane capacity and there is no land available to widen the roads due to heavy built-up areas and higher price of land.

M/S Altinok Consulting Engineering Inc. in Jv With M/S Lion Engineering Consultants Pvt. Ltd. Prepared a Feasibility Report "Consultancy services for preparation of Comprehensive Bengaluru city road infrastructure plan to decongest traffic and to prepare comprehensive traffic management plan for proposal of vehicular tunnel / Grade separator / Road widening in selected corridors in the State of Karnataka.".

M/S Altinok conducted a study report regarding the decongestion on the existing roads of Bangalore. They studied a 190 km of project corridors earmarked for decongestion. One of the corridors is the North South project corridor.

During the study they evaluated the pros and cons of the different alignment option such as North South corridor as Elevated Corridor, A mix of Elevated Corridor and Tunnel and Simply North South tunnel. and their proposals. They weighted the options and suggested the Tunnel as a final proposal based on the minimised land acquisition, enhance safety to commuters, uninterrupted flow of traffic between sections and minimal disruption to existing traffic during construction.

1.2 Introduction to Underground Tunnels

- Why is a tunnel beneficial?

Widening of existing Road infrastructure is not possible due to densely built-up and environment issues (tree removal) and disruption to traffic during construction.

Elevated Corridor: It generally follows the ROW of road which limits the geometrical alignment resulting in speed restriction at some critical locations which limit the capacity of corridor. Land Acquisition Cost and disruption to existing plying traffic and One lane will be lost due to construction of piers.

Tunnel Corridor- Feasible option to connect the heavy traffic nodal points by taking the alignment below built-up areas. It reduces the travel time of traffic of longer trip length and decongest city roads and disruption to traffic movement during construction.

- Similar projects in India and abroad.
    - *The Orange Gate-Marine Drive tunnel is a dual-tunnel project in Mumbai, India*
    - *Mumbai Costal Road Phase 1 - 2.07 Kms*

- *Thane Boreivali Tunel Project - 10.25 Kms Tunnel*

1.3 Project Objectives

- Objectives of the Tunnel project (decongestion, LOS, no-signal corridor, lower fuel consumption, better citizen outcomes)
- Enhance city transport infrastructure in line with existing and planned projects

2. Executive Summary

2.1 Overview of the Tunnel Project

Bengaluru's population has grown dramatically, and the city now ranks among the top metropolitan areas in the country, both in terms of population and in terms of economic activity. The city has undergone rapid urbanization and has transformed into one of the fastest growing economic centers of the world which has attracted millions of job-seeking individuals from different part of countries and world. However, the city road networks have not seen major improvements either in terms existing roadway capacity or creation of new road networks to reduce traffic congestion. Bengaluru City has a total registered vehicle count of approximately 1 crore vehicles in 2023, vehicles have grown at an average growth rate of 8% over the past 10 years. Increasing traffic volume and its associated adverse impacts on traffic congestion and noise pollution is a key problem in Bengaluru.

Without the intervention of planned construction to decongest the traffic hot spots along with promotion public transport/metro the situation is likely to deteriorate further.

The high density of urban and residential spaces, non-availability of land makes it impossible to widen the existing roads to meet the demands of the rising economic development of the city. The construction of elevated corridors at the center line of existing road would result in loss of at least one lane for the construction of piers at grade and in addition the current traffic plying on road will be affected very severely resulting in more traffic congestion during a construction period of project which city cannot afford.

The Twin Tube tunnel proposal is a technological solution which would have minimum land acquisition, minimal disruption to existing flow of traffic. The tunnel will provide uninterrupted traffic to the traffic going towards electronic city (Silk Board) from Airport side and vice versa.

The proposed tunnel alignment spans crucial parts of Bengaluru, connecting Hebbal Junction in the north part of Bangalore to Silk Board Junction in the south. Project will significantly reduce travel times, enhance road safety, and offer an alternative to the heavily congested surface roads. In addition, the proposal of connecting ramps at Place Ground, Racecourse and Lalbagh Botanical Garden would also provide much needed connectivity to important nodes of Bangalore city.

2.2 Key Highlights & Salient Features

- (Top-level data points total length, alignment, technology, approximate cost, development model financing framework, etc.)

Salient Features of Project

- Project will have a length of 16.745 Kms (Hebbal to Silk Board)/ 16.571 Kms (Silk Board to Hebbal).
- The project will also have connecting ramps at Palace Ground, Racecourse and Lal Bagh Botanical Garden.
- The Project will include tunneling trough Tunnel Boring Machine, New Austrian Tunnel Method and Cut and Cover methods.
- **Details of Main Tunnel:**
  - Total Length of Road Tunnel: Twin Tunnels - Tube 1 - 16.745 km, Tube 2 -16.571 km
  - Total Length of TBM (Tunnel Boring Machine) Portion of Road Tunnel: 3 Lane Twin Tunnels - Tube 1 - 14.248 km, Tube 2 - 14.239 km
  - Total Length of Cut & Cover Tunnel: Tube 1 - 1.262 km; Tube 2 - 1.080 km
  - Total Length of Open Ramps: Tube 1 - 0,730 km; Tube 2 - 0.751 km
  - Lane Configuration of Main Tunnel: 3 Lane Each Tube
- **Details of Intermediate Entry & Exit Ramps**
  - Total length of Entry & Exit Ramps: 16.545 km
  - Total Length of NATM Tunnel Portion: 9.651 km
  - Total Length of Cut and Cover Portion: 3.928 km
  - Total length of Open Ramps portion: 2.194 km
  - Lane Configuration of Entry & Exit Ramps: 5.248 km (Intermediate Lane); 10.784 km (2-lane); 0.513 km (3-lane)
- Cross Passages: 26 Nos. for evacuation during emergencies.
- The project will have a combination of both transverse and longitudinal ventilation systems. Transverse Ventilation in Main Tunnel; Longitudinal Ventilation in Entry & Exit Ramps
- 5 Nos. of TBM lowering and retrieving shafts are proposed which will be developed as a Commercial hub which are to be used for parking, office spaces, rental shops, command and control centers for Tunnel Operation.
- The estimated project construction cost is Rs. 17780.130 Crores

(Including Civil Cost, LA, Utility, centages, Taxes etc.)

- The Tunnel Crown will be around 15 m to 50 m below the Ground level.

2.3 Major Benefits and Impact

- With the completion of the tunnel project, the commuter will be able to cover distance from Hebbal Junction to Silk Board junction in just 35 minutes against current travel time of 80-90 minutes.
- Intermediate connecting entry and exit ramps are proposed at Palace Ground, Racecourse and Lalbagh Botanical garden to improve connectivity to central part of Bangalore.
- Improved Level of Service to commuters. The commuters will be able to travel at LOS-B and LOS-C , Against Current Level of Service during peak hour is LOS-E & LOS-F.

2.4 Economic Benefits

As the proposed tunnel is developed to ease the transportation to the North South corridor. The year-wise economic benefits are enclosed as below. All the costs are discounted at a rate of 12% as per planning commission.

Table: Economic Benefits

S. No.	Description	Details
1	Total Economic benefits @ 12% rate (amount in cr.)	18703
2	Net Economic Costs @ 12% rate (amount in cr.)	9710
3	Internal rate of Return	19.07%
4	Economic NPV @ 12% (amount in cr.)	8993
5	Benefit / Cost Ratio	1.926

Further details are available in Chapter 12 of Main Report.

2.5 Environmental Benefits

The project alignment and construction methodology is prepared to minimize the environment affects. The alignment is planned in a way that there is minimize land Acquisition and least tree replantation possible.

Tunnel is a feasible option to connect the heavy traffic nodal points by

taking the alignment below built-up areas. It reduces the travel time of traffic of longer trip length and decongest city roads and disruption to traffic movement during construction.

The reduction in travel length and travel time contribute to less emission of oxides and other pollutants.

2.6 Project Readiness

A total of 32.29 Ha. of area to be acquired.

- The LAP is submitted and the land will be acquired through, Form-1 State of Karnataka.
- Site visits have been conducted along with the BBMP, Other stake holders (GAIL, BMRCL etc) regarding the utility Shifting.

3. Project Description

3.1 Location and Alignment

The entire project lies in the Bengaluru city and connects the northern part of Bangalore to its southern part.

The North - South Corridor starts from Hebbal Esteem Mall junction and ends near Silk Board KSRP Junction. The road sections are going to connect the electronic city (Southern part) to Hebbal Junction (Northern Part) of the project.

The project is going to develop as Underground Vehicular tunnel with twin tube configuration. To provide seamless connectivity to important intermediate nodes entry exit ramps have been provided at three intermediate locations.

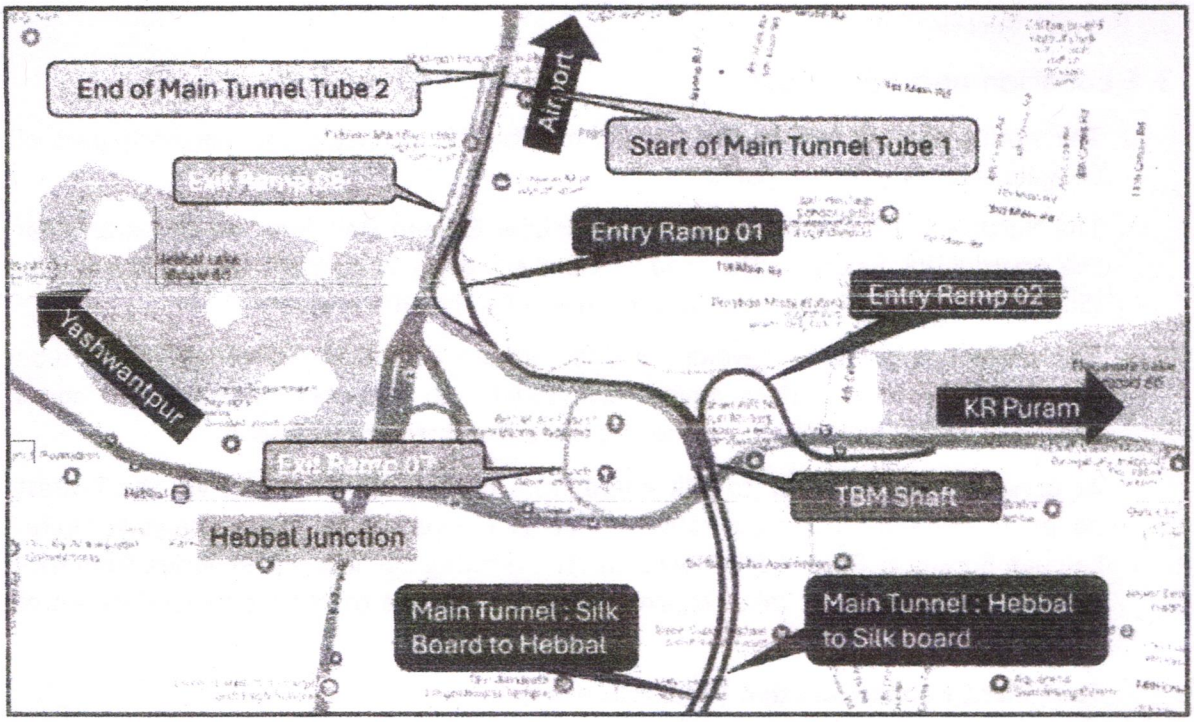
At present the commuter to Silk Board from Hebbal has to travel via the busiest nodes of city and follows the route of Hebbal Flyover- Mekri circle-Chalyuka circle-Lalbagh Botanical Garden-Silk Board Jn. The existing corridor width varies from four lanes to six lane. And it takes approximately 90 minutes to cover a mere distance of 18 Km by road

Start Point Hebbal Junction (Near Esteem Mall)

The project Stretch Start from Hebbal near Esteem Mall and end near silk board junction, where existing road is a 6-lane divided carriageway road.

The Entry at the start location has been planned near esteem mall for connecting traffic from Airport flyover and another entry has been provided from service road for the traffic coming from Sahakarnagar & Yelahanka to the main tunnel for conflict free movement at junction another entry ramps have been proposed at the Ring Road. Similarly, two exits have been proposed, one towards the Ring road and another on service road.

The starting point has two entry ramps into the tunnel and two exits. Each entry and exit have 2 lane configurations.



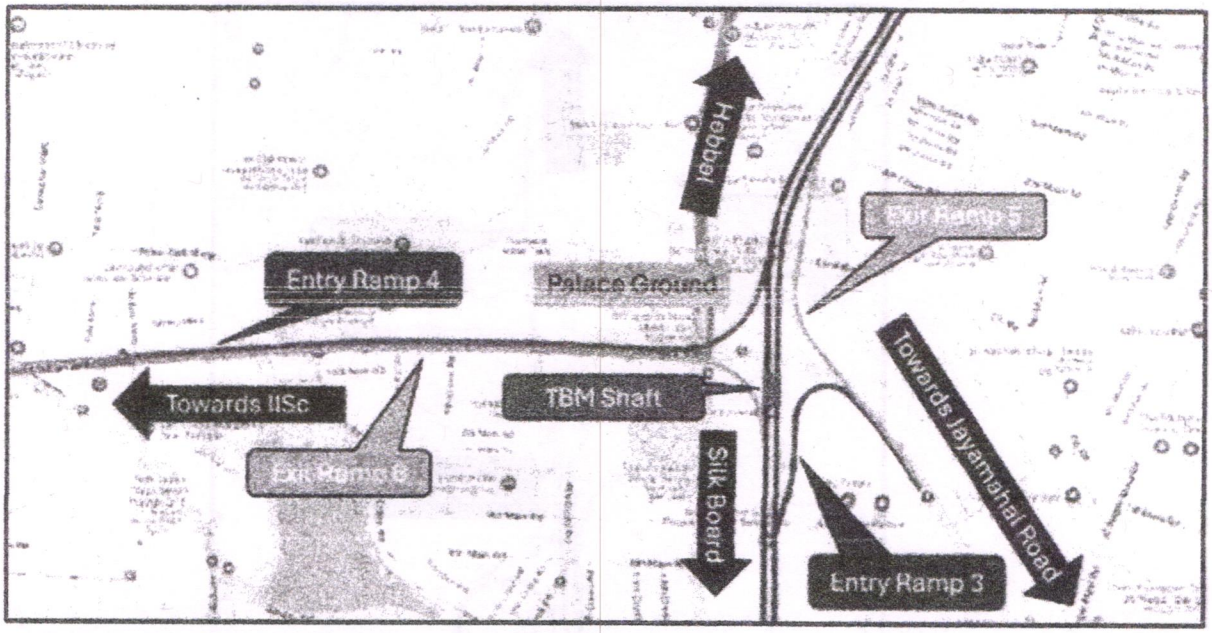
Sr. No.	Location	Description	Length (m)	Direction Of Traffic	Lane Configuration
Ramps at Start of Main Tunnel					
1	Hebbal Junction	Entry Ramp 1 into Main Tunnel	341	From Service Road Airport to Bangaluru City	2 Lane
2		Exit Ramp 08 from Main Tunnel	548	To Service Road towards Sahakar Nagar, Yelahanka	2 Lane
3		Entry Ramp 2 into Main Tunnel	814	From KR Puram on Outer Ring Road	2 Lane
4		Exit Ramp 07 from Main Tunnel	415	Towards Yeswanthpur on Outer Ring Road	2 Lane

Intermediate Point -1 Near Palace Ground

The first intermediate location has been planned near Mehkri circle. There are a total of 4 Entry Exit Ramps at this location.

Two ramps have been proposed on Jayamahal Road: One exit ramp for the traffic coming from Hebbal Side, and one entry ramp for traffic going to Silk Board side from Jayamahal Road.

Two Ramps have been proposed on CV Raman Road: One exit Ramp on CV Raman Road for the traffic coming from Silk board side and one entry ramp for the traffic going to Hebbal side from CV Raman Road.



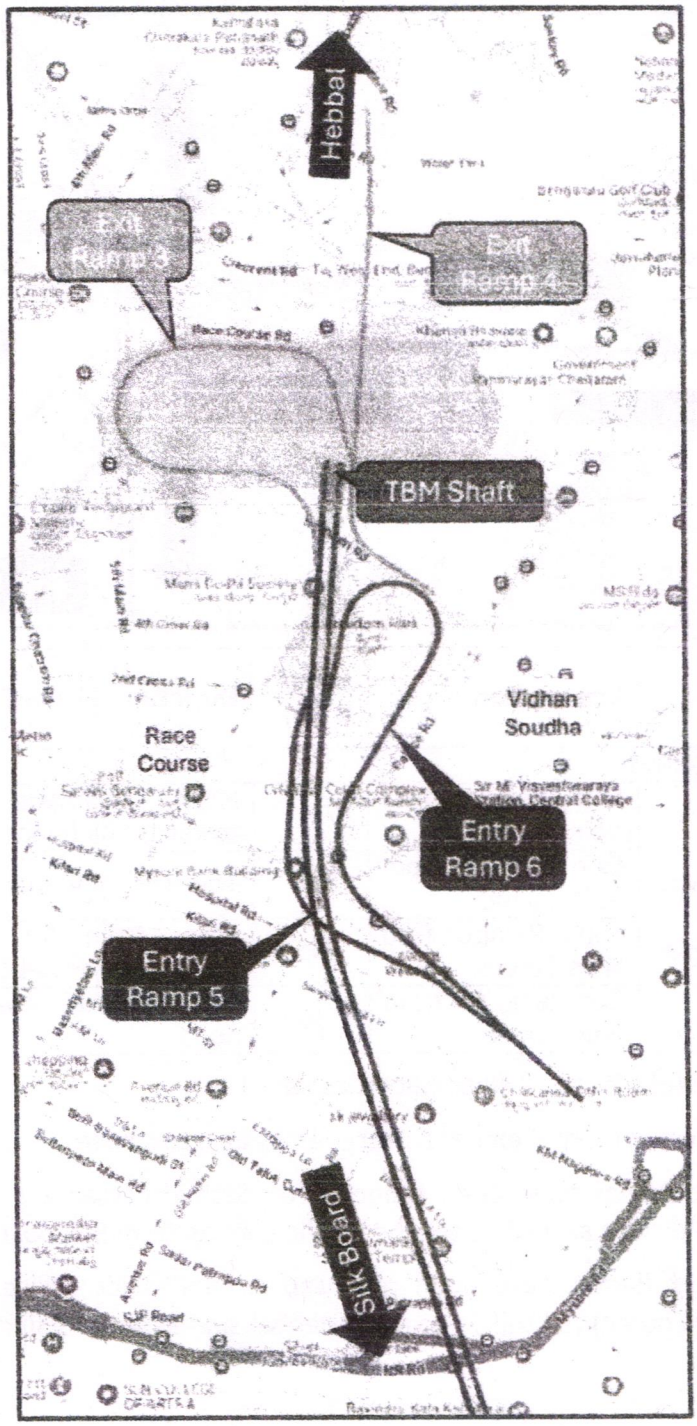
Sr. No.	Location	Description	Length (m)	Direction Of Traffic	Lane Configuration
Intermediate Ramps					
1	Near Palace Ground/ Mekri Circle	Entry Ramp 03 into Main Tunnel	871	From Jayamahal Road towards Silk Board	Intermediate Lane
2		Exit Ramp 06 from Main Tunnel	1942	Towards CV Raman Road	Intermediate Lane
3		Entry Ramp 4 into Main Tunnel	1945	Entry from CV Raman Road towards Hebbal	Intermediate Lane
4		Exit Ramp 05 from Main Tunnel	1110	Exit Towards Jayamahal Road	Intermediate Lane

Intermediate Point -2 Near Race Course

There are a total of 4 exit and entry ramps at racecourse.

Two Exit Ramps have been proposed on Seshadri Road for Traffic coming from Hebbal Side and as well as for the traffic coming from Silk board side.

Two Entry Ramps have been proposed from District Officer Road (CSI Hudson Memoria Church) for traffic going to Hebbal side as well as Silk Board side.


Hebbal
Exit Ramp 3
Exit Ramp 4
TBM Shaft
Vidhan Soudha
Race Course
Entry Ramp 6
Entry Ramp 5
Silk Board

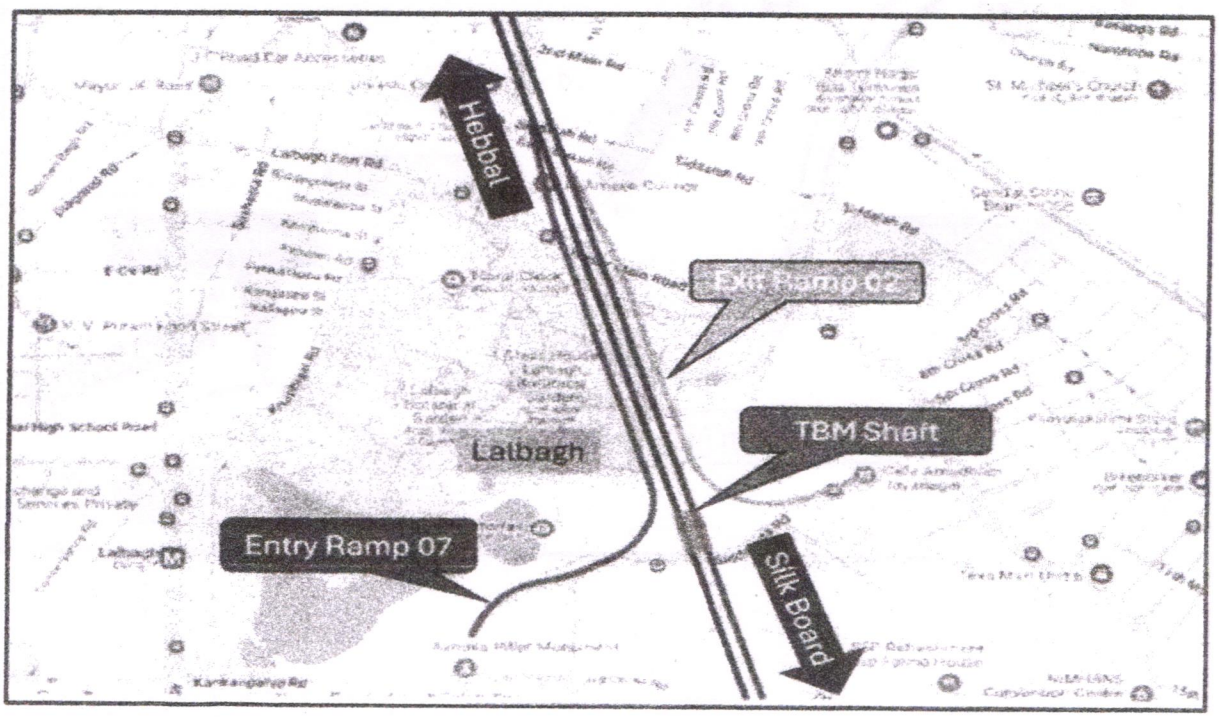
Sr. No.	Location	Description	Length (m)	Direction Of Traffic	Lane Configuration
Intermediate Ramps					
1	Near Racecourse / Vidhan Saudha	Entry Ramp 5 into Main Tunnel	1197	From District Officer Road Towards Hebbal	2 Lane
2		Entry Ramp 6 into Main Tunnel	1783	From District Officer Road Towards Silk Board Junction	2 Lane
3		Exit Ramp 04 from Main Tunnel	1141	On Seshadri Road (Towards KR Circle)	2 Lane
4		Exit Ramp 03 from Main Tunnel	1465	On Seshadri Road (Towards KR Circle)	2 Lane

Intermediate Point -3 Near Lal Bagh Botanical Garden

There are a total of 4 exit and entry ramps at racecourse.

Two Exit Ramps have been proposed on Seshadri Road for Traffic coming from Hebbal Side and as well as for the traffic coming from Silk board side.

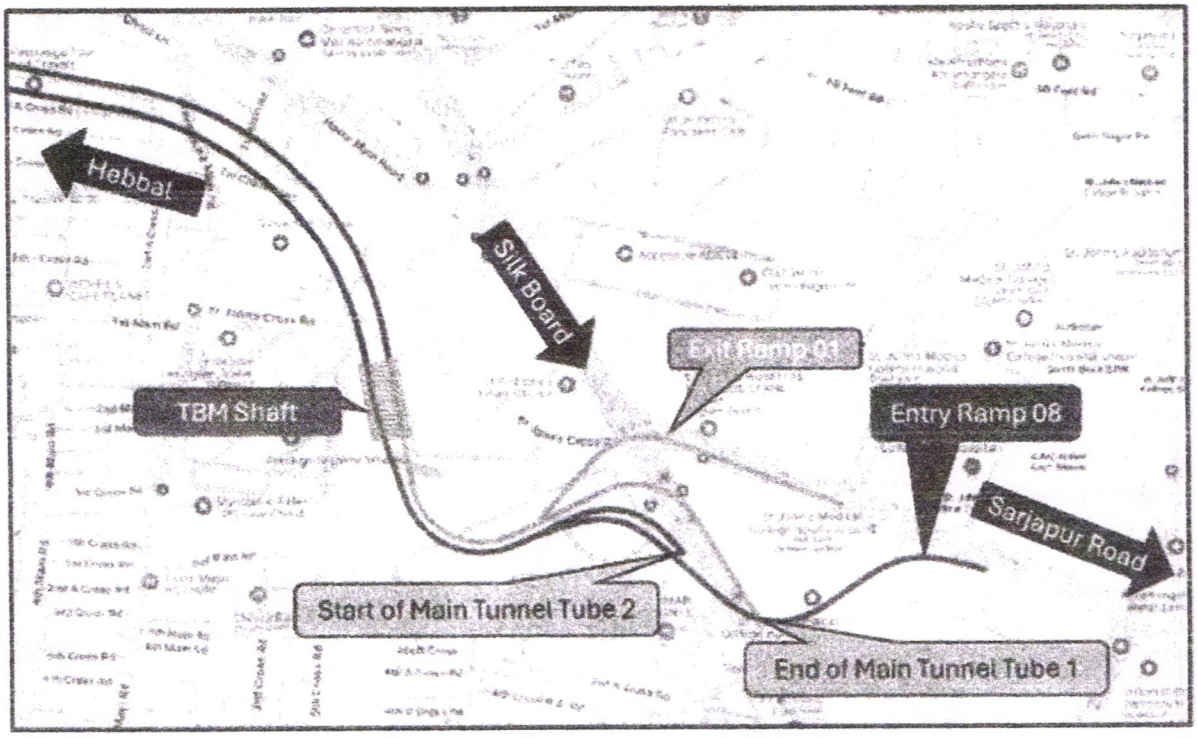
Two Entry Ramps have been proposed from District Officer Road (CSI Hudson Memoria Church) for traffic going to Hebbal side as well as Silk Board side.



Sr. No.	Location	Description	Length (m)	Direction Of Traffic	Lane Configuration
Intermediate Ramps					
1	Near Lalbagh	Entry Ramp 7 into Main Tunnel	1416	From Siddapura Road (Near Ashoka Pillar).	2 Lane
2		Exit Ramp 2 from Main Tunnel	1081	On Siddapura Road Near Wilson Garden	2 Lane

End Point Near Silk Board.

The Tunnel ends before silk board junction on Hosur road. Both entry and exit ramps has been planned on Hosur Road for the traffic going to electronic city. However, additional, entry & exit ramp has been planned to connect the traffic going to Ring Road/ HSR layout area on Sarjapur road near St. John Hospital.



Sr. No.	Location	Description	New Length (m)	Direction Of Traffic	Lane Configuration
Ramps at End of Main Tunnel					
1	Silk Board	Exit Ramp 1 from Main Tunnel	455	On Sarjapur Road / HSR layout (Ring Road)	2 Lane
2		Entry Ramp 8 into Main Tunnel	654	From Sarjapur Road / HSR layout (Ring Road)	2 Lane

- **Finalization of Alignment**

Based on the Feasibility Study Conducted by M/s Altinok Consultancy Engineering prepared a rough alignment for North South Corridor. Based on the alignment discussed in Feasibility Study further analysis of alignment was conducted and its components such as connecting ramps location, width, method of construction, vertical shaft locations were analyzed in detail.

The projects or projects under execution, projects in pipelines, infringement with Metro and Rail are considered while planning the alignment. Discussions with various stakeholders and agencies were discussed.

Infringement to protected environmental hotspots were also kept in mind while planning the alignment. The alignment is planned in such as way that exit and entry ramps passes through Government Land which would minimize the acquisition of private owned lands.

The alignment was presented to the Authority at the inception stage and the alignment was discussed/presented in a series of meetings at Bangalore with different stake holders, suggestions and observations were recorded and incorporated in the alignment submitted in Draft DPR Stage. The alignment was formally finalized on Approved and intimated vide BBMP Office letter BBMP/EIC/PR/2024-25 Dated 22-01-2025. The alignment passes below the existing metro and K ride.

3.2 Tunnel Configuration and components

To cater for the existing and projected traffic volume 6 lanes are needed and to cater for the 6-Lane configuration twin tube tunnel of 3+3 Lanes is proposed.

The lane configuration for each exit and entry ramp into tunnel is 2 lanes. However, at palace ground location due to scarcity of land intermediate lane is proposed.

The Project has twin tube tunnel configuration, each tunnel has 3 Lanes (each lane of 3.5 m).

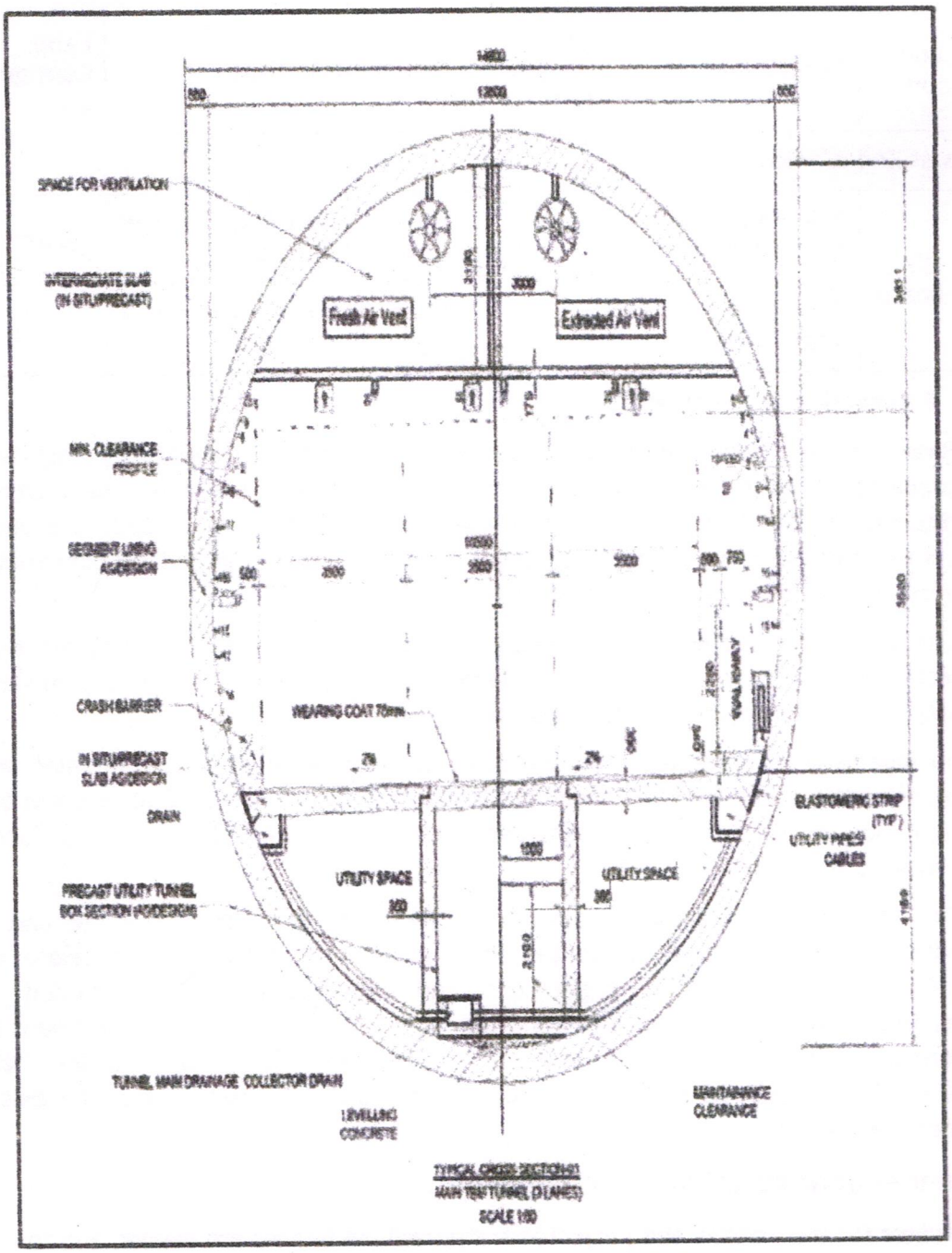


Figure : Typical Cross Section of TBM Tunnel

4.1 Geometric and Structural Design Standards

- (Design codes used, speed criteria, lane widths, gradients, typical cross sections, referencing DPR design chapters.)

Geometric Design is based on IRC:86-2018, IRC:SP:84-2019 and IRC:SP:91-2019.

The design speed is based on as per IRC 86-2018, Highway Capacity Manual (Indo-HCM)-2012-17 published by the CRRI.

The details are mentioned in Chapter 8 and Volume- II B - Structural Design Report

4.2 Tunnel Construction Methodology

In project 3 type of Tunnel Construction Methods are to be used, namely through Tunnel boring Machine, through New Austrian Tunneling Method and Cut and Cover method. The lengths of each methodology is mentioned below.

- **Details of Main Tunnel:**
  - Total Length of Road Tunnel: Twin Tunnels - Tube 1 - 16.745 km, Tube 2 -16.571 km
  - Total Length of TBM (Tunnel Boring Machine) Portion of Road Tunnel: 3 Lane Twin Tunnels - Tube 1 - 14.248 km, Tube 2 - 14.239 km
  - Total Length of Cut & Cover Tunnel: Tube 1 - 1.262 km; Tube 2 - 1.080 km
  - Total Length of Open Ramps: Tube 1 - 0,730 km; Tube 2 - 0.751 km
  - Lane Configuration of Main Tunnel: 3 Lane Each Tube
- **Details of Intermediate Entry & Exit Ramps**
  - Total length of Entry & Exit Ramps: 16.545 km
  - Total Length of NATM Tunnel Portion: 9.651 km
  - Total Length of Cut and Cover Portion: 3.928 km
  - Total length of Open Ramps portion: 2.194 km
  - Lane Configuration of Entry & Exit Ramps: 5.248 km (Intermediate Lane); 10.784 km (2-lane); 0.513 km (3-lane)
- Type of TBM envisaged for usage: 8 Nos of TBM are planned to be used.

Advanced TBMs—Slurry, Earth Pressure Balance (EPB), and Variable Density—have become more accessible in India, lowering geological risks and enabling more precise tunneling under dense urban environments

- Timelines for construction

50 months of construction duration is earmarked for each package.

4.3 Ventilation and Fire & Life Safety

Electromechanical System:

Highway tunnels require various installations to ensure the safety of commuters in the underground environment. The MEP services include main power supply system, power backup system, UPS system, Lighting system, Surveillance system, Incident Detection System, Public address (PA) system, Tunnel radio, Emergency Call Network, Supervisory Control and Data Acquisition (SCADA) system etc. The estimation of MEP items is done as per project specific proposal and designs.

Tunnel Ventilation System and Fire Fighting system:

The transverse type of mechanical ventilation system is considered for the tunnel lengths/section having lengths more than 2000 m, longitudinal type ventilation system has been considered for the sections between 500m and 2000m and natural ventilation has been considered for section less than 500m length as per IRC: SP:91-2019. Suitable air monitoring systems have also been considered. Fire detection, fire alarm and firefighting systems have been provided. Fire check doors Fe25/Fe400 have been considered for cross passages.

Further details are mentioned in Volume II C - Electrical design Report and Volume II D - Ventilation Design Report

As per IRC:SP:91-2019 the twin tube tunnels shall be connected by a cross passage at every 500 m for emergency evacuation in the event of an incident/accident in one of the tubes. The cross passage shall have provision for one traffic lane, edge strip of 0.60 m, crash barriers and walkways on either side. In normal conditions the cross passage shall be closed.

Fire fighting system

According to the latest guidelines for Road Tunnels published by the Indian Roads Congress (IRC), the firefighting system of the tunnels must be equipped with:

- Fire detection systems
- Hand - Operated Fire Extinguishers
- Fire Hydrants
- Water Reservoir
- Fire - Hose Coil with Supply
- Sprinklers

Following recommendations are given in IRC:SP:91 (2019), PIARC (1999) an NFPA 502:

- Fire detection systems available. These include detectors of heat (temperature and rate of rise), smoke, and flame. In addition, there are spot and linear heat detectors, the latter being preferable. Automatic fire detection systems shall be capable of identifying the location of the fire within 15 m (50 ft). Automatic fire detection systems shall be able to detect a tunnel fire incident of 5 MW or less within 90 seconds or better in a testing environment of 3 m/sec (590 fpm) air velocity. Fire alarms are recommended to be placed at every 100 m while the fire

alarm sensor at every 20 m.

- The fire extinguishers should have a minimum content of 6 kg. They should be rated for liquid, grease and electrical equipment fires. The maximum distance between fire extinguishers of 90 meters.
- It is recommended that all road tunnels of sufficient length (200 to 1000 m according to the case) be provided with a water supply standpipe installed through the length of the tunnel. This standpipe should have a minimum capacity of 1000 l/min at 0.5 MPa. The standpipes can be either wet or dry. Hydrants should be placed at a spacing of 90 to 200 m. The between hose connections is recommended to 85-90 meters.
- The high-pressure water mist pumps are connected to a tank. The total capacity of the water tank shall be sufficient to provide water supply for 60 minutes of operation. The tanks shall be placed closed to the pump room and are recommended to be built at ventilation stations.
- Sprinkler systems are a type of fixed fire suppression system (FFS) that can be used in tunnels to help prevent fire spread and cool the tunnel structure. Sprinkler arrangement is recommended to be used at every 4 m.

Emergency and evacuation

The strategic planning of safety and evacuation during fire, accident and during vehicle breakdown inside tunnel is important in tunnel designing process. As a first step, in the event of an incident in the tunnel, the alarm can be raised by video surveillance or by more specific means such as (IRC: SP-91-2019):

- Emergency telephones (call stations)
- Notification of door opening (cross-passages) or removal of a fire extinguisher from its hook,
- Alarm push buttons (manual call points),
- Automatic incident detection (by analysing CCTV images),
- Fire detection systems.

In any case, it is important to evacuate early and fast. Therefore, in addition to providing an emergency route to a safe place, measures are required to make sure people react quickly and evacuate early through the emergency exits.

During the emergency scenario, the ventilation system aims to create and maintain a tenable environment for the evacuation of tunnel users. Specifically, this environment consists of acceptable visibility and air quality levels. In general during emergency operation, the most important thing is to evacuate quickly on foot, following the designated exit signs, driving out of the tunnel if possible, and never stopping your vehicle unless absolutely necessary; if it has to be stopped, one must proceed on foot to the nearest exit, always prioritizing the safety over belongings (PIARC Ref.: 2012R25EN).

For the discussion of safety and evacuation strategies in the present twin tube tunnel, two locations are considered, one inside the entry and exit ramps and other

one inside the main tunnel passage.

Fire or accident near the entry and exit ramps

If there is a fire inside entry or exit ramps near the main tunnel section (up to 100 m from the main tunnel section) the hot smoke will be blown through the closest main tunnel section by means of the jet fans. The nominal value for the velocity of the tunnel airflow downwind the fire lies between 1.0 m/s and 1.5 m/s.

The entry to the corresponding ramp and the main tunnel tube will be stopped. The vehicles upstream to the fire inside ramps must be evacuated through the entry or exit locations. The passengers downstream to the fire location are required to walk towards the nearest cross-passage in the main tunnel. In the corresponding, where this ramp is connected, main tube the vehicular movement is stopped upstream to the smoke or will be diverted through the cross-passages to other tube. and the vehicles will be allowed to go out to main tube in the downstream direction.

In case of fire in the entry and exit ramp near the open cut, the fire and hot smoke will be blown away through the open area. The vehicles inside the ramps in the downstream directions will be directed towards the main tunnel sections (vehicular movement in the main tunnel is controlled accordingly) and the entry to the ramp will be closed.

During the vehicle accidents, the vehicles inside the ramp and close to main tunnel section will be diverted towards the main tunnel section. Entry to the ramps will be closed.

Fire in the sections between the ventilation stations

If there is a fire within the ventilation stations 1 to 5, detected hot smoke will be extracted through the dampers. In this scenario, the exhaust air fans will be operated at their maximal power in order to get the maximum available extraction output. The jet fans are operated so that it is possible to avoid an expansion of the hot smoke gases in the tunnel on the one hand and on the other hand to ensure an equal afflux of the fresh air upwind of the fire location to the extraction point. It is also suggested to operate both the jet fans, fresh air and exhaust air, in extraction mode to increase the smoke extraction rate and the fresh air is expected to entre in the tunnel sections through the entry and exhaust ramps in this case.

The cross-passages will be used as emergency exit which connect main tunnel tubes. These are located at every 500 m connecting the road tunnel with the other side tunnel. In case of a fire the people can leave the hazard zone via this evacuation route. In order to keep this emergency and rescue path free from smoke, a shear wall with an emergency door is proposed, if possible, for each cross passage. These emergency doors or the main doors have to be equipped with an assisted electrical or mechanical opening system to ensure moderate opening forces of the emergency doors. In addition to that these walls are equipped with a pressure difference measurement to control the pressure difference between the road tunnel and the cross-passages.

The minimal air flow velocity through an open door of the cross-passage has to be 2.5 m/s in direction to the road tunnel where the fire is located. This means, that

the pressure in the emergency and other side of the tunnel has to be higher than the pressure in the incident tunnel. In case of a fire and unfavourable meteorological conditions the pressure in the incident tunnel can reach up to 360 Pa (plus ambient pressure).

During this kind of emergency, all the entries to the main tunnels will be closed. The passengers within the range of 100 m to the fire location, need to get out of the vehicles and walk towards the nearest cross-passages in the opposite direction to smoke.

In tunnels with two tubes operating with unidirectional traffic and with transverse ventilation, the ventilation typically supports smoke propagation in the driving direction (the initial direction of smoke propagation due to traffic-induced airflow). The smoke gradually affects the empty part of the tube in front of the incident. People that are stuck in traffic behind the incident can be evacuated to the other tube and are normally not affected by the smoke. The second tube will normally be closed to traffic and can be considered a safe zone to evacuate to.

In case of accidents, the entry to the corresponding tube is closed and the traffic upstream to the accidental location is either stopped or diverted to other tunnel tube through the cross-passage. The injured people are rescued or the passage to the ambulances are provided from the nearest possible entries. One lane is made available for the same. The traffic downstream to accidental location is allowed to go out of the tunnel.

Drainage and Dewatering System

The tunnel drainage system shall cover all sorts of water which may reach the tunnels such as road surface spillage, cleaning water, ground water seepage, firefighting or rainwater etc. It is important to control the spills at source level, however, tunnels cannot be assumed dry at all times. Therefore, continuous drainage shall be provided to collect those water and channelize it to the designated sumps from where it can be mechanically discharged to nearest municipal drains through the project shaft. A typical arrangement for drainage system has been included in the DPR however Contractor shall carry out the detailed design to estimate the amount of water for which drainage system shall be designed and sizing of each component shall be elaborated.

Drain and sumps in Open Ramp zone: the entry of surface ground water shall be restricted by appropriate measures in at grade highway design so that it does not reach the falling grade of ramp area and unnecessarily increase the drainage efforts of tunnel. Also, the canopy roof structure shall be installed to minimize the entry of rainwater. Still some amount of rain water and ground water seepage can find access to ramp area and same shall be collected in the side drain of ramp. A central drain in case required, may also be constructed. A sump of suitable size shall be constructed at the interface of ramp and cut & cover section and water from this sump can directed to nearest municipal drain by pumping.

The main drainage pipes shall remain buried in the base slab of ramp section. However, for maintenance purposes manholes at the spacing between 50 to 75m should be planned, the manhole opening size of minimum 400mm x 400mm or as designed by the contractor can be utilized. All ramp sections of main tunnels and

entry/ exits proposed to have drainage arrangements of similar kind.

Drainage in Cut & Cover tunnels: The cut & cover section can expect ground water seepage and road spillage from cleaning, running vehicles or firefighting. The side drainage shall run along the Cut & cover tunnels to collect the water. A central drain connecting the surface drain to carry water along the C&C stretch is proposed. The central drain of C&C section will merge with the central drain of NATM or TBM section. The pipe and manhole arrangement will remain similar to ramp section that means the manhole spacing between 50 to 75m with a size of minimum 400mm x 400mm. The side drain should be connected with central drain at every manhole point

Drainage in NATM tunnels : NATM tunnels are also designed as tanked structures i.e. all around water proofing of inner lining. Similar to C&C tunnels the sources of water inside NATM tunnels can include ground seepage, road spillage from cleaning, running vehicles or firefighting. The side drainage shall run along the NATM tunnels to collect the water. A central drain connecting the surface drain at manhole spacing to carry water along the tunnel stretch is proposed. The central drain of NATM tunnels will merge with the central drain of TBM section. The pipe and manhole arrangement will remain similar to C&C tunnels that means the manhole spacing between 50 to 75m with a size of minimum 400mm x 400mm. The side drain should be connected with central drain at every manhole point.

Drainage in TBM bored tunnels: TBM bored tunnel have a large space available below the road deck. That space can be utilized to convey various projects and commissioned utilities between the shafts and to the surface. The tunnel's main drainage will run at the base of utility tunnel which shall collect all the water from NATM/ C&C tunnels and drop it in the sump situated in cross passages. At the road level sources of water in TBM tunnel are ground seepage, road spillage from cleaning, running vehicles or firefighting. The side drainage shall run along the pavement to collect these water and will drop to the central drain through a pipe running along the lining surface. The connecting pipe of minimum 150mm dia to be placed at the spacing of approximately 50m. The central drain shall be a covered drain which will have connection to sump situated at lowest points along the tunnel. Two CPs with sump between the shafts are proposed to have more efficient drainage scheme and drain size. Sump inside the CP shall be equipped with riser pipe and pump to drain the accumulated water to the surface. The pump shall be connected with SCADA for start stop cycle, which should facilitate the automatic start of sump pump as per the capacity of sump storage and pump performance. The water from sump shall be drained to nearest municipal drain through the shafts.

4.4 Tunnel Monitoring and Control

The SCADA (Supervisory Control and Data Acquisition) system is provided in this tunnel which will enable efficient monitoring and controls for various aspects of the tunnel's operations, including ventilation, lighting, traffic management, fire detection, and emergency systems, allowing operators to remotely manage the tunnel's functionality and respond to potential issues in real-time from a central control room located at shaft location. The key function of SCADA is as under-

Monitoring:

- Sensor data collection from throughout the tunnel, including air quality, temperature, humidity, CO levels, water leaks, and equipment status.
- Monitoring traffic flow and vehicle speeds.
- Surveillance camera feeds for visual observation

Control:

- Adjusting ventilation fan speeds based on air quality conditions.
- Regulating lighting levels depending on time of day and traffic conditions.
- Activating emergency systems like fire alarms, sprinklers, and evacuation procedures.
- Managing traffic control systems like variable message signs and lane closures.

Benefits of a tunnel SCADA system:

Enhanced safety:

Real-time monitoring and control of critical systems can help to prevent accidents and quickly respond to emergencies.

Operational efficiency:

Optimized ventilation and lighting based on traffic conditions can lead to energy savings.

Improved maintenance:

Early detection of potential issues allows for preventative maintenance and minimizes downtime

5. Project Cost Estimates

5.1 Capital Cost/Civil Cost Estimates

- (Broad cost heads—tunnel construction, land acquisition, utility shifting, traffic management, etc. Summaries referencing the BOQ in the DPR for line items.)

Table: Cost Estimate for Package1

Item No.	Description	Total Amount in Rs.
BILL NO. 1	Site Clearance	60,10,749
BILL NO. 2	**Tunnel Work**	
A	Main Tunnel	
a.	Tunnelling By TBM	5,89,80,77,332
b.	Cross Passages	26,73,67,124
c.	Cut And Cover Tunnel	3,06,19,00,476
d.	Open Cut (Ramps)	53,69,34,960
e.	Shafts (2 No's)	93,43,11,771
B	**Intermediate Entry/Exit**	
a.	NATM Tunnel	3,13,89,84,309
b.	Open Cut (Ramps)	1,21,87,99,719
c.	Cut And Cover Tunnel (2-lane,3-lane & Intermediate Lane)	2,82,44,08,299
C	**Sub Total Cost of Tunnel Works(A+B)**	**57,88,07,83,989**
D	Electro- Mechanical Works	3,96,70,10,106
E	I&M cost @1% of C	57,88,07,840
F	Tunnel Ventilation & Fire Fighting	1,02,85,60,940
G	Cement concrete wearing coat	30,45,37,265
H	Inter Modal Building -2 Nos	3,27,60,63,038
BILL NO. 3	Traffic Signs, Markings, Appurtenances etc.	8,89,02,666
BILL NO. 4	Reconstruction/New Construction of Structures	
a.	Aqueduct at Km 0+288, Entry Ramp-02(ORR)	52,21,373
b.	Nala Diversion at Hebbal	17,45,78,795
BILL NO. 5	**Road Restoration and Development**	
a.	Reclamation Of Existing Road in Shaft, Approach Area & Ramps (Road, Footpath, Lighting etc.)	9,24,40,759
b.	Junction Development	3,94,94,324
BILL NO. 6	**High-Capacity & High-Speed Busses with Driving and Trailing Coaches (Neo-Bus System)**	
a.	Telecommunication & Passenger Information System	5,00,00,000
b.	Fare Collection System	5,00,00,000
c.	EV Coach of Minimum 12 M Length	20,00,00,000
BILL NO. 7	Miscellaneous (Trees, Artwork in Tunnel etc.)	2,85,02,940
BILL NO. 8	GPS/GNSS-Based Tolling	3,22,00,000
B) Estimated Construction Cost Without GST		**67,80,31,14,783**
Labour Cess @ 1% Of (B)		67,80,31,148
GST @ 18% Payable on Construction Cost Only (On B)		12,20,45,60,661
C) Construction Cost Including Labour cess & GST		**80,68,57,06,592**
Contingencies @ 1% Of (B)		67,80,31,148
Planning & Designing Charges @ 1% Of (B)		67,80,31,148
Construction Supervision Charges @ 2% Of (B)		1,35,60,62,296
Maintenance For 20 Years I.E. @ 0.25% for the first 5 years, 0.35% for the next five years, 0.45% for next five years, 0.5% for the next five		-

Item No.	Description	Total Amount in Rs.
years (On C)		
Escalation @ 5% Per Annum For 2nd, 3rd,4th, Year During Construction Payable to Contractor Of (C)		-
D) Total Cost Including Centages		**83,39,78,31,183**
Land Acquisition, Resettlement, Rehabilitation Cost		4,00,00,00,000
Utility Shifting Cost		75,00,00,000
E) Total Project Cost (Sum of All the Above)		**88,14,78,31,183**

Table: Cost Estimate for Package2

Item No.	Description	Total Amount in Rs.
BILL NO. 1	Site Clearance	32,37,906
BILL NO. 2	Tunnel Work	
A	Main Tunnel	
a.	Tunnelling By TBM	45,46,51,66,550
b.	Cross Passages	24,59,05,906
c.	Cut And Cover Tunnel	1,32,60,10,638
d.	Open Cut (Ramps)	33,66,24,192
e.	Shafts (3 No's)	1,39,59,54,884
B	Intermediate Entry/Exit	
a.	NATM Tunnel	5,41,72,08,181
b.	Open Cut (Ramps)	1,16,02,05,284
c.	Cut And Cover Tunnel (2-lane,3-lane & Intermediate Lane)	3,49,56,27,989
C	Sub Total Cost of Tunnel Works(A+B)	58,84,27,03,628
D	Electro- Mechanical Works	3,13,94,74,157
E	I&M cost @ 1% of C	58,84,27,036
F	Tunnel Ventilation & Fire Fighting	1,18,65,82,932
G	Cement concrete wearing coat	35,44,20,402
H	Inter Modal Logistic Building -3 Nos	4,36,11,83,192
BILL NO. 3	Traffic Signs, Markings, Appurtenances etc.	9,29,45,319
BILL NO. 4	Reclamation Of Existing Road In Shaft, Approach Area & Ramps (Road, Footpath, Lighting etc.)	6,00,55,959
a.	Junction Development	3,74,62,651
BILL NO.5	High-Capacity & Highspeed EV Busses	
a.	Telecommunication & Passenger Information System	5,00,00,000
b.	Fare Collection System	5,00,00,000
c.	EV Coach of Minimum 12 M Length	20,00,00,000
BILL NO. 6	Miscellaneous (Trees, Artwork in Tunnel etc.)	2,85,17,460
BILL NO. 7	GPS/GNSS-Based Tolling	3,22,00,000
B) Estimated Construction Cost Without GST		69,02,72,10,646
Labour Cess @ 1% Of (B)		69,02,72,106
GST @ 18% Payable on Construction Cost Only (On B)		12,42,48,97,916
C) Construction Cost Including Labour cess & GST		82,14,23,80,669
Contingencies @ 1% Of (B)		69,02,72,106
Planning & Designing Charges @ 1% Of (B)		69,02,72,106
Construction Supervision Charges @ 2% Of (B)		1,38,05,44,212
Maintenance For 20 Years I.E. @ 0.25% for the first 5 years, 0.35%		

Item No.	Description	Total Amount in Rs.
for the next five years, 0.45% for next five years, 0.5% for the next five years (On C)		
Escalation @ 5% Per Annum For 2nd, 3rd,4th, & 5th Year During Construction Payable To Contractor Of (C)		-
D) Total Cost Including Centages		4,90,34,69,095
Land Acquisition, Resettlement, Rehabilitation Cost		4,00,00,00,000
Utility Shifting Cost		75,00,00,000
E) Total Project Cost (Sum of All the Above)		89,65,34,69,095

5.2 Project Structuring - Packaging

The project have been bifurcated in two number of packages considering the following aspects of the project.

- For the ease and timely construction of the tunnel project.
- Factors such as bid capacity of the leading tunnel construction firms in India and Across Globe.
- The per day boring capacity of a TBM.
- Civil construction cost of the project
- Geography of the project.
- Minimal Construction infirngement in both packages

The package has been divided into North and South Portions from Km 8+748. The upper half has been considered as package 1 and lower half has been considered as Package 2 .

The detail of the project is as mentioned below,

- Package 1: Design and Construction of 3 lane Underground Twin Tunnel Road from Hebbal (Esteem Mall junction) (Km. 0+000) and Silk Board (KSRP Junction) along with 3lane/2-lane entry & exit ramps on Enhanced BOT (Toll) Mode including operation and maintenance in Bangalore City (North South Corridor).Package 1- Hebbal Near Esteem Mall Junction to Seshadri Road, Freedom Park (8.748 Km

- Package 2: Design and Construction of 3 lane Underground Twin Tunnel Road from Hebbal (Esteem Mall junction) (Km. 0+000) and Silk Board (KSRP Junction) along with 3lane/2-lane entry & exit ramps on Enhanced BOT (Toll) Mode including operation and maintenance in Bangalore City (North South Corridor). Package-2: From Seshadri Road, Freedom Park (Km 8.748) to Silk Board (Km 16.745).

5.3 User Charges/ Toll Revenues

- Toll rates are estimated based on the Gazette's published by Government of Karnataka. The base toll rates are considered from the **Toll gazette PWD 06 EAP 2012 (P3), Bengaluru, Dated 07-03 -2015. As per rule 5, sub rule (1) of gazette,** the base rates are increased by 3% each year without compounding with effect from 1st April 2008.
- As per Sub-rule (2) of gazette the applicable base rates are revised with the effect from 1st April each year to reflect the increase in wholesale price index for the

month of December of the year. The base toll rates are given in table below. For satellite based tolling system, the charges would be collected for the distance travelled in Kms.

Table: Toll Capping Rates

Type of vehicles	Base Rate of Fee per km in Rs
Car/Jeep/Van	0.65
LCV/Mini Bus	1.05
Bus/Truck	2.20
3 Axle trucks	2.40
MAV (4 Axle and above) Heavy Construction machinery (HCM), Earth Moving Equipment (EME)	3.45
Oversized Vehicles (7 or more axles)	4.2

Toll Fee

Toll revenue is the product of the forecasted traffic expected to use the project road and the appropriate toll fee for the vehicle category. Toll indexing has been carried out as per the toll policy and rounded off to nearest rupee.

- Revenue from Single Trips: Number of vehicles making single trips X Toll Fee X 365 days
- Revenue from Return Trips: Number of vehicles making Return Trips X Toll Fee X 150% X 365 days
- Revenue from Monthly Traffic Trips: Number of vehicles making Single Trip X Toll Fee X 2/3*50* 12 months.

Based on the above discussions the toll revenue has been computed for node-to-node travel length. Further the above toll rate will be adjusted by 5% per annum without compounding for the subsequent years. It is further adjusted on the basis of Wholesale Price Index as per the following formula:

- Applicable Rate of fee= Base Rate + Base Rate X {(WPI A-WPI B)/ WPI B}X 0.4
- Where WPI A = Wholesale price index for the month of December of the immediately preceding year and
- WPI B = Wholesale price index of the December month of the year

The toll rates for the subsequent years were calculated on the basis of 5% annual increase in WPI with 40% restriction. The base year for the toll revenue is considered as FY 2030-31.

The toll capping rates have been escalated with an inflation WPI rate of 5% every year. Toll rates in the 1st year of operation i.e., 2030-31 for the section including road length, structure length and bypass length is presented in the below tables.

For Package 1

S. No.	From	To	Length in Kms	Car
1	Hebbal (km 0.000)	Silk Board Junction	8.75	170
2	Hebbal (km 0.000)	Sarjapur/ HSR layout (Ring Road)	8.75	170

S. No.	From	To	Length in Kms	Car
31	Race Course (km 7.05) from Palace Rd.	ORR (Km 1.30 from KR Puram)	8.00	155
32	Race Course (km 7.05) from Palace Rd.	CV Raman Road (Mekhri Circle)	5.44	105
33	CV Raman Road	Hebbal	7.18	140
34	CV Raman Road	ORR (Km 1.30 from KR Puram)	5.91	115

For Package 2

S. No.	From	To	Length in Kms	Car
1	Hebbal (km 0.000)	Silk Board Junction	7.997	150
2	Hebbal (km 0.000)	Sarjapur/ HSR layout (Ring Road)	8.049	150
3	Hebbal (km 0.000)	Hosur Main Road (Wilson Garden)	4.119	75
4	Hebbal (km 0.000)	Seshadri Road (Towards KR Circle)	0.000	0
5	Hebbal (km 0.000)	Palace Road (Mekhri Circle)	0.000	0
6	ORR (Km 1.30 from KR Puram)	Silk Board Junction	7.997	150
7	ORR (Km 1.30 from KR Puram)	Sarjapur/ HSR layout (Ring Road)	8.049	150
8	ORR (Km 1.30 from KR Puram)	Hosur Main Road (Wilson Garden)	4.119	75
9	ORR (Km 1.30 from KR Puram)	Seshadri Road (Towards KR Circle)	1.140	20
10	ORR (Km 1.30 from KR Puram)	Palace Road (Mekhri Circle)	0.004	0
11	Mekhri Circle	Silk Board Junction	8.395	155
12	Mekhri Circle	Sarjapur/ HSR layout (Ring Road)	8.447	155
13	Mekhri Circle	Hosur Main Road (Wilson Garden)	4.517	85
14	Mekhri Circle	Seshadri Road (Towards KR Circle)	1.140	20
15	Race Course from palace rd.	Silk Board Junction	9.278	170
16	Race Course from palace rd.	Sarjapur/ HSR layout (Ring Road)	9.330	170
17	Race Course from palace rd.	Hosur Main Road (Wilson Garden)	5.400	100
18	Silk Board (km 16.693)	Hebbal	7.847	145
19	Silk Board (km 16.693)	ORR (Km 1.30 from KR Puram)	7.847	145
20	Silk Board (km 16.693)	CV Raman Road (Mekhri Circle)	7.847	145

S. No.	From	To	Length in Kms	Car
21	Silk Board (km 16.693)	Race Course	9.386	175
22	Sarjapur/ HSR layout (Ring Road) (km 16.386)	Hebbal	8.230	150
23	Sarjapur/ HSR layout (Ring Road) (km 16.386)	ORR (Km 1.30 from KR Puram)	8.230	150
24	Sarjapur/ HSR layout (Ring Road) (km 16.386)	CV Raman Road (Mekhri Circle)	8.230	150
25	Sarjapur/ HSR layout (Ring Road) (km 16.386)	Race Course	9.769	180
26	Jayanagar (From Ashoka Pillar) (km 11.600)	Hebbal	4.347	80
27	Jayanagar (From Ashoka Pillar) (km 11.600)	ORR (Km 1.30 from KR Puram)	4.347	80
28	Jayanagar (From Ashoka Pillar) (km 11.600)	CV Raman Road (Mekhri Circle)	4.347	80
29	Jayanagar (From Ashoka Pillar) (km 11.600)	Race Course	5.886	110
30	Race Course (km 7.05) from Palace Rd.	Hebbal	1.703	30
31	Race Course (km 7.05) from Palace Rd.	ORR (Km 1.30 from KR Puram)	1.703	30
32	Race Course (km 7.05) from Palace Rd.	CV Raman Road (Mekhri Circle)	0.703	15
33	CV Raman Road	Hebbal	0.000	0
34	CV Raman Road	ORR (Km 1.30 from KR Puram)	0.000	0

- Method of toll collection

The toll can be connected via GNSS Tolling system.

- Toll sharing to be done using t+1 settlement account between BBMP and the two packages

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State Level Environment Impact Assessment Authority-Karnataka

(Constituted by MoEF, Government of India, under section 3(3) of E(P) Act, 1986)

No. SEIAA 80 MISC 2024

EIC

Date: 26.11.2024

To,

The Chief Engineer
Bruhat Bengaluru Mahanagara Palike,
N.R. Square, Hudson Circle,
Bengaluru – 560002

Respected Sir,

Sub: Proposed tunnel route of distance 18 Km from Bangalore-Hebbal Esteem Mall Junction to Silk Board Junction-applicability of Environmental Clearance - Reg

Ref: BBMP Letter No. CE/BBMP/PR/1615/2024-25 dated 15.11.2024.

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Inviting reference to the subject cited above and draft Detailed Project Report submitted vide reference captioned above, it is to inform that, the proposed tunnel route of distance 18 KM from Bangalore-Hebbal Esteem mall junction to Silk Board Junction does not attract the Environment Clearance under EIA Notification, 2006.

As per the scheduled list of Project or Activities requiring Prior Environment Clearance, entry 7(f) of EIA Notification, 2006 page No.21 dated 14.09.2006 and amended from time to time, expansion of National Highways upto 100 KMs involving additional Right of Way or Land acquisition upto 40 Mts on existing alignments and 60 Mts on re alignments or bypass is exempted from obtaining EC.

Extract of the EIA Notification, 2006 is enclosed for your kind information.

Yours faithfully,

(Vijay Mohan Raj V)
Member Secretary,
SEIAA, Karnataka

Room No. 706, 7th Floor, 4th Gate, M.S. Building, Bangalore - 560 001 Phone : 080-22032497 Fax : 080-22254377
Website : http://environmentclearance.nic.in e-mail : msseiaakarnataka@gmail.com