

5. Selection of Alignment

5.1 INTRODUCTION

The identification of the route alignment of the inter corridors Bantwal – Chitradurga and Koppal – Metgal was initially taken up in the early 2015 by the Ministry of Road Transport & Highways (MoRT&H) under Logistics Efficiency Enhancement Programme (LEEP) scheme. The alignment was Identified and submitted by M/s AT Kearney in his LEEP Final Report. Based on this alignment M/s NHAI has launched a scheme under Bharatmal to prepare detailed project report for development of Economic Corridors, Feeder routes, inter corridors throughout India to enhance the efficiency of freight transportation.

In the current consultancy assignment, the Consultant was asked to identify the most techno economically feasible alignment to connect the already identified corridor. It was however stipulated that the consultant might review the alignment based on existing conditions at site and possibility to develop the existing route as access controlled corridor if it passes through problematic area and will propose alternative solutions wherever it is necessary.

5.2 METHODOLOGY FOR ALIGNMENT SELECTION

In accordance with the Terms of Reference (ToR), the consultants studied the alignment finalized in the LEEP and the following steps were followed in finalizing the alignment:

- **STEP 1:** The first step was to conduct a preliminary ground reconnaissance jointly with the Client to identify the crucial bottlenecks of the project corridor. In this step the requirements for realignments/ new alignments were identified and the major settlement areas were also discussed which demands bypasses. During the initial site visit the black spot locations were also identified where geometric improvement is required.
- **STEP 2:** The Consultant mapped the critical alignment gradient of the existing road corridor at the Ghat sections which demands realignment. The mapping was carried out during the preliminary ground reconnaissance by a hand GPS instrument. The gradient mapped was also reconfirmed from the available topographic maps published by Survey of India.
- **STEP 3:** For determination of the alternative routes for the smooth grade alignment, the Consultants conducted a study of the local area and consulted other stake holders for finalization of the alternate routes.
- **STEP 4:** Once an alternate route was identified, a through desk study was conducted wherein the ground terrain data was extracted from available terrestrial imagery data and also studied from the Satellite Imagery collected from NRSC ISRO.
- **STEP 5:** After a preliminary finalization of the proposed realignment and bypasses, a walk-through survey to the accessible locations / paths was conducted by a team of experts comprising of the highway specialist, survey engineer and geologists for the finalization of the most probable alignment.

5.3 ALIGNMENT OPTIONS – BANTWAL TO CHITRADURGA

The alignment corridor is the primary link route connecting the Mangalore port at Bantwal to the Golden Quadrilateral of India NH 4 (Mumbai – Pune – Bangalore – Chennai Highway) at Chitradurga which is the central part of the State of Karnataka. The development of this route will enable the freight and commercial traffic which is destined for the Northern part of India from the Mangalore port to reach NH 4 at Chitradurga by shortening in distance to about 196 Km than travelling through the present NH 75 connecting Bantwal to Hassan and to NH 4 near Tumkur traversing through the

S. P. Somanath, DGM (Tech) & Project Director, NHAI, Mysore

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Development of Economic Corridors, feeder routes and coastal roads to improve the efficiency of freight Movement in India (LOT-3/KN/PACKAGE-2) Phase –III of Chitradurga – Mangalore inter-corridor of NH 173-From Mudigere Hand Post at Junction of NH 73 to Nellyadi Junction from Km 163+300 to Km 230+020



Shiradi Ghat. Bantwal to Chitradurga, the project corridor traverse through Mudigere, Chikkamangaluru, Kadur, Hosadurga and Holekere is about 278 Km and from Bantwal to Chitradurga via NH 75 and NH 4 is 474 Km. The figure below depicts the connecting locations from Bantwal to NH 4 via the project corridor and the existing NH 75.

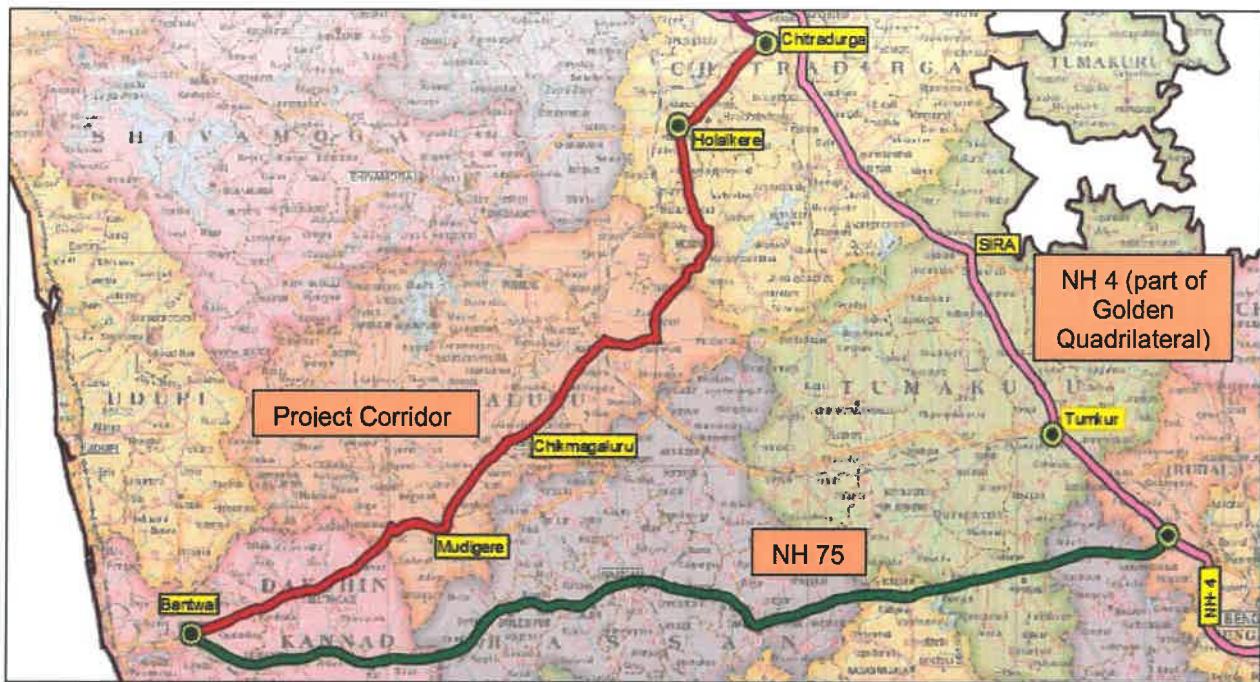


Figure 5-1: Route showing Project Corridor and Existing NH 75

Another aspect which demands the development of the proposed project corridor is that, the region of Mudigere and Chikkamangaluru are hubs of coffee plantations which has short self-life and need immediate processing. This proposed corridor will boost the coffee industry as well as regional economy and live hood.

5.3.1 Realignment for Charmadi Ghat

During the preliminary site visits consultations with various stake holders were conducted with available ground data mapping, the Consultants came to understand that the major bottle-neck for the Bantwal to Chitradurga corridor is the portion of the alignment passing through the Charmadi Ghat section which start from the Charmadi village end ending near Bidarahalli village. The criticality of this portion of alignment is that the alignment undergoes major grade change from around 198m MSL to around 974m MSL within a very short length of around 22 Km which is characterised by a series of hair-pin bends and bling curves. The average gradient along the corridor is more than 5% and at some stretches the gradient exceeds 8.5% to 10%. The figure below depicts the rise in ghat section.

S. R. Srinivasan,
DGM (Tech) & Project Director,
NHAI, PTU, Chitradurga.

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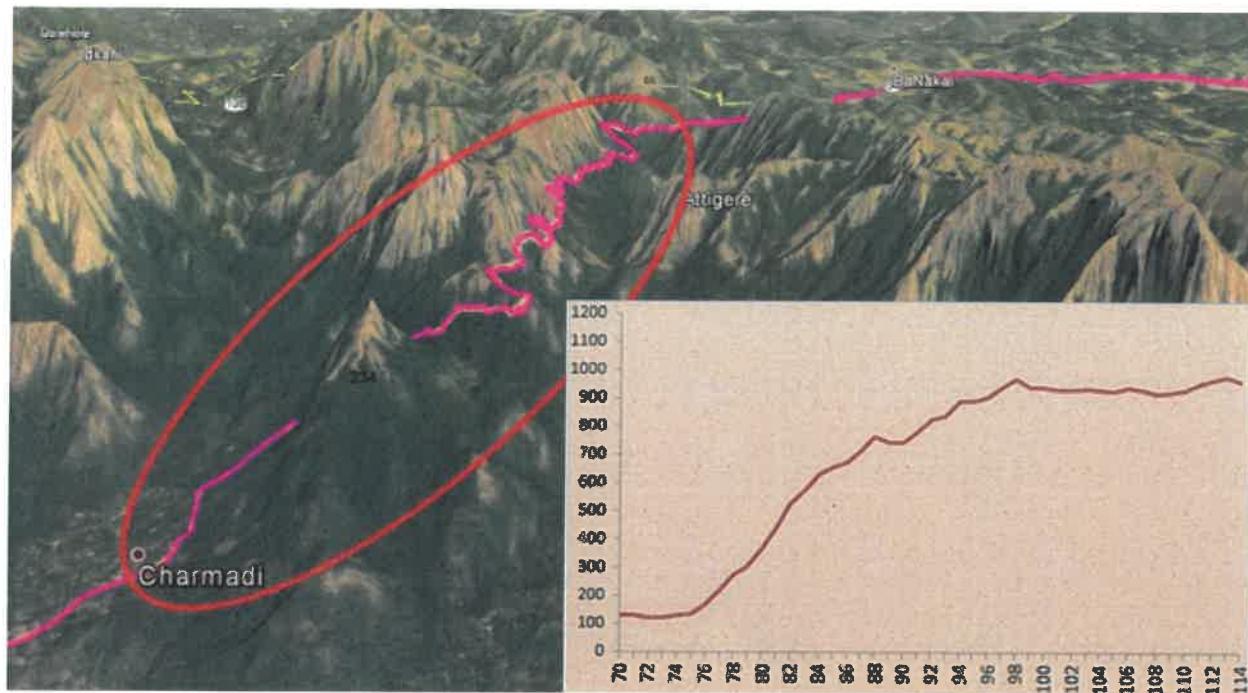


Figure 5-2: Grade in Charmadi Ghat Section

The steep gradient and the sharp curves make the existing route from Bantwal to Chikkamangaluru via Mudigere unfavourable for the commercial traffic movement. The long trailer vehicles unable to negotiate the sharp hairpin bends and the heavy vehicles require uneconomical tractive efforts to raise the steep gradients. Hence as a result the North bound freight movement from the Mangalore port tends to take the existing NH 75 through Hassan passing through Shiradi Ghat section and reaches Chitradurga even though the route is about 196 km longer in length than the proposed route under study.

The tendency for the commercial vehicles preferring the route through the existing NH 75 through Shiradi Ghat due to the following factors:

- A major portion of NH 75 from NH 4 junction near Visveswarapura upto Hassan about 153 Km is four laned.
- The Shiradi Ghat section (about 20 Km in length) is a gentler ghat section as compared to the Charmadi Ghat section. In this section the gradient and curves are quite negotiable by the commercial freight traffic. Hence the State Government had taken up the work of upgrading the existing road through the Shiradi Ghat by 10m width rigid pavement.
- The remaining portion of NH 75 from Hassan to Maranahalli and from Addahole to Bantwal Cross Road has been awarded for 4 laning.

The figure below shows the location of both the Ghat Sections that is the Charmadi Ghat and the Shiradi Ghat and the development of NH 75.

S. B. Srinivasan
DGM (Tech) & Project Director,
NHAI, PTU, Chitradurga

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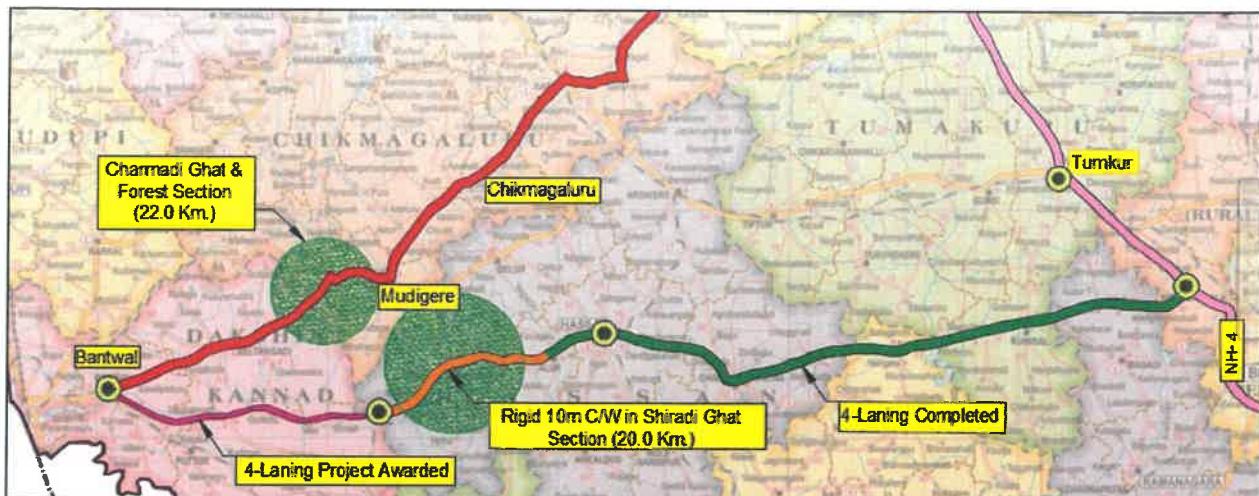


Figure 5-3: Ghat Sections and the Development of NH 75

The Consultants while exploring the various options for alternate to the Charmadi Ghat Route, came to understand that the State Government had once taken up the study for of a new route connecting Mudigere Hand Post with NH 75 near Nellyadi, to promote the pilgrimage visits to the Temples of Shishila, Byreshwara and Dharmastala. The figure below depicts the alternate route connection the religious places.

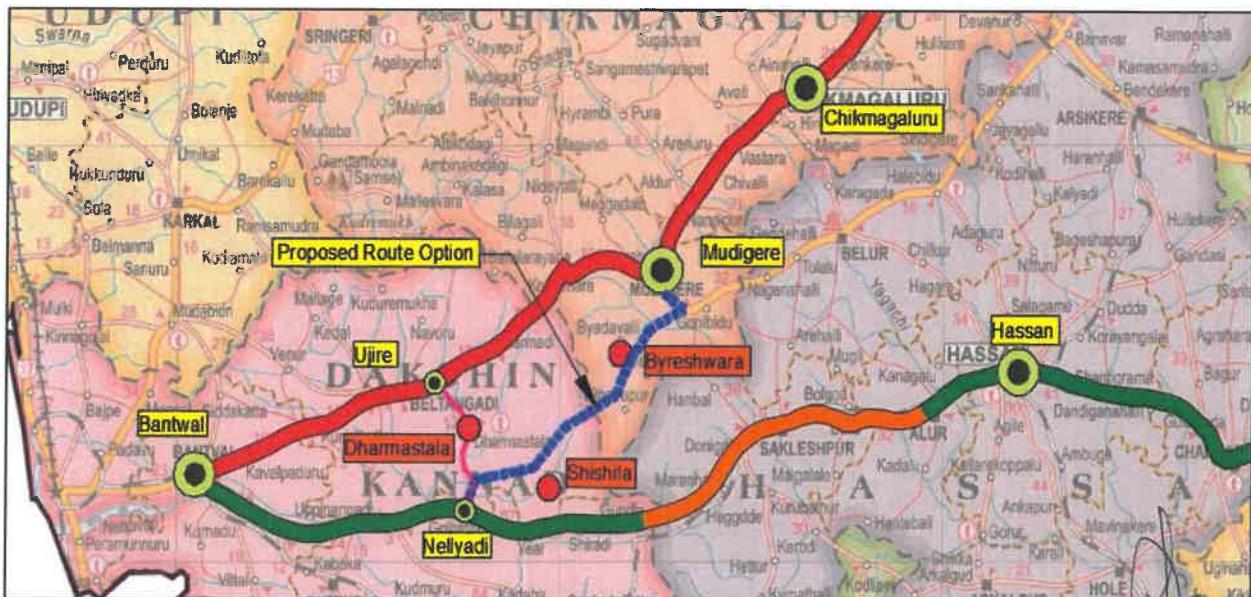


Figure 5-4: Proposed Alternate Route Option

Dharmastala Temple is an 800 year old religious institution in the temple town of Dharmastala in Dakshina Kannada, Karnataka. Every year thousands of devotees visit Dharmastala to pay homage to the Temple deity. Lakshadeepa, the festival of lights, is the annual festival of Dharmastala in November–December. On an average the flow of pilgrims is about 10,000 people a day. Due to lack of connecting routes the devotees often avoids the other two religious destinations which are Temples of Shishila and Byreshwara. So to connect these two religious spots the study of the alignment was taken up but the study was temporally suspended due to lack of fund. The new route will also enable the pilgrims coming from the Northern part of Karnataka, Maharashtra, Andhra Pradesh and other Northern States of India to reach Dharmastala without negotiating the sharp curves and the step

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gradients of Charmadi Ghat Section and it will enable the pilgrims to pay homage to the temples of Shishila and Byreshwara.

Communications between State and Central Government for funding and implementation of linking Shishila & Bhairapura, in the Mudigere Taluka of Chikkamangalur District

VIP Reference letters:-

- A. Letter No. CNH/Tai/AE2/New Road/Sadanandagowda, MP/2009-10; dated 04/..../2009. Written to The Director General (Roads Wing) & Spl. Secretary to Gol. MoRTH by Chief Engineer National Highway, Bangalore.
- B. Fax No: Mar.17 2010 dated 24th Feb 2010. Written to Shri Kamal Nath, the Then Hon'ble Minister of Road Transport and Highway, Gol, New Delhi by D.V Sadananda Gowda Member of Parliament (Lok Sabha).
- C. Letter No. CM/462/GOI/2011 dated 16th Sep 2011. Written to Shri C.P Joshi, the then Hon'ble Minister of Shipping, Road Transport and Highway, Gol, New Delhi by D.V Sadananda Gowda Chief Minister of Karnataka.

In the above mention reference letters, the state government since 2009 shows the imperatives of the linking of Shishila and Bhairapura, in the Mudigere Taluk of Chikkamangaluru District by new road which further gets connected to economic corridor and pilgrimage in Dakshin Kannada District. It also shows that no proper connectivity exists between Chikkamangaluru District and Dakshin Kannada District. During the previous government (United Progressive Alliance –UPA), letters where written by the Chief Engineer, NHAI, The Member of Parliament (Lok Sabha) and the Chief minister of Karnataka through personal request has written through vide letter no. CM/462/GOI/2011 dated 16.09.2011 to Shri C. P. Joshi, the then Hon'ble Minister of Shipping, Road Transport and Highway, Gol, New Delhi for approval of the linking of Shishila and Bhairapura, in the Mudigere Taluk of Chikkamangaluru District. The letter also highlight the needs of is connecting economic corridor and pilgrimage in Dakshin Kannada District and required to expedite the approval of the project in the financial year (FY) 2010-11 and again requested in FY 2011– 2012 by Government of India.

While exploring the alignment from the Mudigere Hand post to NH 73 near Nellyadi, the Consultants found that there are two ODRs one connecting Mudigere Hand post to the near location of Byreshwara Temple and the other originating from near Shishila Temple and connect NH 73 near Nellyadi. Inbetween the two routes, there are a combination of fair-weather roads and foot tracks along the hill slopes of Bhairapura Coffee Estates. The figure below shows the alignment details.

S. P. Sonnayekar,
DGM (Tech) & Project Director,
NHAI, PTU, Chitradurga.

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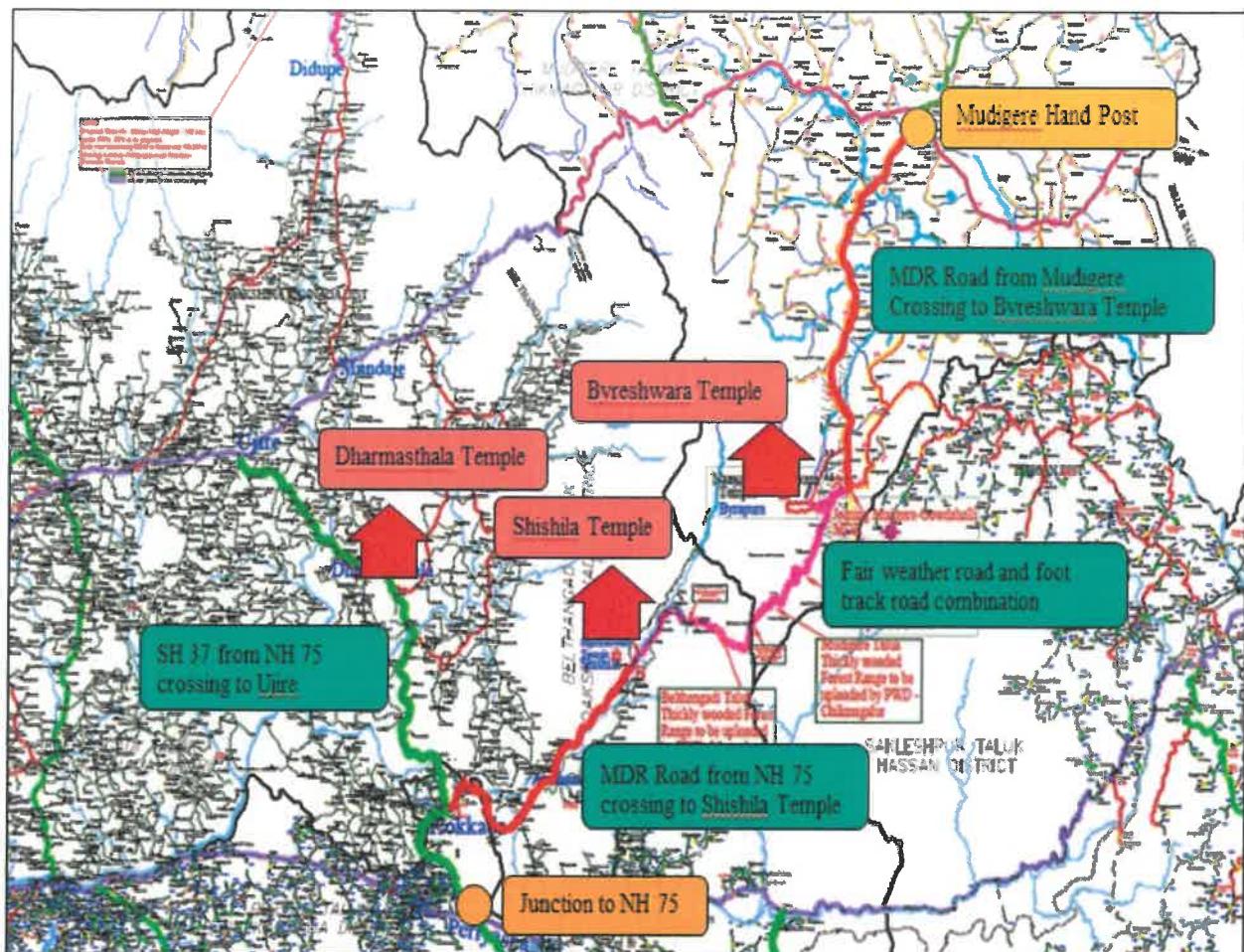


Figure 5-5: Details of Proposed Route

Based on the satellite imagery data and the topographic contour maps obtained from the Survey of India the Consultants tentatively outlined two alignment alternatives on the virgin foothills of Byrapura ranges for a descent / ascent from a level of 960m (MSL) to a level of 200m (MSL). The layout for both the alternatives are presented below.

S. P. Annashekar,
DGM (Tech) & Project Director,
NHAI, PIU, Chitradurga.

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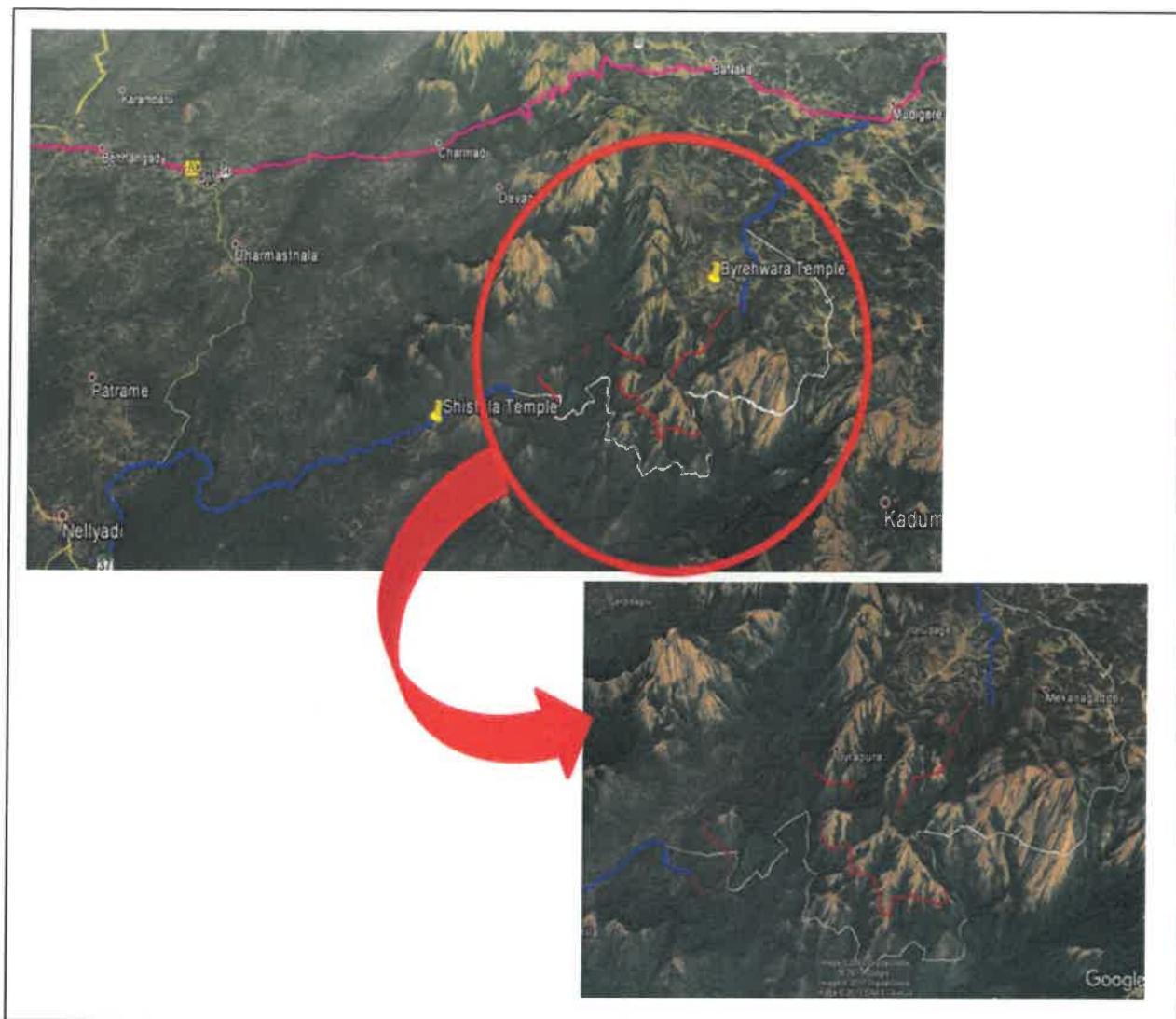


Figure 5-6: Proposed Virgin Alignment

The Consultants generated a tentative ground contour data and a DEM (Digital Elevation Model) obtained the secondary data of the digital satellite imagery. From the ground data, the alignment options as finalized were further fine-tuned so that the average gradient is about 5%. The proposed virgin / new alignment options with the tentative ground profile have been depicted in the figure given below.



S. P. Somashankar,
DGM (Tech) & Project Director,
NHAI, PIU, Chitradurga.

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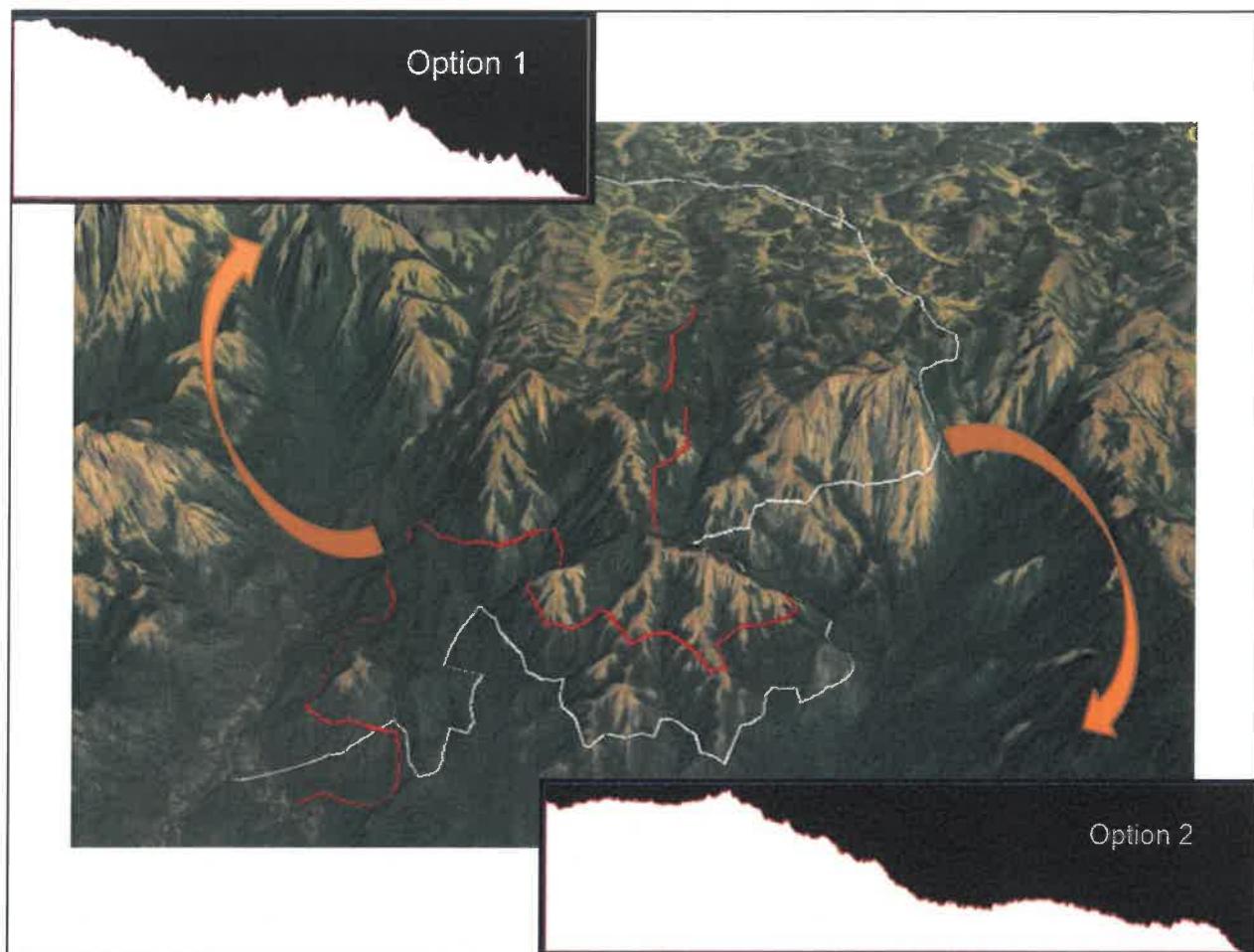


Figure 5-7: Proposed Profile for the Alignment Options

Both the alignment options follow the gentle slope to reach the descent / ascent of around 760m. The alignment Option 1 attains the elevation change within 24.75 Km that is having an average gradient of around of 3%. Though the gradient will not be the same throughout but there will be a maximum of 4.5 to 5% at some locations and there will be some relief grades (flat grades) of 1.5 to 2.0% for easy freight movement.

The alignment Option 2 attains the elevation change within 34.4Km out of which about 8.8Km is on the flat plateau ground. So the length of alignment for the net grade change is 25.6Km that is having an average gradient change of 2.9% which is almost same for Option 1.

The basic advantage which the Option 1 has over Option 2 is that being shorter in length, Option 1 will induce lesser environmental impact as compared to the other. Hence Option 1 has been considered as the design alignment for this report.

The alignment options are purely tentative at this stage, further modifications shall be carried out on further stages of the detail design for which the length may vary and there may be requirements of tunnels and viaduct structures for smooth alignment geometry.

The following positive weightages has been adhered for the proposed new alignment as an alternative to the original route through Charmadi Ghat.

- Preliminary study reveals that in comparison to the existing route through Charmadi Ghat Section which passes through the Revenue Forest the proposed alignment mostly passes through the Byrapura Coffee Estates and other private plantation estates.

S. P. Somashankar,
DGM (Tech) Project Director,
NHAI, PIU, Chitradurga

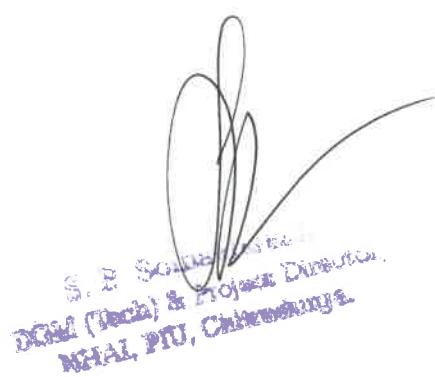
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- The existing section of road (of NH 73) from Mudigere to Bantwal Crossing of approximate length of 94 Km, traversing Charmadi village, Ujire, Belthangady, Guruvayankere, Punjalkatte, Kavalkatte is entirely ribbon developed with settlement along the entire length. Here the widening of the existing road will induce huge impact on the acquisition and resettlement cost and also realigning the entire length will also be uneconomical. Hence avoiding this entire corridor length including the Charmadi Ghat section with sharp hairpin bends and steep rising gradients, the alternate route will be of smooth and negotiable grades and length from Mudigere Hand post to the junction at NH 75 will be approximately 65 Km.
- The section of NH 75 where the proposed alignment is to terminate has already been awarded for Four Laning upto Bantwal Road Crossing.
- The proposal will reduce the cost for four laning of two parallel corridors from Bantwal Road Crossing to Mudigere Hand Post (approximately 94 Km) and also from Bantwal Road Crossing to Nellyadi (approximately 42 Km) which has already been awarded for four laning.
- The development of the corridor will promote pilgrimage visits to the Temples of Shishila and Byreshwara.
- The Consultants while conducting the preliminary ground reconnaissance observed that road connecting Ujire to Dharmastala and Nellyadi to Dharmastala found that the existing road is insufficient to handle the huge amount of growing pilgrim traffic to Dharmastala. During the annual festivals, in the month of November and December, it is estimated that about 10,000 people visit the temple every day. Hence to cater the huge volume of traffic, it is recommended that the connecting road from the project corridor needs to be upgraded.
- The development of route will enable the commercial traffic movement from Mangalore port to the norther part of India without negotiating the Charmadi ghat section and also will reduce the travel distance by 190 km compared to the existing route through the Shradi Ghat Section.
- The development of this route will also enhance the commercial development of the area in means of export of the plantation products namely coffee, cardamom, pepper and areca.

The Consultant presented the proposed alignment at various forums and the Client, principally accepting the layout of the proposed alignment, advised to carry out the detailed engineering investigations and studies along the proposed layout corridor for further refinement of the alignment and to carry out a detail environmental study necessary for the forest, wild life and environmental clearance.



A handwritten signature in blue ink, which appears to read "S. P. Sankar" and "DGM (Tech) & Project Director, NHAI, PTU, Chitradurga". The signature is written over a stylized, curved line that resembles a road or a bridge.