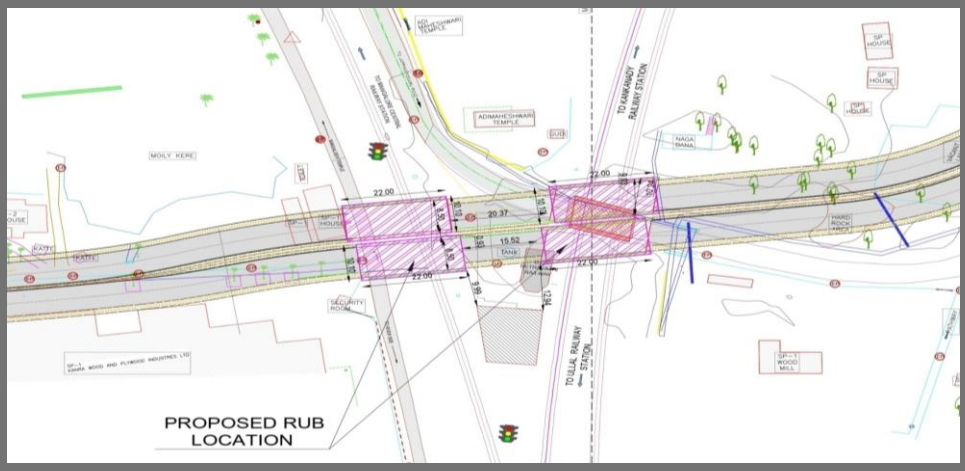
DETAIL PROJECT REPORT



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MANGALURU
SMART CITY | Way to go.. Way to Grow...

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1. INTRODUCTION

1.1. Mangaluru Smart City Proposal

Karnataka Urban Infrastructure Development & Finance Corporation Limited (KUIDFC) is the State Level Nodal Agency (SLNA) for the Smart Cities Mission in Karnataka. ***Mangaluru was a proud Participant in second round of this Challenge and now aspires to translate the vision i.e. the broad components across both 'area-based' and 'pan-city' heads identified in the Smart City Proposal (SCP) into Reality.*** Mangaluru Smart City Proposals (SCP) is considered as Area Based Development Proposals (ABD) and Pan City Proposals. The SCP has identified 65 projects/sub projects to be taken up under ABD and Pan City Proposal

Figure 1-1 shows the ABD area considered under Mangaluru Smart City Proposal and the priority roads for development as smart roads. The connector road from NH66 through Mahakalipadapu is a major entry to the city from NH66.

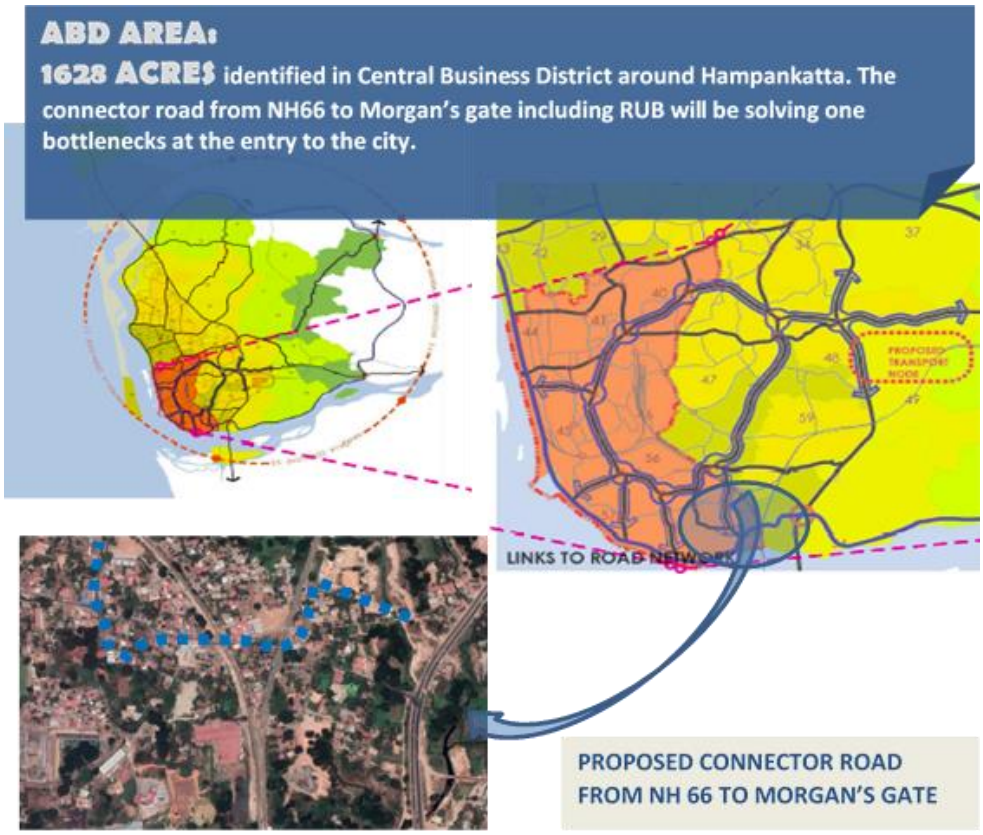


Figure 1ABD area considered under Mangaluru Smart City and connector road from NH66 through Mahakalipadapu is a major entry to the city from NH66.

1.2. Connector road Proposal under Mangaluru Smart City Project

The development of connector roads has been envisaged in the smart city proposal for improving the connectivity from CBD of the city with the waterfront as well as to improve the accessibity of the CBD from national highway. The connector road will be developing as smart road as envisaged in the SCP of Mangaluru smart city proposal.

Transforming existing roads into Smart Roads has been envisaged under the Smart City Mission. In this regard, Mangaluru Smart City Ltd (MSCL) intends to develop world class road infrastructure that is efficient mode of transport and inclusive to all strata of society. This entails comprehensive upgrading of the public Right of Way (ROW) of the streets which includes refurbishment of existing carriageway, laying of new footpaths and cycle tracks, creating utility corridors, developing pedestrian facilities, development works for landscape, hardscape, street furniture, signage, lighting, etc.

The connector road proposal from NH66 near Jeppu to Morgans gate including construction of RUB will be solving one of the major bottleneck at the entry to Mangaluru city from NH 66. Also there will be a considerable reduction in the traffic congestion at Pumpwell circle which is another major entry point to the city.

1.3. Background of the Project

The location at Mahakalipadapu is where the railway track leading from Ullal Bridge bifurcates, one towards the Mangaluru Central Railway station and one towards the Mangaluru Junction Railway station / Bengaluru. Two manned Level Crossings (LC) were being operated for the vehicles to cross the railway tracks at this location, the first one for the railway track leading to Mangaluru Junction Railway Station and second one for the railway track leading to Mangaluru Central Railway Station.

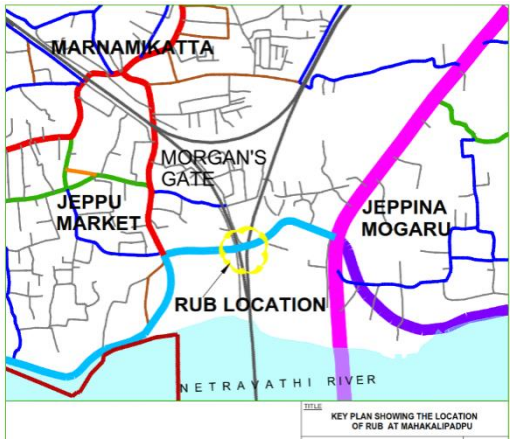


Figure 2key plan (in the Circulation Map of Mangaluru) of the location

LC towards Mangalore junction railway station which was constructed by Railways was closed few years back by the Railways itself after constructing an RUB below the railway track leading to Mangaluru Junction Railway station. Similarly, the Railways wanted to close the LC towards Mangaluru Central Railway Station, for which the Railways wanted to execute an RUB below the railway track leading to Mangaluru Central Railway Station. But since this was a deposit LC, the RUB had to be constructed on deposit contribution only and accordingly the Railways informed Mangaluru City Corporation (MCC) to deposit the required funds for the execution of the RUB (for 2lanes) and the Railways would execute the RUB. In lieu of closing LC No. 293A, Railways agreed to provide access through their property parallel to the railway track on the western side of the track, to connect the road from Morgan's Gate to LC No. 293A, to the western side opening of the proposed RUB.

Development of waterfront is one of the major project envisaged under smart city mission. The pilot stretch of 2.00 Km from Netravati Bridge to Bolar sea face is in DPR stage. Connector road from NH66 is one of the major entry to the proposed waterfront area. Hence it was mutually decided between MCC and MSCL that the connector to the approach roads to the RUB at Mahakalipadapu would be undertaken by MSCL. MSCL also would provide the required funds for the development of the RUBs at Mahakalipadapu.

Since the connector road proposed to develop as the major entry to the Mangalore city, it is decided to develop 4 lane 18m wide road from NH66 to Morgan's gate and 4 lane RUB across the railway tracks. The RUB will be across both the railway track to Mangalore junction railway station and Mangalore central railway station.

1.4. Proposed Interventions

The proposed intervention aims to achieve the following:

- Seamless mobility for citizens of Mangaluru
- To eliminate traffic congestion and facilitate smooth flow of traffic
- To create inclusive road infrastructure for all strata of society
- Promote environmentally sustainable means of transport

The proposed connector road will be having three parts

1) **PART 1 : 4 Lane 18 m wide Connector road from NH 66 to proposed RUB**

This involves development of 18m wide four lane smart road from the entry point of NH66 to proposed 4 lane RUB. Total length of the road is 485m.

2) **PART 2 : 4 lane railway under pass across railway tracks to Mangalore junction and Central railway station**
   This part includes 4 lane railway under pass across railway tracks to Mangalore junction and Central railway station. As per the site visits carried out by southern railway, it is decided to adopt 'Box Pushing' method for the construction of RUB. The size of the proposed box is 9.5m X 22m.
3) **PART 3** : **4 Lane 18 m wide Connector road from proposed RUB to Emphasis junction**
   This involves development of 18m wide four lane smart road proposed RUB to Morgan's Gate via Emphasis junction. Total length of the road is 650m.

Details of proposed features of connector road and RUB are covered in subsequent section

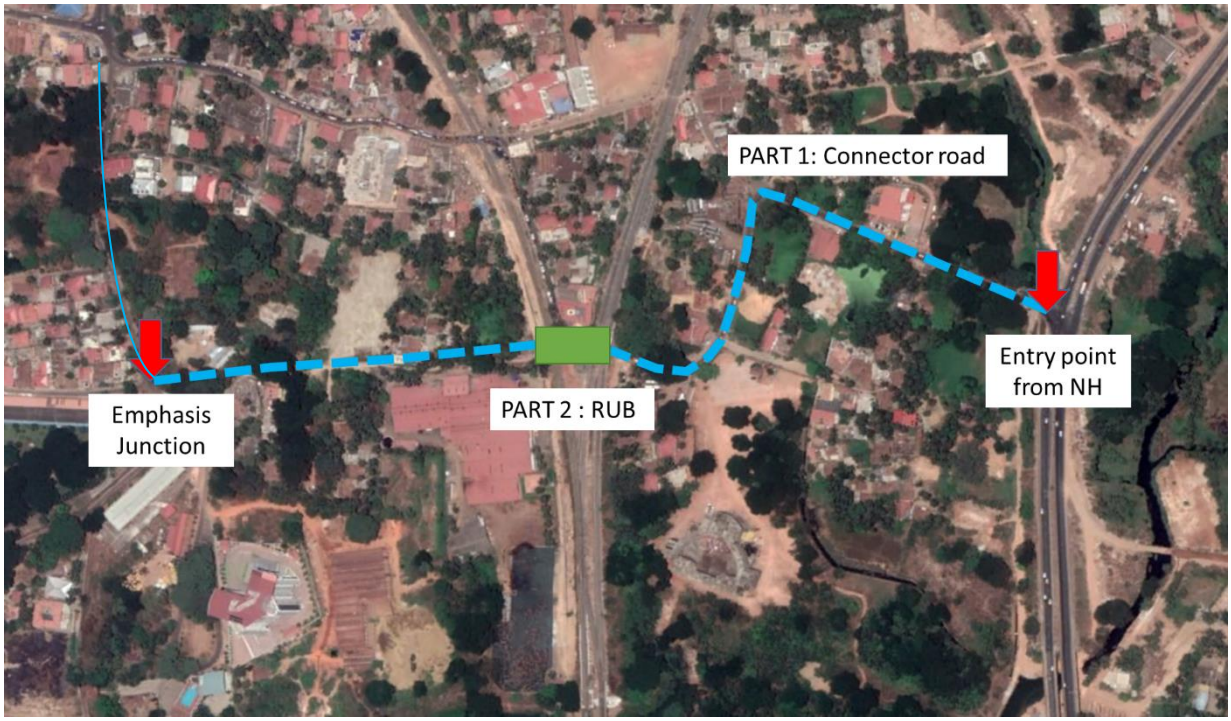


Figure 3 Proposed Interventions

1.5. Expected Benefits and Beneficiaries

The proposed underpass is proposed to offer the following benefits to the identified beneficiaries:

- **Citizens / Commuters**
  a. Hassel free commuting
  b. Enhanced travel experience.
  c. Reduction in travel time.

- **Local Authority/ MCC**:
  d. Reducing traffic congestions in the Pumpwell junction.
  e. Closure of LC at the major entry to the city.
  f. Improved accessibility to the city.
- **MSCL**
  g. Connectivity to the waterfront area.
- **Sothern railway**
  h. Closure of LC

1.6. Stakeholders/ Organizations Involved

- Citizens
- Mangaluru Smart City Limited (SPV)
- Sothern Railway
- Mangaluru City Corporation

1.7. Pre-Requisites

a. **Deposition of Cost to Southern railway for the proposed RUB**
   The construction of proposed RUB will be carried out by the southern railway, Palakkad division. MSCL will be transferring the cost for the construction of RUB to southern railway after finalising the general alignment drawings, DPR and estimates.
b. **Land acquisition for the proposed Connector Road**
   The existing road from entry point from NH66 to proposed RUB is a two lane road. The road from proposed RUB to Emphasis junction is a one lane kutcha road. As per the proposal, an 18m, 4 lane road is proposed as connector road. MCC already initiated the land acquisition process.

1.8. Objective of the Report

The purpose of the Detailed Project Report is to provide details of various considerations and the elements proposed for the Connector road and RUB. It aims to give a basic design idea to all the stakeholders before proceeding for final design and estimates.

1.9. Structure of the Report

This report is organized as follows:

Chapter 1 Introduction
Chapter 2 Existing Site Reconnaissance
Chapter 3 Preparation of general alignment drawings by Southern railway
Chapter 4 Development of RUB as an initiative of Member of Parliament
Chapter 5 Proposed Interventions
Chapter 6 Timeline
Chapter 7 Budget and Cost Estimates
Annexures

2. EXISTING SITE RECONNAISSANCE

Detailed Site Reconnaissance was carried out at the proposed site for connector road and RUB.

Images below demonstrate the pictorial facts of the above aspects decided in discussion with MSCL during various site visits and meetings on the sub-project.

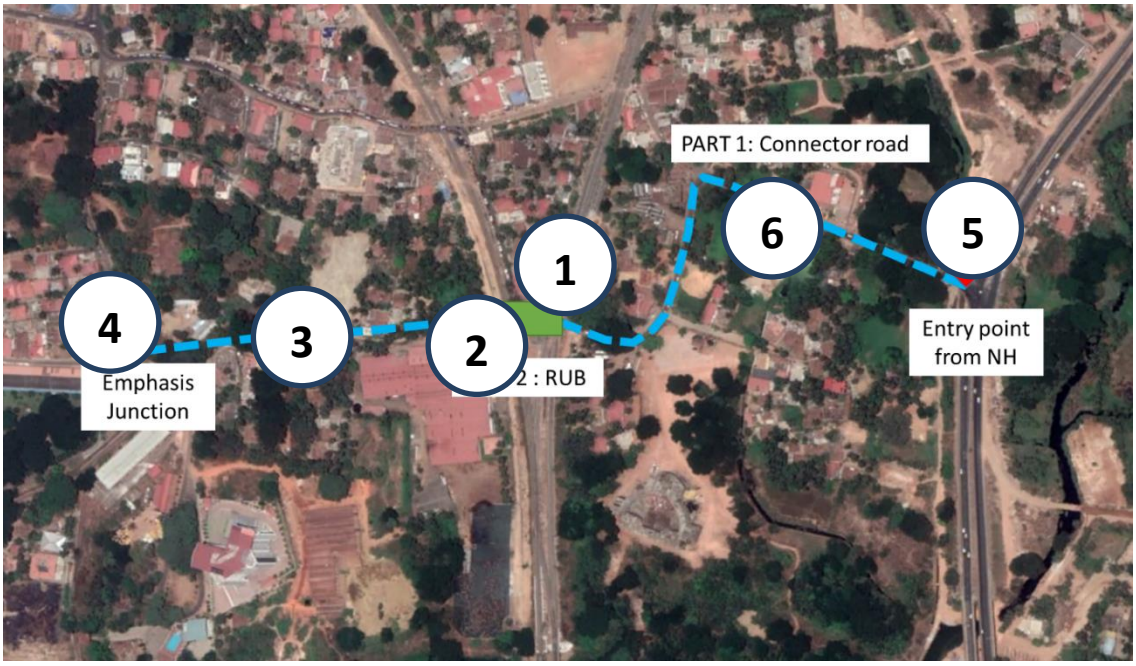


Figure 4Existing RUB across the track to Mangalore Junction Railway station - 1

Figure 5Location of the proposed RUB along the track to Mangalore Central Railway Station

Figure 6 Narrow Road towards Mphasis Junction

Figure 7 Emphasis Junction

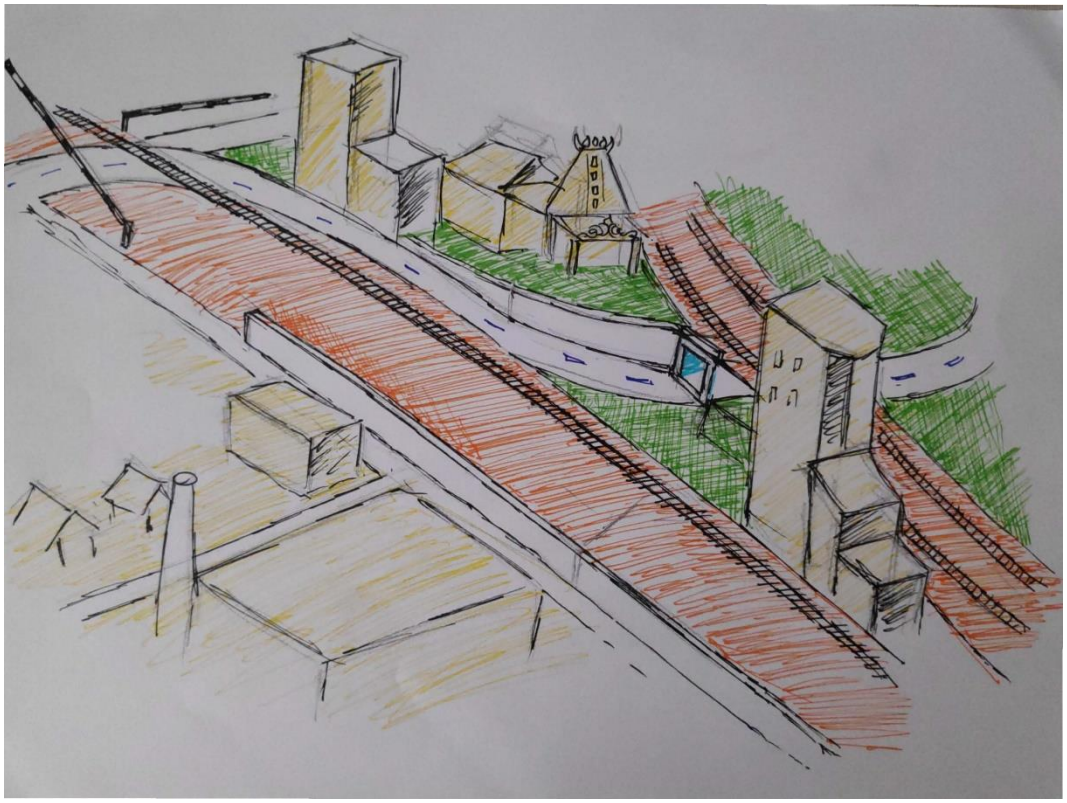


Figure 8 Existing RUB-Design View

3. PREPARATION OF GENERAL ALIGNMENT DRAWINGS BY SOTHERN RAILWAY, PALAKKAD DIVISION

The project of developing the connector road was originally envisaged by MCC with a vision of improving the access to Mangalore city from National highway. The project has been transferred to MSCL during the revision of smart city proposal. The development of waterfront being the major project of MSCL, development of access towards the waterfront is one of the major challenge for the implementation of waterfront. Currently, the existing level cross along the railway track to central railway station is a major hurdle.

Railways wanted to close LC No. 293A also, for which the Railways wanted to execute an RUB below the railway track leading to Mangaluru Central Railway Station. But since this was a deposit LC, the RUB had to be constructed on deposit contribution only and accordingly the Railways informed Mangaluru City Corporation (MCC) to deposit the required funds for the execution of the RUB (for 2lanes) and the Railways would execute the RUB. MCC already paid an amount Rs. 13 lakhs as centage charge to southern railway, Palakkad Division for initiating the preparation of GAD (General Alignment Drawing). The project was not progressed due to lack fund for the project.

As per the request of MSCL, southern railway submitted a preliminary cost of Rs. 42 crores and instructed to deposit the centage charge of Rs. 84 lakhs. MSCL deposited an amount of Rs. 70 lakhs by deducting the centage charges previously paid by MCC. On 23rd July 2019, a technical team visited Mangalore for initiating the preparation of GAD. The meeting had conducted in the chairmanship of Deputy Commissioner, DC district for discussing the way forward. A site had conducted along with railway officials to discuss the alignment of the RUB. Executive Engineer, MCC and consultants of MCC were also present during the site visit. Detailed ETS survey of location carryout.

Figure 9 Joint Survey with Southern railway officials

On 29.08.2019, Executive engineer, MSCL visited Additional Assistant Divisional Engineer (ADEn) for discussing the way forward for finalizing the GAD and Estimate. ADEn informed that the advanced copy of the GAD will be shared with MSCL after preparation and a site visit will be scheduled after the preparation of GAD

.

Figure 10 Discussion with ADEn on 29.08.2019

Southern railway shared the advanced copy of GAD on xx.xx.2019. The alignment of the RUB with proposed road had been checked and requested ADEn for the site visit for finalizing the GAD. ADEn along with the technical team from railway visited the site on 24.09.2019 for finalizing the GAD.

Figure 11 Site visit by ADEn on 24.09.2019

The final GAD is awaited from southern railways. ADEn instructed to proceed with the land acquisition process as per the proposed alignment of connector roads.

4. DEVELOPMENT OF RUB AS AN INITIATIVE OF MEMBER OF PARLIAMENT AND FUNDING FROM MPLAD:

MSCL had informed Sri. Nalin Kumar Kateel, the Member of Parliament (LokSabha) of Dakshina Kannada Parliamentary Constituency, regarding the importance of the subject RUB and Connector Road and he immediately accepted to take up the project and also allocate some fund from MPLAD for the same. He also wrote to the Railway Authorities that the development of this RUB should be considered as MP's initiative, with part payment for the same being made through MPLAD fund and hence all the benefits of reduction in charges payable on deposit contribution (for projects undertaken by MPs), should be passed on to MSCL, which would be funding the balance amount required for the development of the RUBs.(Annexure 1). The total project cost will be reducing almost 42% if the project is getting implemented under MPLAD.

5. PROPOSED INTERVENTIONS

5.1. RUB (Railway under pass)

The work will be carried out by 'Box Pushing' with temporary girder method under speed restriction of required duration with temporary arrangements for track support by imposing suitable caution.

Two boxes of total length 23.2 m width of proposed across both the tracks. The structure includes 7.5m carriage way and 1.5m foot path on one side in each boxes. The boxes are separated with a gap of 2.2m. The proposed Crossections are shown in figure No. 12.

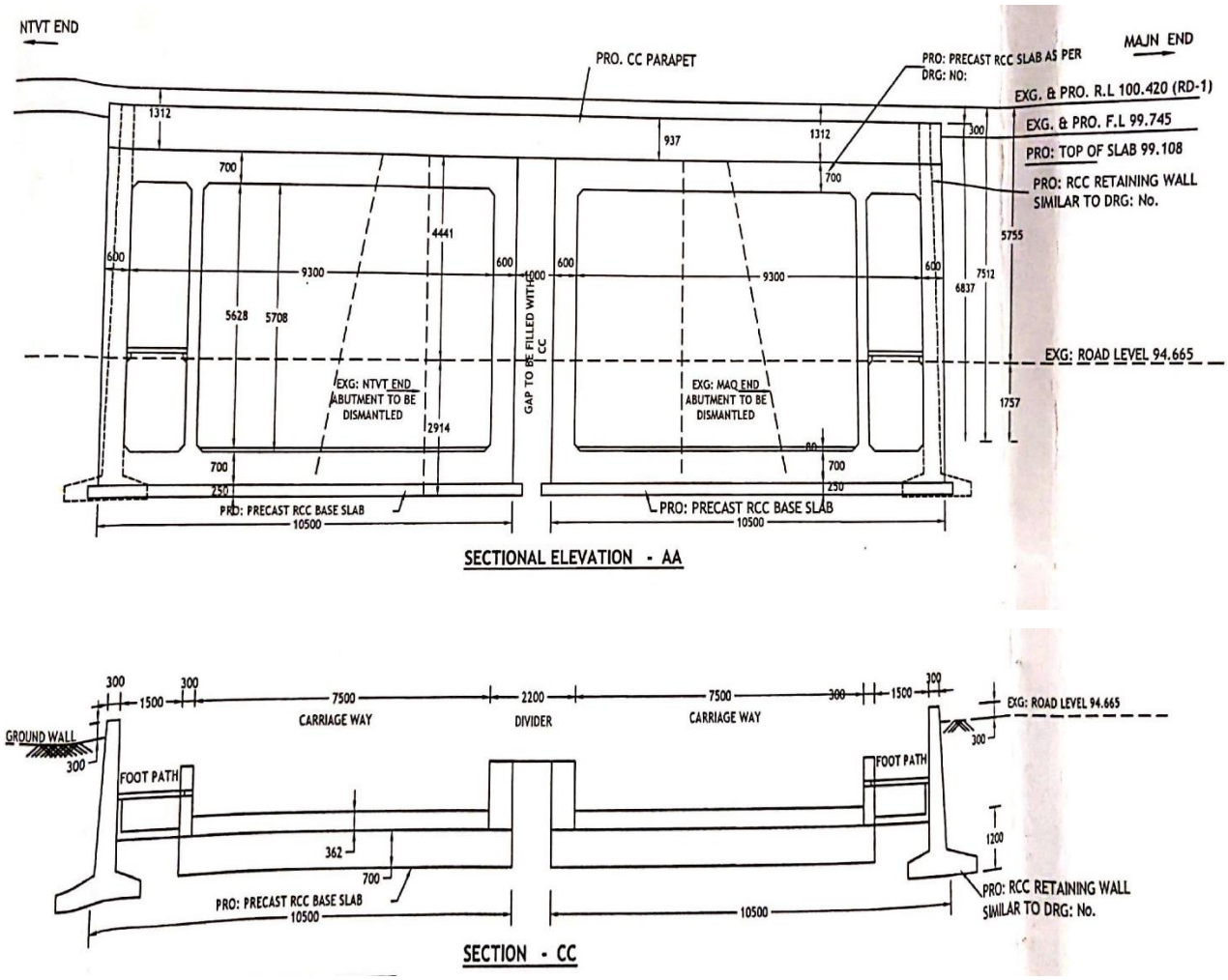


Figure 12 Proposed Crossections of RUB as per GAD

The advanced copy of GAD and key plan is attached in Annexure XX. The preparation of final GAD and estimate is in progress. The design view of the RUB is shown in figure No.13.

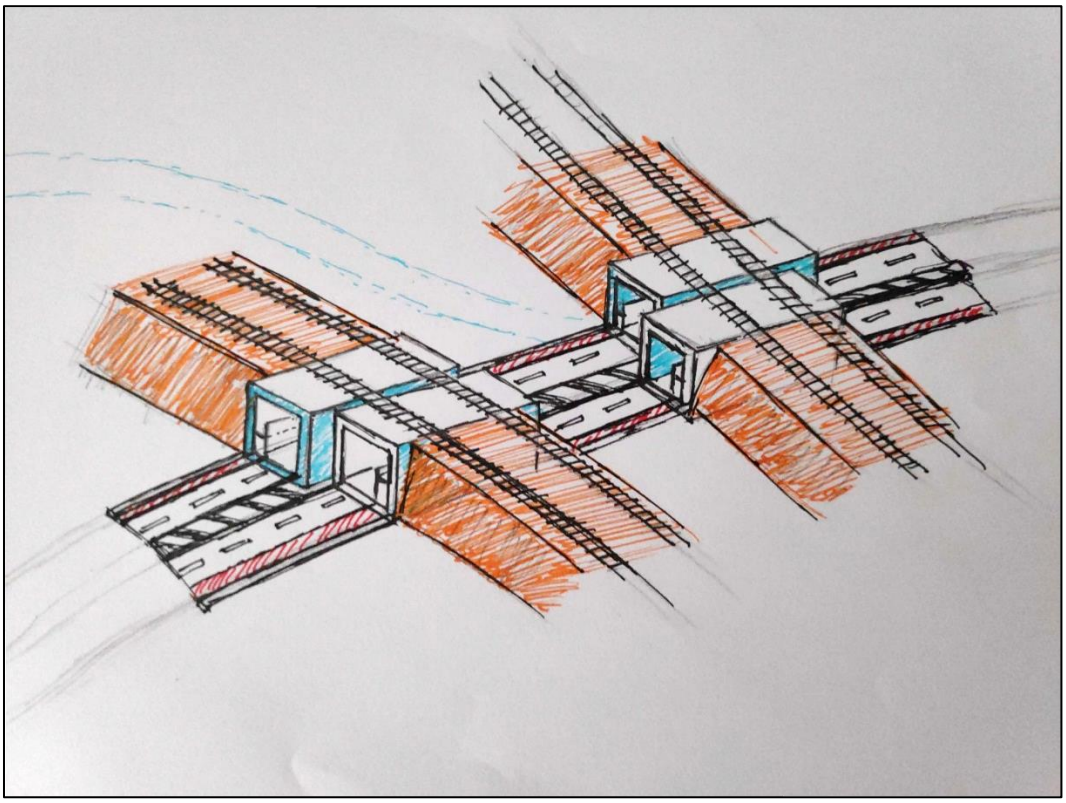


Figure 13 Design View of RUB

5.2. Connector road

5.2.1. Introduction

The connector road from NH66 to Morgan's gate planned as 18m wide 4 land smart road. The Smart Road proposal would consist of the following specific interventions:

The Smart Roads are to be developed in accordance with the street design guidelines such as IRC, UTTIPEC, DULT guidelines, etc. The smart road design would consider the following modes of transport (i) Pedestrian (ii) Public transport users and lastly (iv) Private

motorized vehicles. It shall include the necessary urban infrastructure components such as underground utility duct, storm water drain, etc and external development such like landscaping, street furniture, signage, road marking, etc.

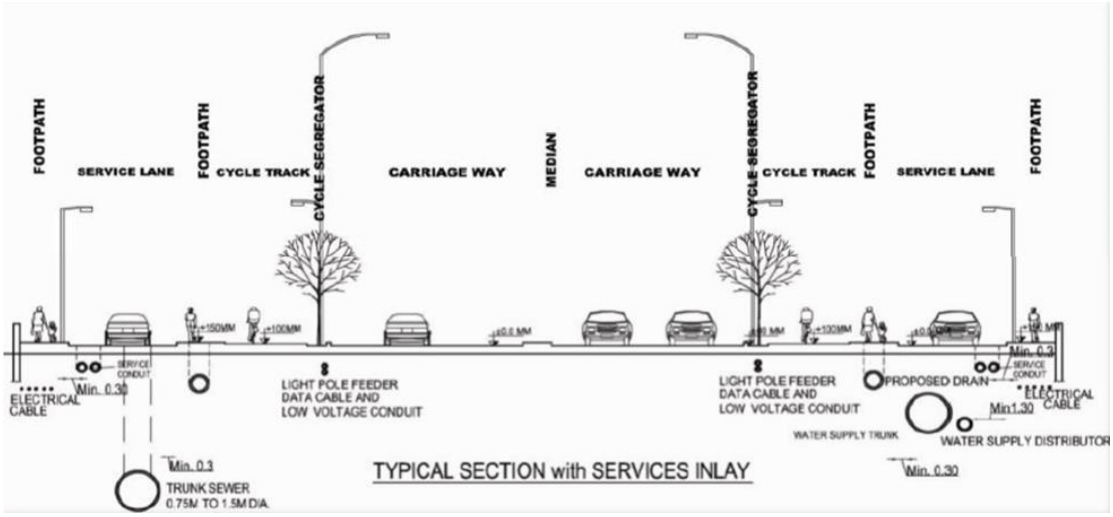
The Smart Road proposal would consist of the Following specific interventions:

- **Underground Utility Corridor**
- **Pedestrian Footpath and related facilities**
- **Carriageway with road markings**
- **Storm Water Drainage system**
- **Roadside plantation/shade trees**
- **Street furniture**
- **Signage**
- **Smart Bus Shelters and E-Toilets**
- **Smart Street Lighting**

The salient features of the above components are described below:

1) Underground Utility Corridor:

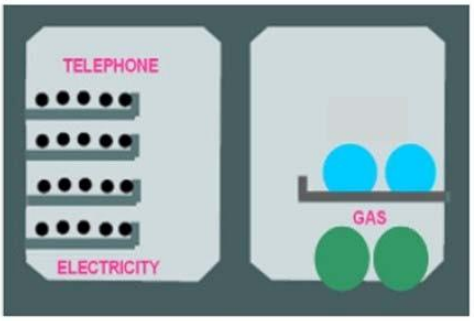
There would be a defined utility corridor which would involve transferring overhead utilities into dedicated underground utility corridors for ease of maintenance and to withstand natural disasters. The underground RCC Trench would accommodate the following utilities – telephone lines, electrical lines, gas line and water supply pipes.



Due consideration shallbe given to the MoUD Guidelines for planning of underground utilities

Mangalore Smart City Proposal as piresto consider planning of following infrastructure facilities in a coordinated way

- ***Sewerage (through ADB Fund Convergence)***
- ***Water Supply (through ADB Fund Convergence)***
- ***Electrical Cables (Through IPDS Prop***
- ***Storm Water Drainage***
- ***Fibre Optics,*** Etc



Rectangular CUD with or without partition (accessible through Manholes)

The depth of installation should not be less than 0.6m. [15]

Table 4-8 Broad recommendations about depth of laying (denoting the bottom of trench) of services

S.No	Type of utility	Depth (in meters)
1	Trunk Sewer Line	2 to 6m
2	Water Supply line	1 – 1.5
i	Service Line	0.6 - 1
ii	Trunk Line	1 – 1.5
3	Electric Cable	1 – 1.5
i	LT Cable	0.6 - 1
ii	HT Cable	1.5 - 2
4	Telecommunication cable	2 - 3
i	Directly laid	0.6 - 1
ii	Laid in ducts	2 - 3
5	Gas Mains and lines carrying combustible materials	2 - 3

2) Pedestrian Footpath and related facilities

Planned footpaths for easy movement of pedestrians, physically and visually challenged citizens as well as cyclists. These shall be 150mm above the finished road level. The footpaths shall have an adjacent clearly demarcated cycle track for cyclists. Additionally, tactile tiling will also be used to aide movement of visually-challenged citizens.

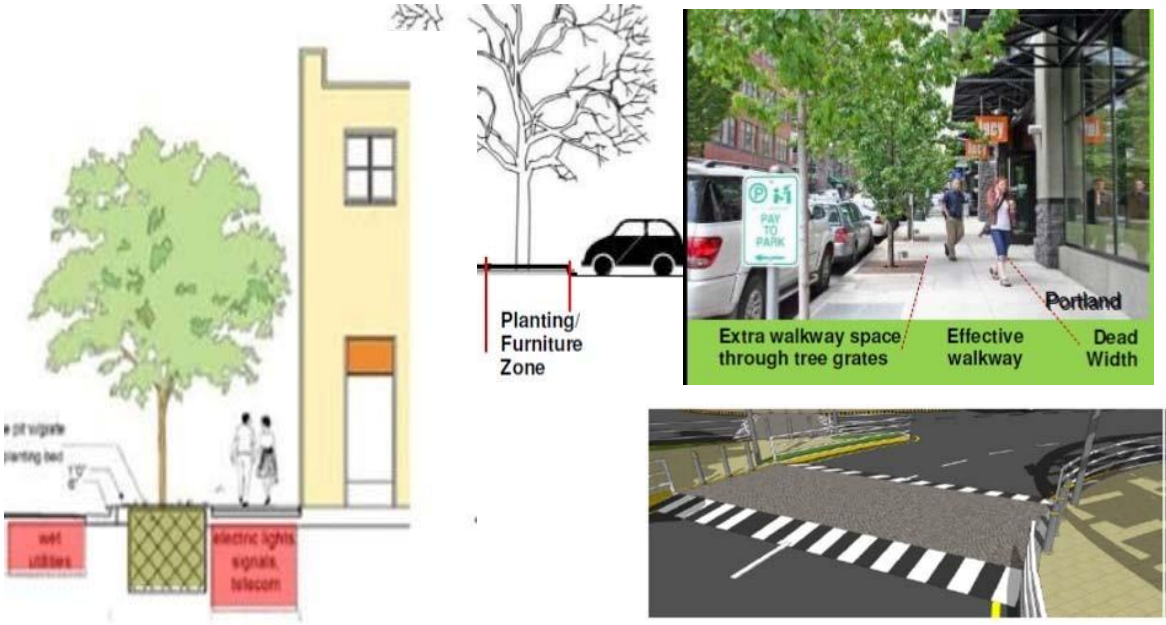


Table top crossings shall be proposed at all intersections and pedestrian crossings. Each table top will be of 150mm height to match footpath levels. The top shall be 3m wide and finished with 80mm thick cobblestone pattern paving blocks. Pedestrian facilities shall be planned with due consideration to the MoUD Guideline

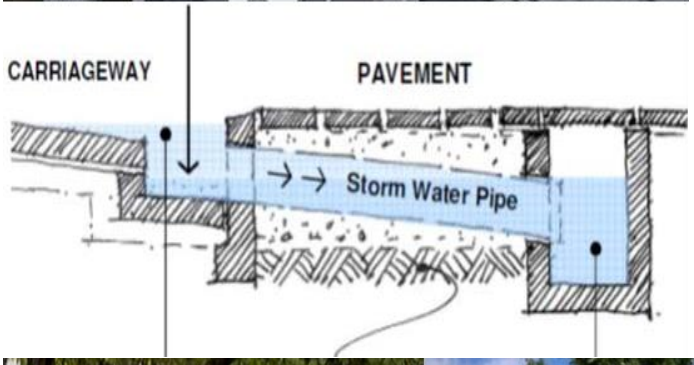
ROW(m)	Bus lane	Carriage Way(width)	Footpath	Cycle Track / lane	Service road
6	nil	nil	as per design	as per design	nil
7	nil	nil	as per design	as per design	nil
8	nil	nil	as per design	as per design	nil
9	nil	nil	as per design	as per design	nil
10	nil	nil	as per design	as per design	nil
11	nil	2.75m	1.80m min	mixed	nil
12	nil	2.75m	1.80m min	1.2 m painted	nil
13	nil	2.75m	1.80m min	1.2 m painted	nil
14	nil	2.75m	1.80m min	1.2 m painted	nil
15	painted	3.1 m	1.80m min	1.5 m painted	nil
16	painted	3.1 m	1.80m min	1.5 m painted	nil
17	painted	3.1 m	1.80m min	1.5 m painted	nil
18	painted	3.1 m	1.80m min	1.5 m painted	nil
19	painted	3.1 m	1.80m min	1.5 m painted	nil
20	painted	3.1 m	1.80m min	1.5 m painted	nil
21	painted	3.1 m	2.0m min	1.5 m painted	nil
22	painted	3.1 m	2.0m min	1.5 m painted	nil
23	painted	3.1 m	2.0m min	1.5 m painted	nil
24	painted	3.1 m	2.0m min	1.5 m painted	nil
25	painted	3.1 m	2.0m min	2.2 m segregated	nil
26	painted	3.1 m	2.0m min	2.2 m segregated	nil
27	painted	3.1 m	2.0m min	2.2 m segregated	nil
28	painted	3.1 m	2.0m min	2.2 m segregated	nil
29	painted	3.1 m	2.0m min	2.2 m segregated	nil
30	painted	3.1 m	2.0m min	2.2 m segregated	nil

3) Carriageway with road markings

Properly designed carriage way with well demarcated road markings for efficient flow of vehicular traffic

4) Storm Water Drainage system

The roads shall have a Storm water drainage channel between the carriageway and the footpath to ensure effective drainage of rain-water.The storm water drain would be covered with perforated RCC covers.



5) Road side plantation/ Shade trees

The Smart Road shall have roadside plantation to provide shade to pedestrians and to reduce the urban heat island effect. The plantation would Comprise of shade trees and landscaped green are as which would enhance the street aesthetic sand provide climatic comfort to the pedestrians and cyclists.

Mangaluru city has a composition of terrain from plains towards the coastal region to undulating topography toward the Western Ghats on the east. Owing to which the road also has varying gradient and character.

The Road side landscape would enhance the experience of the commuter in terms of microclimate and aesthetics along with ensuring safety.

Further it would enrich the experience of the commuters with the natural seasonal dynamism of the plant species.

Landscape design of the road would be deliberated considering the hierarchy of roads in the development which will guide tree planting giving a distinct character and experience to the commuter.

Here intersection plays a vital role in term of safety and focal point or point of orientation

Intersections are the most complex transportation elements. Because there is crossing traffic and numerous potential turning movements, intersections account for a majority of all traffic accidents. For this reason landscape and aesthetics development in an intersection requires careful consideration to ensure that safety is not compromised. Issues affecting aesthetics and design of intersections are:

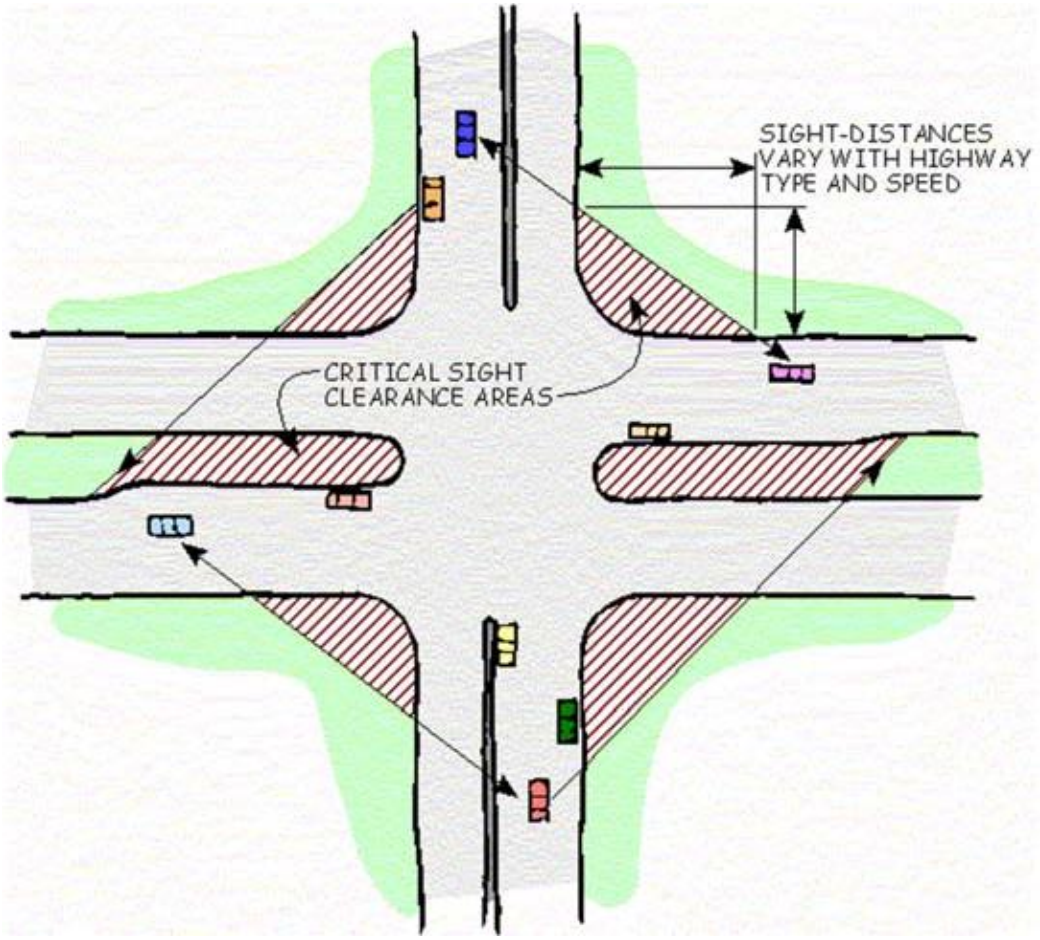
Visibility

- High concentration of visual information in the form of signage, signals, off-site activities, and advertising
- Complex patterns of shade, shadow,and reflection
- Placement of design elements
- Pedestrian movements(including bicycle)
- Future off-site development
- Accessibility
- Aesthetics of intersections

Above to should be considered while laying the landscape scheme for the intersection since traffic slows at intersections, development and design detail are more visible and appropriate aesthetic treatment becomes more important.

SAFESIGHTDISTANCE

- Use landscape and aesthetics tools to reduce the visual complexity at intersections
- Focus on the use of visual contrasts in material textures and colors to make the functional components of the highway intersection visually prominent.
- Accessibility for maintenance must also be considered
- Select plant materials that will not obstruct critical views as they mature.
- Provide a neutral visual back ground to the intersection where possible shall have distinct features than the adjacent to mark the entrance.
- Plants should help focus the view on the intersection.



6) Street furniture

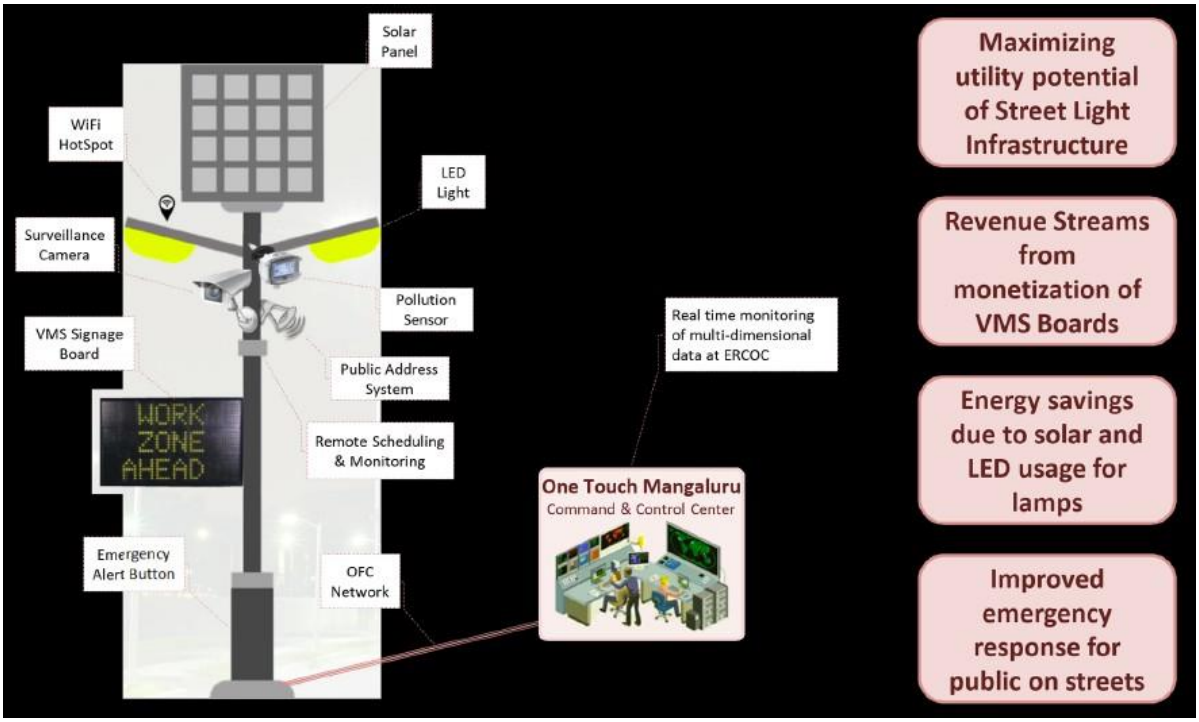
Design Speed (Km/hr)	Safe stopping distance (m)	Desirable sight distance (m)
100	180	360
80	130	260
60	90	180
40	45	90

The smart road would be equipped with relevant street furniture such as benches, garbage bins, etc to provide the necessary facilities to the citizens.

7) Signage

Signage would be installed along the road side to provide guidance and directions to the pedestrians and the vehicular traffic.

9) Smart Street Lighting and Smart Poles



5.2.2. Proposed Alignment and Cross sections.

The proposed connector road is having a length of 2 Kms. The alignment of the road is attached as Annexure III. The proposed crossection of 18m wide 4 lane road shown in figure 14.

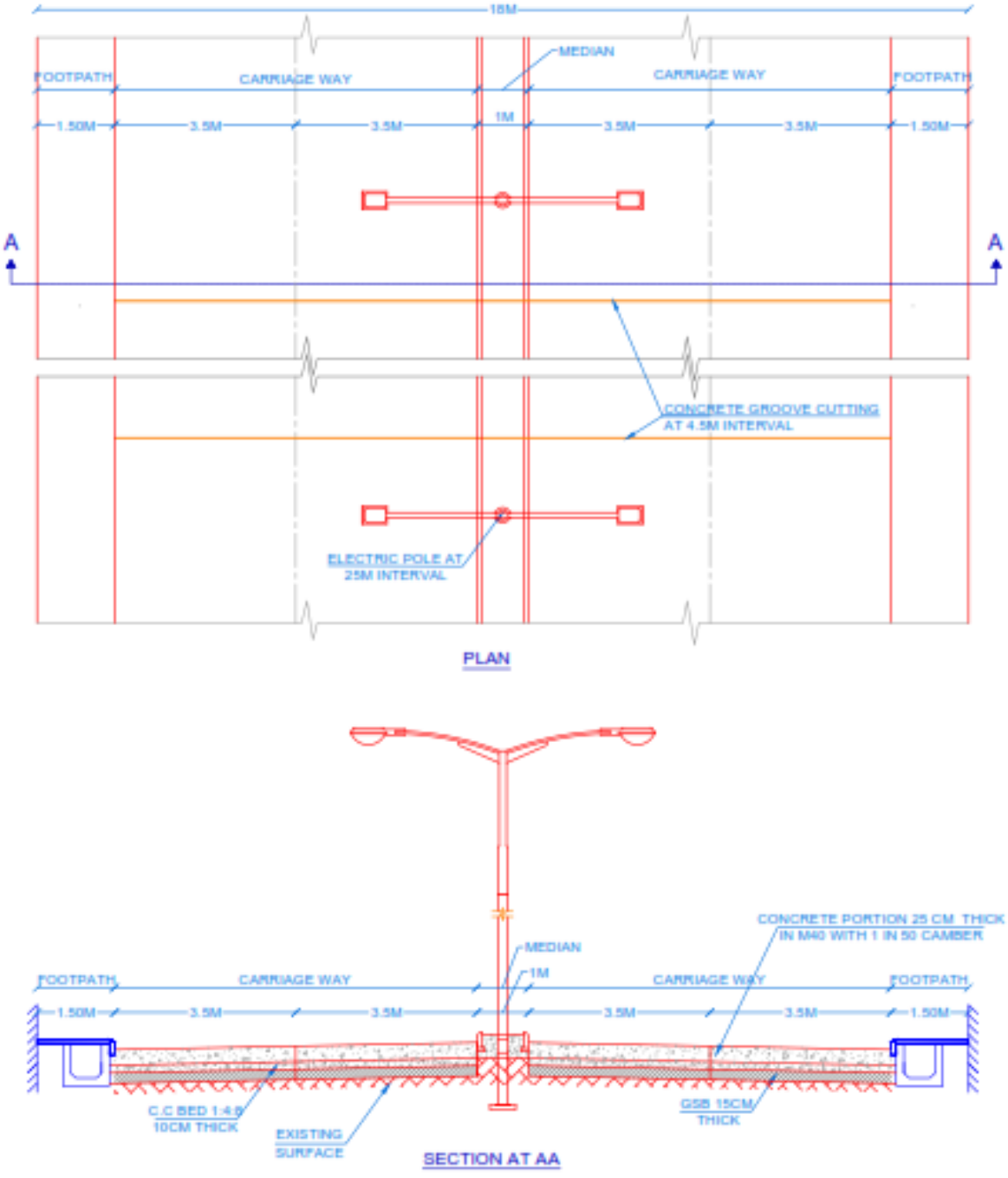


Figure 14 Proposed Crossection of Connector Road

6. BUDGET AND COST ESTIMATES

The section of the report deals with the Cost Estimates for Connector road and RUB.

6.1. Budget under SCP

The current project is categorised under the following SCP Project head for budgeting.

Sr No	Project Name	Cost (in Cr)
ABD Area		
1	Connector from NH 66 near Jeppu to Morgans gate including construction of RUB	49.95

6.2. Tentative Estimate of RUB

Southern railways submitted a line estimate of Rs. 30 Crores which will be reducing after preparation of final DPR. Also since the project is considering under MPLAD, the project cost will be reducing approximately 40%.

6.3. Tentative Estimate of Connector Road

Tentative Estimate for 18m wide 4 lane road: Rs. 49.95crores