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To Minimize Construction Cost and Time of Panvel-Karjat Suburban Corridor (Under MUTP-3A) by Implementation of Value Engineering Aspect

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Abstract: ***Mumbai Metropolitan Region (MMR), contributing about 8 percent of India's GDP, is home for about 22 million people. The Mumbai Metropolitan Regional Development Authority (MMRDA) anticipates the population in MMR to grow by about 42 percent to 28.4 million in 2025 and by 54 percent to 30.87 million in 2036. The Mumbai suburban railway, the main lifeline of the commuter's flow from the suburban to the Central Business District. The Asian Infrastructure Investment Bank (AIIB) is considering providing loan assistance for double line suburban corridor between Panvel and Karjat section of 30 RKm on Central Railway under the MUTP-III Project. Since this Study state that how can we execute this corridor by utilizing the available Assets, Resources by reducing the Project Cost and Time also by 5-7 % Min to Max 10-12%, by using Value Engineering Terminology.***

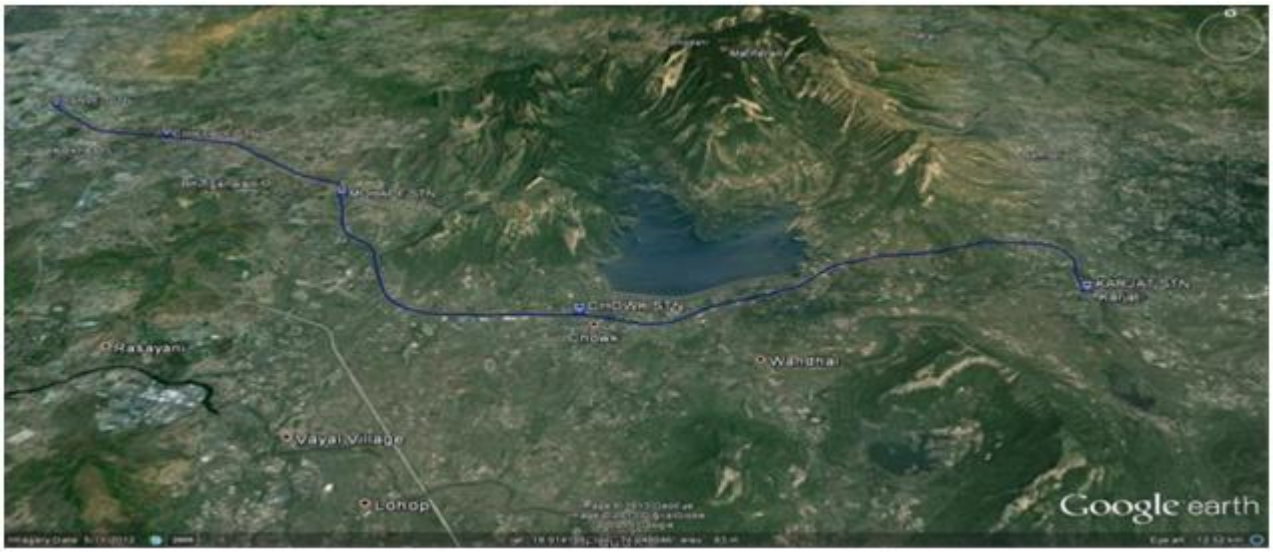
Keywords: Value Engineering, Construction Cost, Time, Asset Utilization, Resources, Suburban Corridor.

1. Introducing of this Suburban Corridor

Since 2002, the World Bank has been providing loan assistance to improve the Mumbai suburban railway system. Mumbai Urban Transport Project-I and Mumbai Urban Transport Project-II is being implemented through loan assistance from World Bank. The Asian Infrastructure Investment Bank (AIIB) has agreed to finance a loan for implementation of Panvel and Karjat Double Line Suburban Corridor (30 RKm) on Central Railways under MUTP-III project. The double line is proposed on the left of the existing line from Panvel to Karjat. A new Suburban terminal has been proposed on East side of existing Kalyan - Karjat Railway line at Karjat. A new station building has been proposed in Chikhale. A new station is proposed at Morbe. Two new tunnels are proposed between Morbe station and Karjat station, but in this Study, we will be considering to reroute the Alignment and utilizing Value Engineering Terminology to Reduce the Construction Cost and Time for Achieving the target in minimum amount of time

2. Proposed or Planned Corridor

The double line is proposed on the left of the existing line from Panvel to Karjat. A new Suburban terminal has been proposed on East side of existing Kalyan - Karjat Railway line at Karjat. A new station building has been proposed in Chikhale. A new station is proposed at Morbe. Two new tunnels are proposed between Morbe station and Karjat station. **Figure 1.1** and **1.2** presents the Route and different components of the project in schematic diagram, not to scale. **Figure 1.3** Presents the Demography Survey, not to scale.



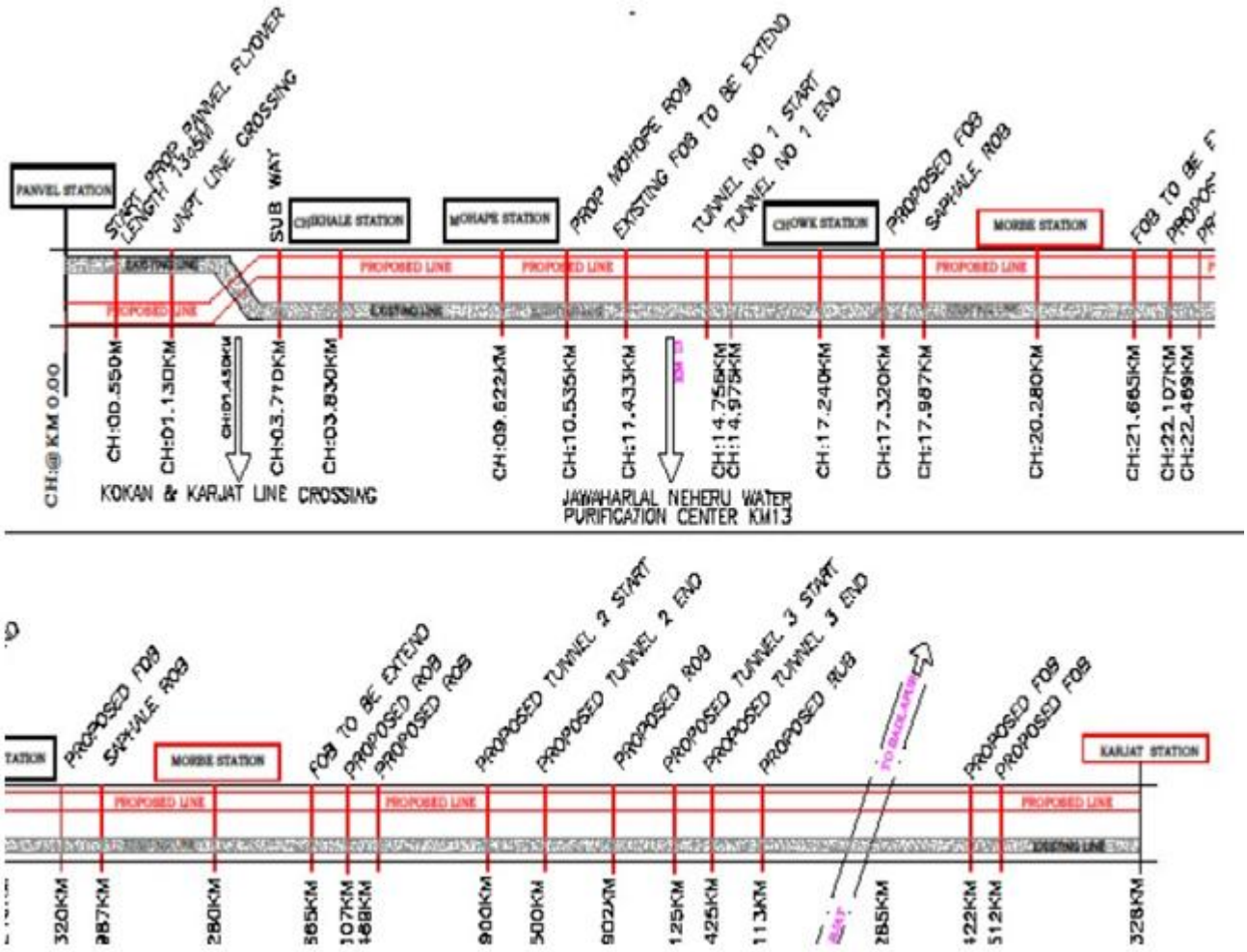


Figure 1.1 and 1.2 Presents the different components of the project in schematic diagram, not to scale.

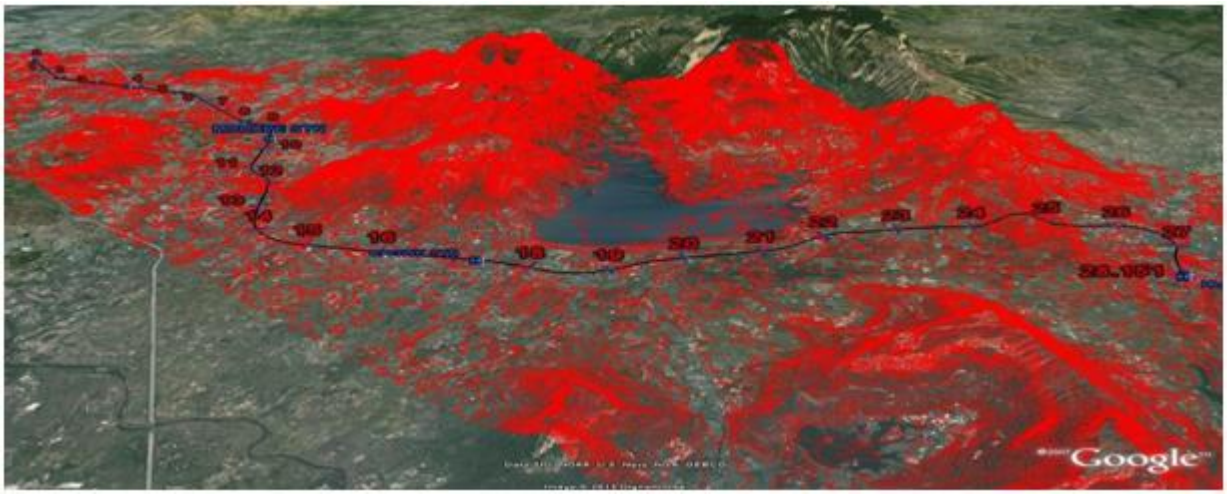


Figure 1.3: Presents the Demography Survey, not to scale

But the Current Alignment it is different and is 4 km longer than the Proposed and existing corridor i.e.: 33km (+/- 2.5 km subjected to Land Accusation), which will be passing through Rasayani station and then crossing Kambe village, moving over MUMBAI PUNE Express Highway and reaching Chouk, then continuing parallel to the existing railway Line and Reaching Karjat Station to join main line of MUMBAI – PUNE.

3. Methodology for Minimizing the Impact

a) Proposed route for New Panvel – Karjat Suburban corridor **(is 33 Rkm +/- 2.5Km) via Rasayani Station** which is **12.00km** (with reference to https://indiarailinfo.com/train/timetable/diva-pen-memu-61019/91187/4408/4418) away from Panvel Jn and is situated on Panvel – Roha/Madgaon Main line of Central Railway.
b) After that there is a curvature and the route will be

passing besides to Reliance Industries pvt ltd. and will cross Patalganga river and moving through a small tunnel of Approx. 180m Length (besides to Pillai HOC College).

c) From there it will be passing through Kambe village and moving over Mumbai-Pune Express Highway. From there it will passing through Lodhvali and reaching Chouk Station. Estimated distance covered between Rasayani and Chouk will be **10.00km (+/-1.5km).**

d) From there it will be joining the existing Line of Panvel-Karjat route and will be covering **11.00 km (+/- 1km)** by passing through a smaller tunnel at larger one at Wavarle (2692 m length) and new Tunnel (300m Length) **as per proposed Design**. Hence the **Total R. Km** is **12.00+10.00+11.00 = 33.00km (+/- 2.5Km subjected to land accusation and geographical aspect**)

NOTE- Since this route is beside to Sahyadri Mountain range, which make Ground level uneven and Terrain type, in this proposed route all the parameters are considered to reduce/avoid any damage to existing Infrastructure, Commercial hubs & Complex, Forest Land and Mountain also (to minimize Tunneling Cost.)

Figure 2.1 and **2.2** Represents **Proposed Route and Alignment of PANVEL-KARJAT route via Rasayani and Chouk station.**

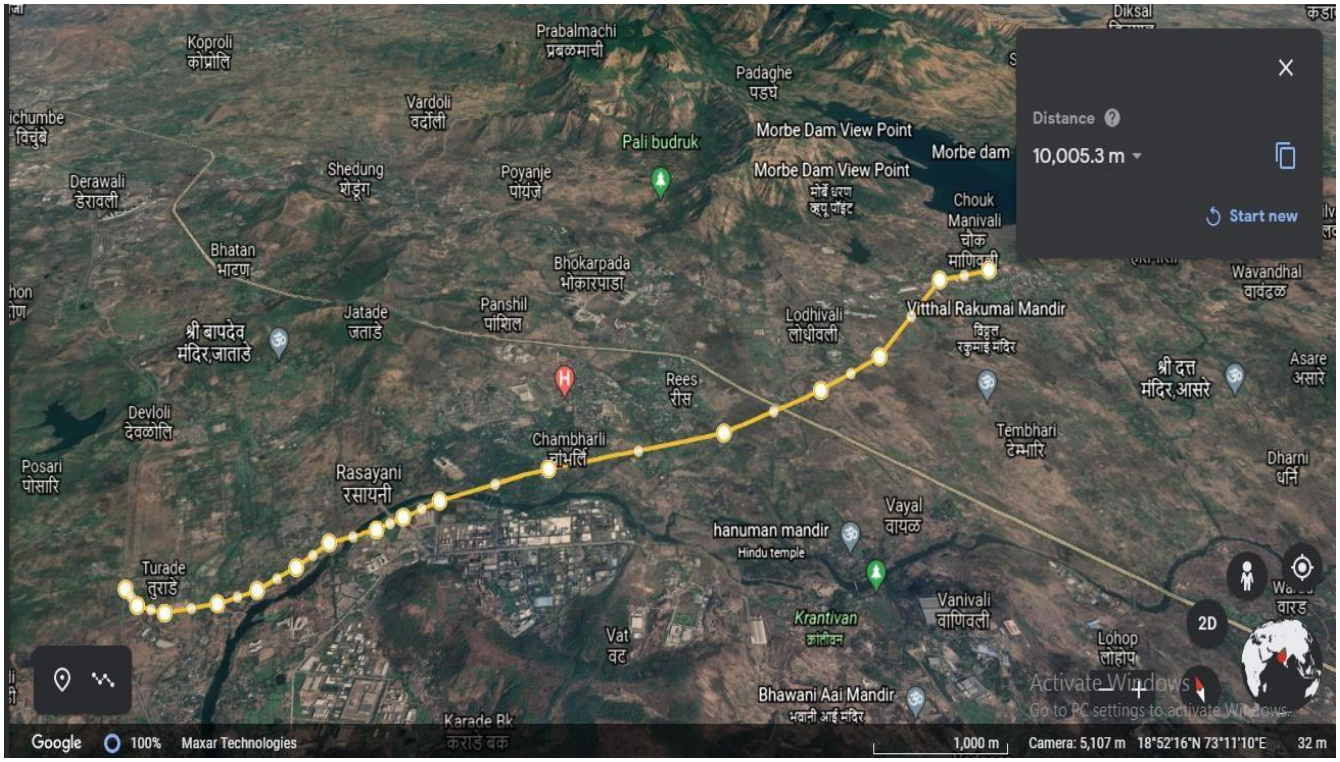


Figure 2.1: Image source: - Google Earth 3D

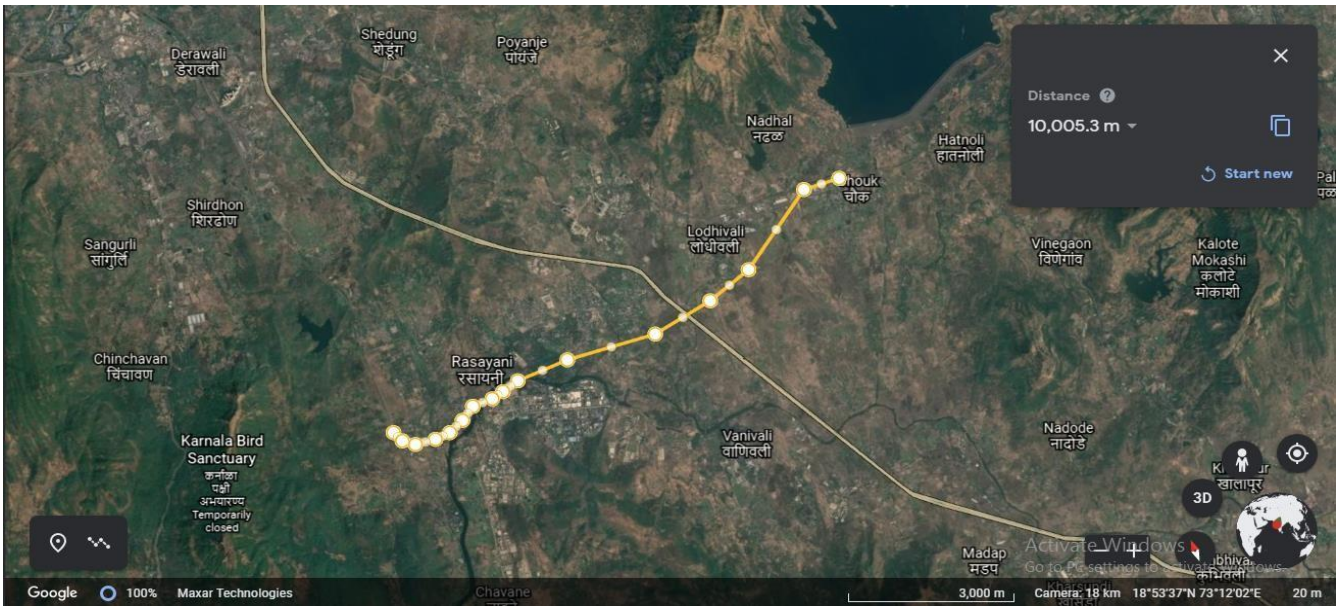


Image source: - Google **Earth 2D**

Figure 2.2 Represents Proposed Route and Alignment of PANVEL-KARJAT route via Rasayani and Chouk

Figure 2.3 Represents Estimated Distance covered by Road from Rasayani to Panvel.

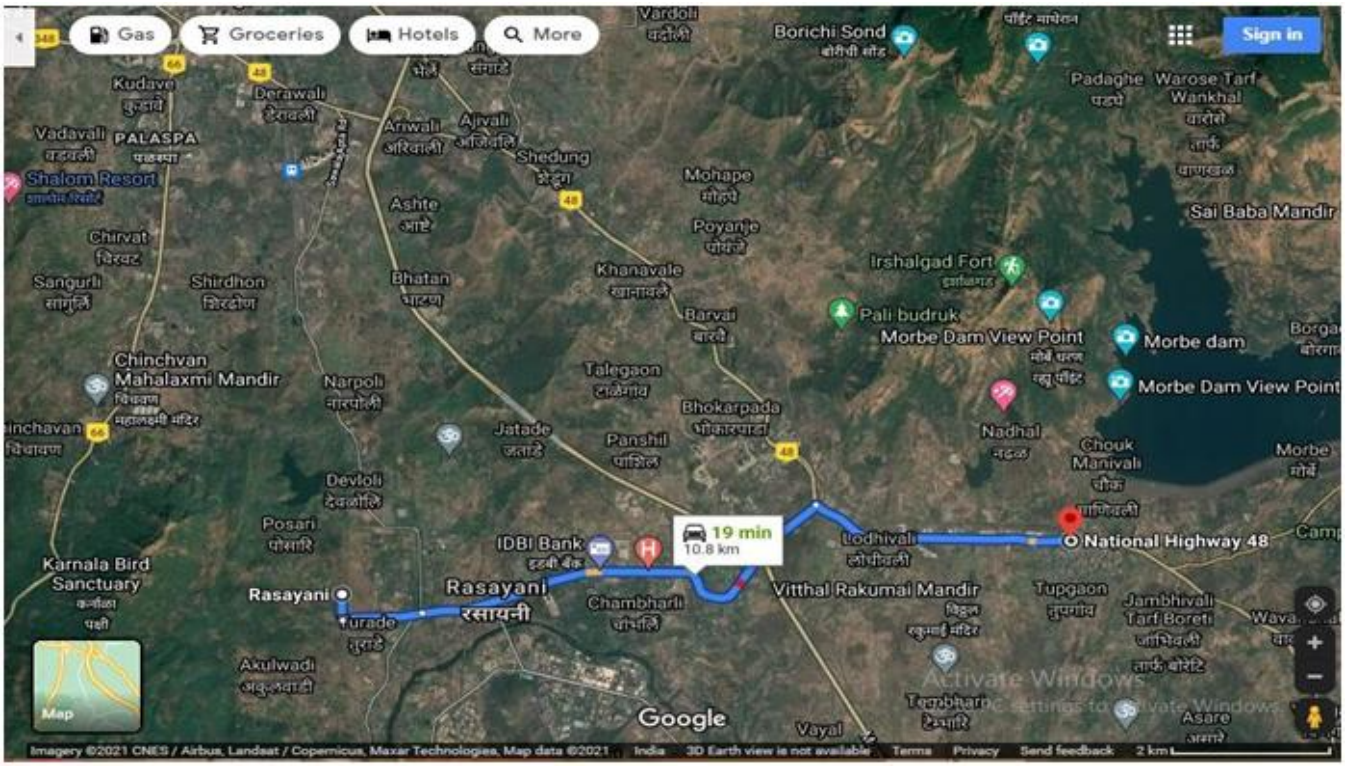


Image source: - Google **Maps 2D**

Figure 2.3 Represents Estimated Distance covered by Road from Rasayani to Panvel

4. Methodology for Laying and Installation Track

Proposal -1

1) The Laying of Track can be Right or Left side as per convenience of INDIAN RAILWAY, but proposed is Left side after crossing of JNPT Freight Line and PANVEL-ROHA/MADGAON Route.
2) Laying of 3rd line parallel (4th Line Optional, subjected to traffic) to Panvel – Roha/Madgaon till Rasayani Station.
3) From Rasayani to Chouk Station Dual Electrified Line and meeting to the Existing Panvel-Karjat route laying on Right side.
4) Chouk to Karjat crossing Second tunnel of about 2600m length and third tunnel of about 300m length are proposed between Wavarle and Karjat as per Proposed plan.

Proposal -2 (Amendment)

1) Construction of 2nd Electrified line on Left side after crossing of JNPT Freight Line and besides to existing PANVEL-KARJAT Route, till Chauk Station (which will be **dedicated to SUBURBAN Corridor**).
2) Utilizing of existing Double line Electrified section till Rasayani.
3) From Rasayani to Chouk Station Single Electrified Line and meeting to the Existing Panvel-Karjat route laying on Right side (**dedicated to SUBURBAN and FREIGHT Corridor**).
4) Chouk to Karjat crossing Second tunnel of about 2600m length and third tunnel of about 300m length are proposed between Wavarle and Karjat as per Proposed plan.

Note- In this proposed corridor **Bypass/Chord line** (**approx**. **1.5 R.km**) are also proposed for better Connectivity and Route Relay interlocking, providing Last mile connectivity.

Image **Fig.4.1**– Representing the Proposed layout with Bypass line.

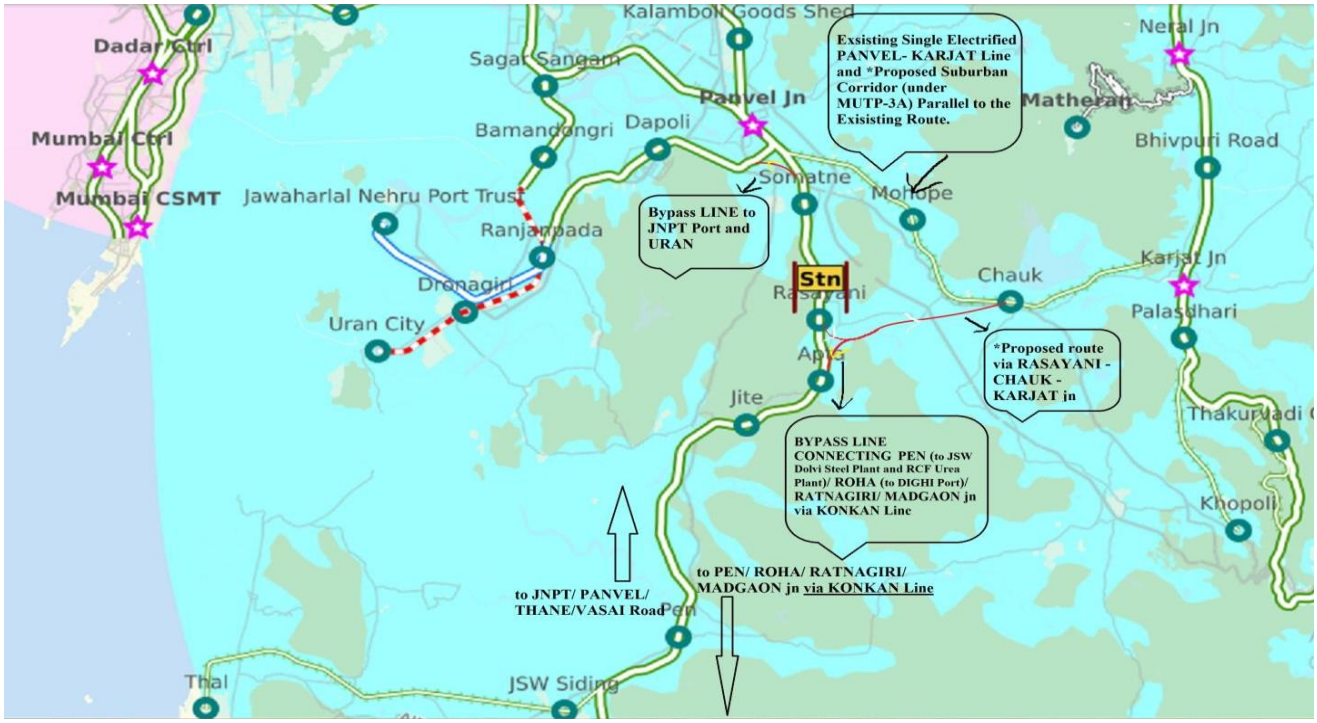


Figure 4.1: Representing the Proposed layout with Chord and Bypass line

4.1 Advantages of this Proposed Alignment

1) Minimizing the Construction Cost and Time also, by connecting Two Cities with enhancing their Punctuality and reducing Travelling Time.
2) To enhance the Freight and Passenger revenue segment, by providing optimum last mile connectivity and Better Infrastructure for achieving Satisfactory feedback from Client/Customer (i.e.; DFCCIL, Ports, Industries and Goods Terminals/Depot).
3) Optimum utilization of Existing Infrastructure and Available Asset by maintaining proper punctuality.
4) To reduce Dependency and Land accusation on Government and Subordinate bodies.
5) Soci-Economic Development by developing Commercial, Residential, Industrial Hubs and Tourism which will attract lots of Opportunities and Business in this Zone.
6) Providing Better connectivity and Route relay interlocking by reducing travelling time and Distance to Industrial Hubs, Ports, Dedicated Freight Corridor, Major Cities and Tourist Destination also.

4.2 Factor and Challenges Affecting this Proposed Alingmnet

Since this corridor is Situated besides to the Western Ghats of Sahyadri ranges the surface is uneven i.e.; Terrain region of Basalt is the predominant rock found across the area which are spread across the huge mountain Ranges, which make the proposed consideration to use more Volume of EARTH (SOIL) Embankment for laying Tracks and using More Elevated Section in critical areas. Due to its terrain region Proposed running kilometer has been increased (to 33.00 km +/-2.5km) compared to the existing line (29.00km) which make an impact for utilization of more land and resources.

4.3 Common Query about the Modification and Changes in this Corridor

1) Due to its New alignment the proposed Running kilometer (Between Panvel-Karjat) has been increased by 4-6 km will it affect the Project Cost and Time?
   Ans. No, it won't affect the Estimated Project cost since we are using the existing infrastructure and we are relying on existing assets (i.e.; Existing Infrastructure and Land beside Main Line). We are optimizing the total Usage of our Land and Assets which can reduce burden during Land accusation, Construction Cost and Time also.

2) Any Benefits of the New Alignment and Modifications in coming future (5-10 years)?
   Ans. Since this is a Gateway Route of Central railway which connects to major Industrial Cities, Various Ports, Dedicated Freight Corridor, Multi Modal Logistic Complex, Commercial Hubs and Tourism sector also of Karjat, Khopoli, Pune, Pen, Roha and further to SOUTH INDIA, this can provide alternate SHORT DISTANCE route for connecting Cities which will be benefits for Freight and Passenger revenue income/Segment.

3) Major Challenges and Factors to be considered for taking this into action?
   Ans. Tunnels, Elevated section, Bridges, Land Accusation and NOC (since passing besides to Industries ,Highways and Few Stretches of forest area)

5. Conclusion

Since, the above Study concludes that by having certain modification in the Proposed railway track/Alignment there are many Advantages and Soci Economic Benefits to both RAILWAY and CUSTOMERS/CLIENTS, which can lead to development providing Valuable Opportunities to the

people who have lost their land and livelihood during the construction of this corridor will enhance lot of Tourist Destination in this area.

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