

**PROPOSED
MITIGATION MEASURE
FOR FOREST LAND
DIVERISON IN
WAGUTHAMALAI
RESERVE FOREST
ALONG MADURAI RING
ROAD (MRR)**

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Proposed Mitigation Measure for Madurai Ring Road (MRR) Crossing Waguthamalai Reserve Forest

References

1. Forest diversion proposal uploaded on parivesh portal of MoEF&CC for seeking prior approval of Central Government under Section 2 of the Forest (Conservation) Act, 1980 for diversion of fresh forest area *vide* FP/TN/Road/32148/2018.
2. Condition of Elevated Corridor imposed by Additional Principal Chief Conservator of Forests, conveyed *vide* PCCF Lr. No. TS4/7185/2018, dated 29.07.2021
3. DFO, Madurai query via Lr. No. C. No. 1173/2018/D dated 14.09.2021

Summary

The National Highways Authority of India (NHAI) undertakes formation of Madurai Ring Road to bypass the Madurai city by connecting all the feeder routes which in turn to reduce the traffic congestion in the city. The Madurai Ring Road stretch involves two phases (Phase 1&2). Phase-1 of Road starts from Vadipatti Bypass in Dindigul to Samayanallur (NH-44) to Thamarai in Trichy- Madurai (NH-38). The Phase-1 of MRR proposed to traverse 210m in Waguthamalai Reserve Forest which requires Forest Clearance for diversion of 1.28 Ha. of forest land.

Project Director, PIU, NHAI, Madurai has applied online on 19.02.2018 for Forest Clearance in the prescribed format of Form A- Part I – under section 2 of the Forest (Conservation) Act, 1980 for diversion of forest land. Subsequently, compliances have been furnished to the observations of Forest Department, Govt. of Tamil Nadu.

As the APCCF requested to provide undertaking that an elevated corridor be provided for the portion of proposed road passing through Waguthamalai RF to enable unrestricted movement of wildlife beneath the corridor, *vide* ref.2. Consequently, after detailed inspection to site and in consideration of techno-economic view, an alternate proposal consisting Wildlife Overpass & Underpass are being proposed along with other mitigation measures for consideration and granting Forest Clearance.

Background

The National Highways Authority of India (NHAI) has been entrusted with the assignment of Development of Economic Corridors, Feeder Routes and Coastal Roads to improve the efficiency of freight movement in the country. As part of it, initiative has been taken to bypass the Madurai city by connecting all the feeder routes which in turn reduce the traffic congestion in the city.

The Madurai Ring Road stretch is divided into two phases (Phase 1&2). Phase-1 of Road starts from Vadipatti Bypass and bisects at Natham Road (SH-72 at km 12/800), Alagarkoil Road (SH-72A at km 10/000), Trichy Bypass (NH-38 at km 115/800) and ends in Thamaraipatti. To cater the increasing traffic levels project road is proposed with Right of Way of 60m.

The Madurai Ring Road Phase-1 proposed to traverse 210m in Waguthamalai Reserve Forest, due to this RF gets bisected into larger Northern portion and marginal southern portion. This involves diversion of Reserve Forest land to an extent of 1.28 Ha. for which Forest Clearance proposal was submitted online on 19.02.2018.

Accordingly, a joint site inspection was conducted on 15-08-2019, 06-11-2019, 16-11-2019, 12.11.2021 and 08.02.2022 by the DFO, Madurai and on 03-03-2020 CF, Madurai inspected the site.

The MRR is passing through narrow portion of Waguthamalai RF as seen in Figure 1, the area of RF proposed for diversion is about 1.28 ha of forest land in lieu of which 2.56 ha area of degraded forest land is proposed for afforestation in Sempatti hills RF. It is a habitat for the vegetation consists mostly of *Acacia planifrons*, *Chloroxylon swetenia*, *Anogeissus latifolia*, *Acacia melligera*, *Grewia tillifolia*, *Acacia chundra* etc. It is confirmed that, there are no spontaneous trees present in the proposed project area and the exact number of non-spontaneous trees are 113 Nos. which requires to be felled. It is learnt that *Lepus nigricollis* (Indian Hare) and *Sus scrofa* (Wild Boar) are present. Indian/Common Indian Hare is Schedule IV species as per Wildlife (Protection) Act, 1972 whereas Wild Boar is unclassified. The MRR shall stand a potential barrier for the movement of said species as fragmentation of RF is observed, hence, measures for integration of bisected areas of RF through Wildlife overpass & underpass and other mitigation measures are proposed.

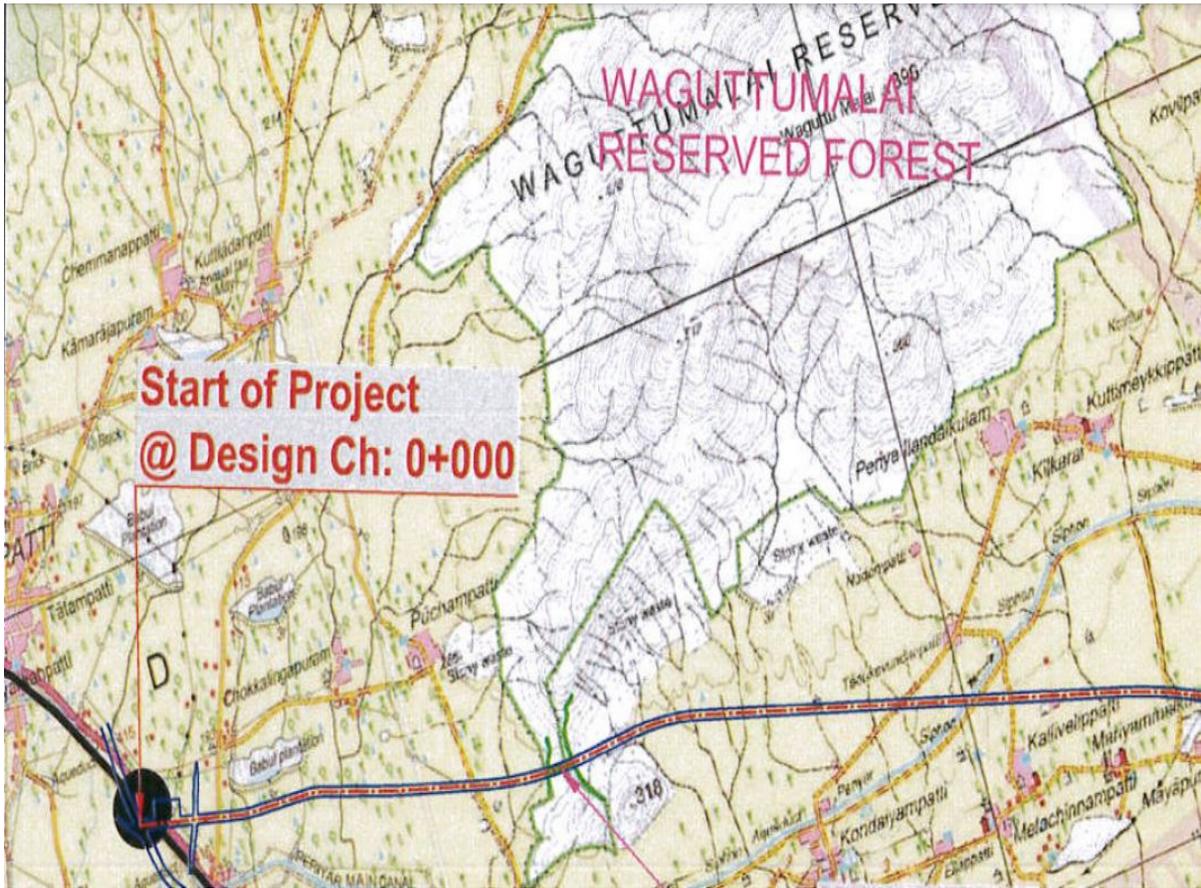


Figure 1: Proposed Alignment Superimposed on Sol, Toposheet

Proposal

The Madurai Ring Road Phase-1 proposed by NHAI is to traverse 210m in Waguthamalai Reserve Forest. This requires Forest Clearance for diversion of 1.28 Ha. of land for formation of highway in Waguthamalai Reserve Forest.

Conditions imposed by APCCF, Madurai vide Recommendation in Part III of Form A

Following are the conditions imposed while recommending the proposal by the Additional Principal Chief Conservator of Forests, Madurai:

- 1. An elevated corridor be provided for the portion of the proposed road passing through Waguthamalai RF to enable unrestricted movement of wildlife beneath the corridor.***
- Adequate number of sign boards at vantage points along the sides of the road as proposed by the DFO may be erected to warn the drivers of vehicles and commuters passing through the affected stretch regarding wildlife crossing the road, avoid throwing of inflammable material like cigarette butts etc. along the roadsides leading to fire in the dry season, littering the road with discarded trash cans, rubbish etc.

Terrain vs Elevated Corridor

The elevation profile of the center line is depicted in Figure 3.

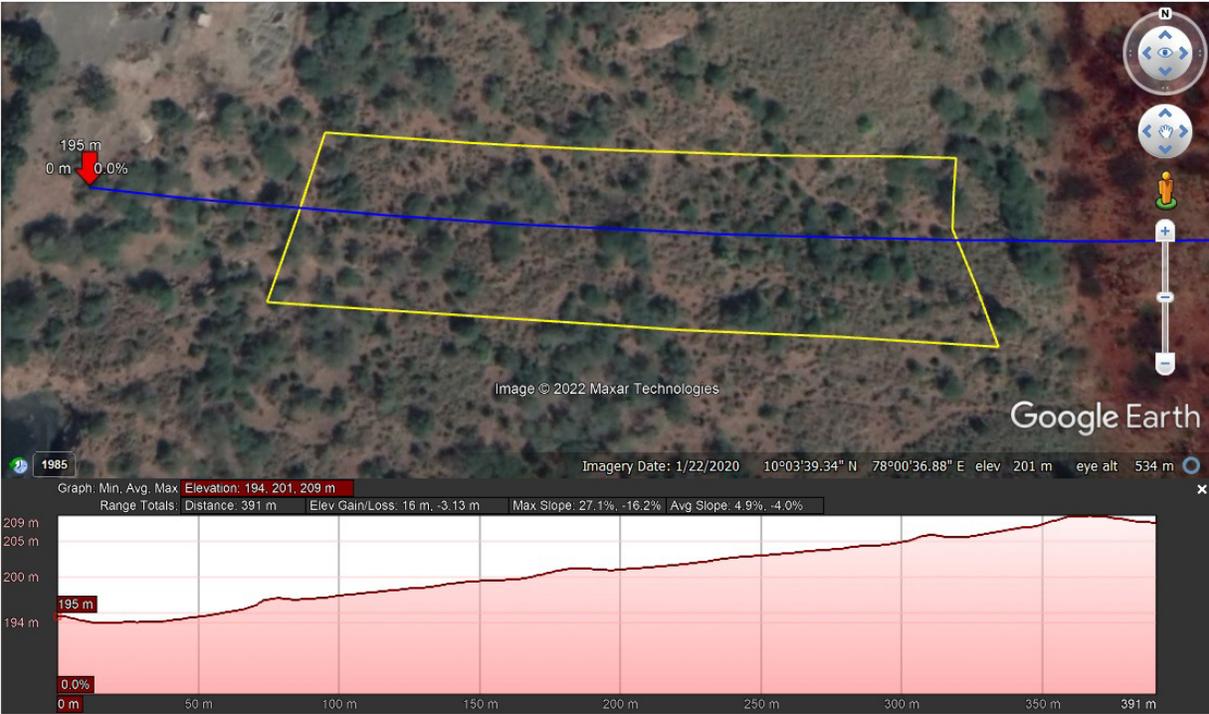


Figure 3: Elevation Profile of the Project Centerline in Waguthamalai RF

During field visit and topographical study, it is evident that the project highway as such planned involves cutting in the range of (-) 0.45m to (-) 8.0m. This involves steep gradient of 7.5m to be negotiated in 210 m. The feasibility of elevated corridor recommended by the APCCF, Madurai has Technical and Financial constraints as per ground truthing. Hence, the compliance to condition imposed are furnished in the follows in the following section.

Compliance to the conditions with Wildlife Overpass & Underpass

Regarding the compliance to the above conditions imposed, it is submitted that the user agency has uploaded all the certificates/undertakings/details as required in this proposal (FC Proposal) requested earlier from time to time.

However, in respect of undertaking towards taking highway as Elevated Corridor in Reserve Forest land, the user agency observes that (i) Steep gradient of 7.5 m to be negotiated in 210 m, make the elevated corridor, techno-economically least preferred, however, Alternate measures like Wildlife overpass & underpass and other mitigation measure expected to satisfy the same purpose for which elevated corridor condition was imposed. The Wildlife overpass is a natural looking structures over the corridor that will provide safe passage for the wildlife.

For example, in Ranthambore wildlife corridor, 5Nos. of wildlife overpass being proposed for 2.5 km stretch that is for every 500m stretch to have one wildlife overpass. In this proposal for 210m one wildlife overpass is being proposed along with underpass and other mitigation / protection measures.

Protection wall proposed along the highway in RF is expected to stand as a barrier to potential man-animal conflict. The location of proposed mitigation measure is depicted in Figure 2.



Figure 2: Location Map of proposed Area to be diverted in Waguttumalai RF

It is to put forth by user agency a viable option to retain landscape's connectivity, as mentioned in the subsequent section.

Mitigation Measures

i. Wildlife Overpass:

Elevated Corridor all over the RF was made as condition. However, few constraints are mentioned below:

1. However, for the elevated corridor, the elevation at km 3+690 is 8 to 13 meters higher than the existing ground level at km 3+480, hence within 210m of highway length traversing in Reserve Forest, negotiating for

8m to 13m elevation difference involves huge change in vertical profile of highway not only in the RF but also in the adjoining area outside the RF.

2. Elevated Corridor over the Reserve Forest will consume large quantities of Cement, Steel and other construction materials which may not be environment friendly solution.

Selection of site for wildlife overpass carried out based on:

1. Km 3+680 as the location of Wildlife overpass is chosen based on the detailed field levels carried out and to satisfy the need of bridging the bisected area at existing landscape's slope.
2. To allow for vertical clearance required for vehicular movement in the highway.
3. In case of location chosen at middle of the 210m highway traversing in RF, Wildlife overpass top level will be higher than the adjoining landscape and necessitates approaches which requires additional land in RF beyond proposed diversion of 60m ROW.
4. May look less friendly to wildlife movement.

Accordingly, the present location of km 3+680 is chosen for Wildlife overpass by user agency and recommends constructing one wildlife overpass at km 3+680 with 20m width as shown in Figure 4 (plan).

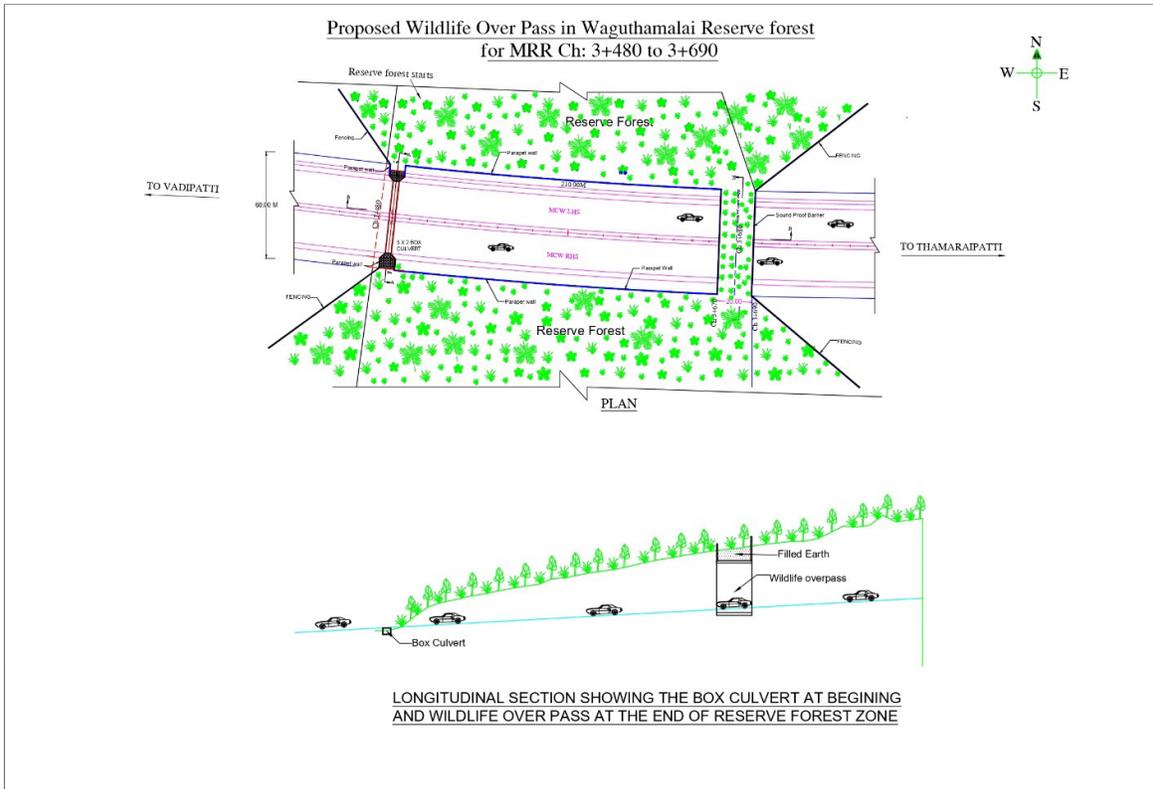


Figure 4: Animal Overpass Location

Cross-sectional view of the proposed overpass is presented in Figure 5. **Sides of the overpass shall be provided with light and sound barriers.** The remaining forest shall be fenced to avoid the movement/fall of animals on the road. The slope of the entrance of the overpass shall be gentle (around 10-12%) to enable easy use of the structure by wildlife.

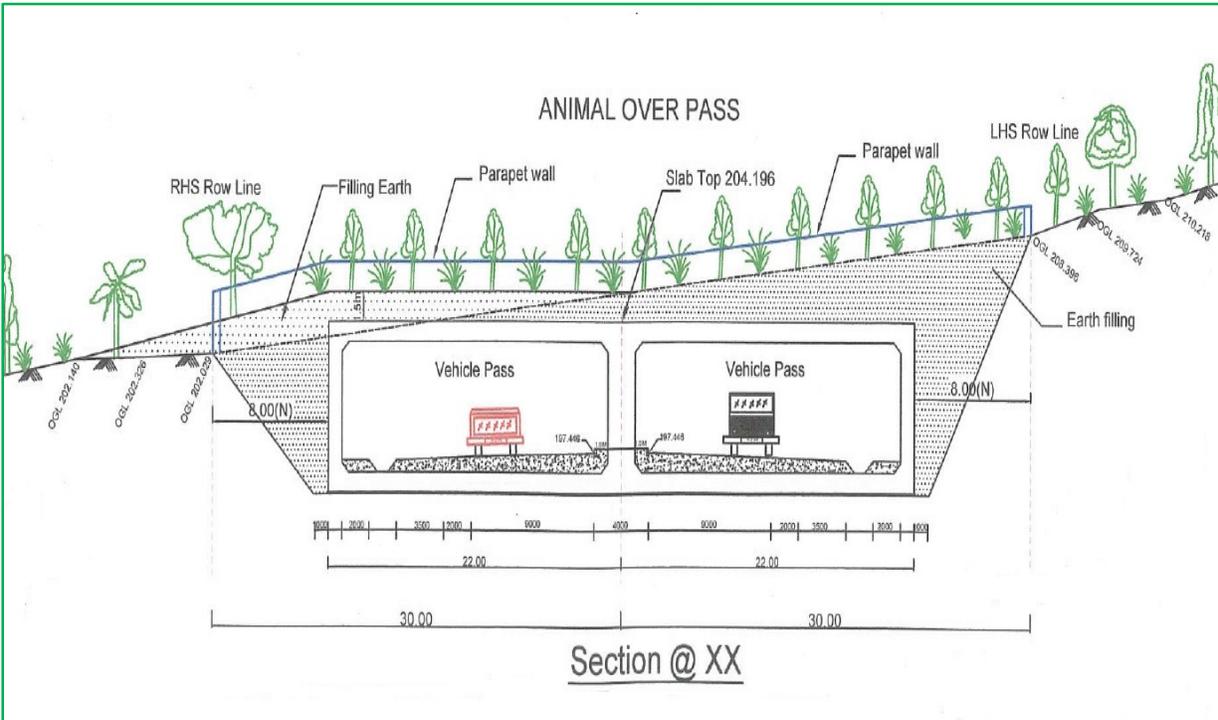


Figure 5: Cross Section of Animal Overpass

ii. Wildlife Underpass:

In addition to the above overpass to facilitate the connectivity for movement of smaller species such as amphibians and reptiles, a box culvert with the size of 3m width and 2m height is also proposed as wildlife underpass at Km.3+490. As this location is most suitable considering minimum cutting involved and adjoining landscape being at the road formation level.

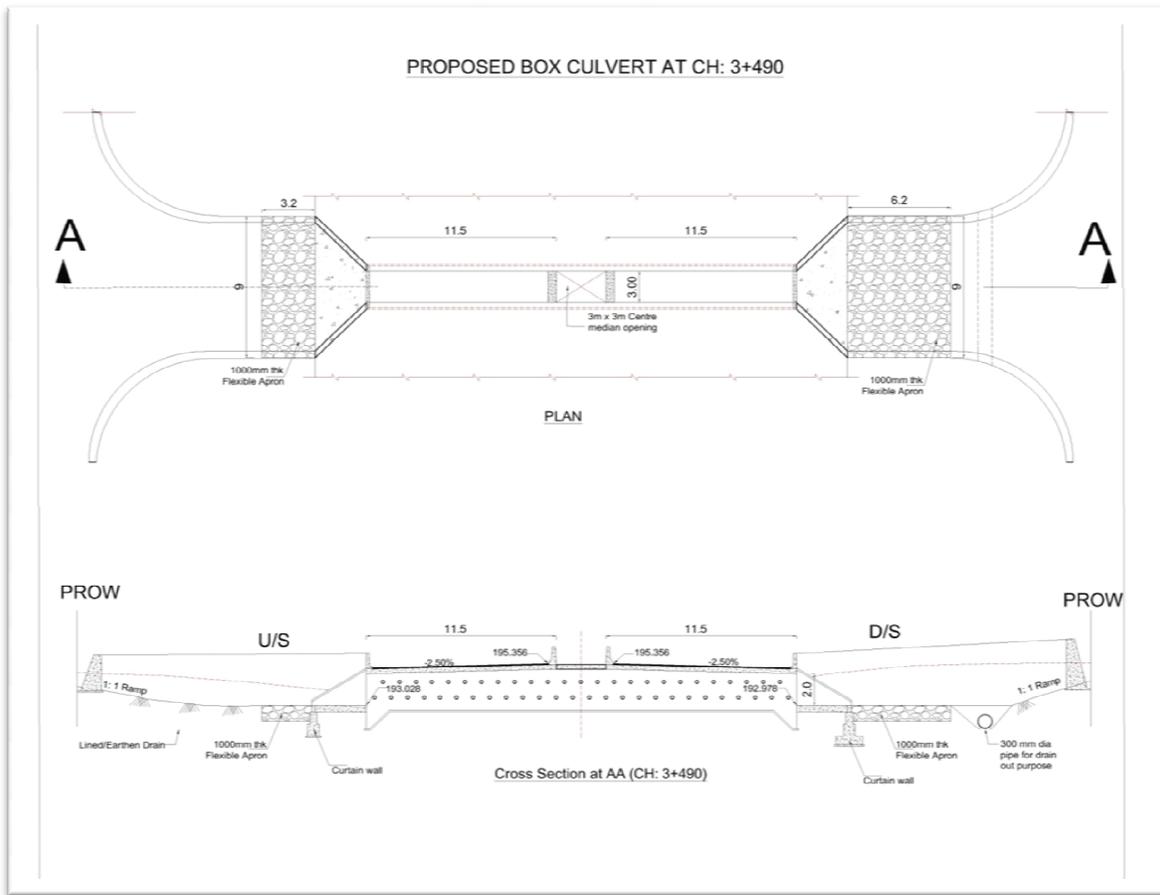


Figure 6: Plan & Cross Section of Wildlife Underpass

iii. Of laction:

Targeted wildlife shall be encouraged to use the overpass by enhancing its porosity to wildlife through enrichment. These enrichments consist of:

- a. Use of appropriate substrate like soil, lead litter, gravel, herbaceous vegetation
- b. Attractants like food plants, carrion, pheromones, dung of conspecifics

iv. Protection Wall with Fencing:

It is important to channelize the movement of wild animals to the passage for crossing the infrastructure by using appropriate funneling arrangements, either natural or artificial, at times it may be necessary except at the underpasses and

overpasses to fence off the road when passing through the wild life habitat. This fence may be essential to avoid mortality of wild life, prevent accidents and ensure the safety of humans. Accordingly, protection wall with fencing along the road from Km.3+430 to Km.3+740 is proposed. Further, funnel type entry and exit proposed in the box culvert structure at Km.3+490 is expected to channelize the movement of amphibians and reptiles

Adjacent areas before and after the animal overpass shall be provided with Protection wall and fencing as shown below.

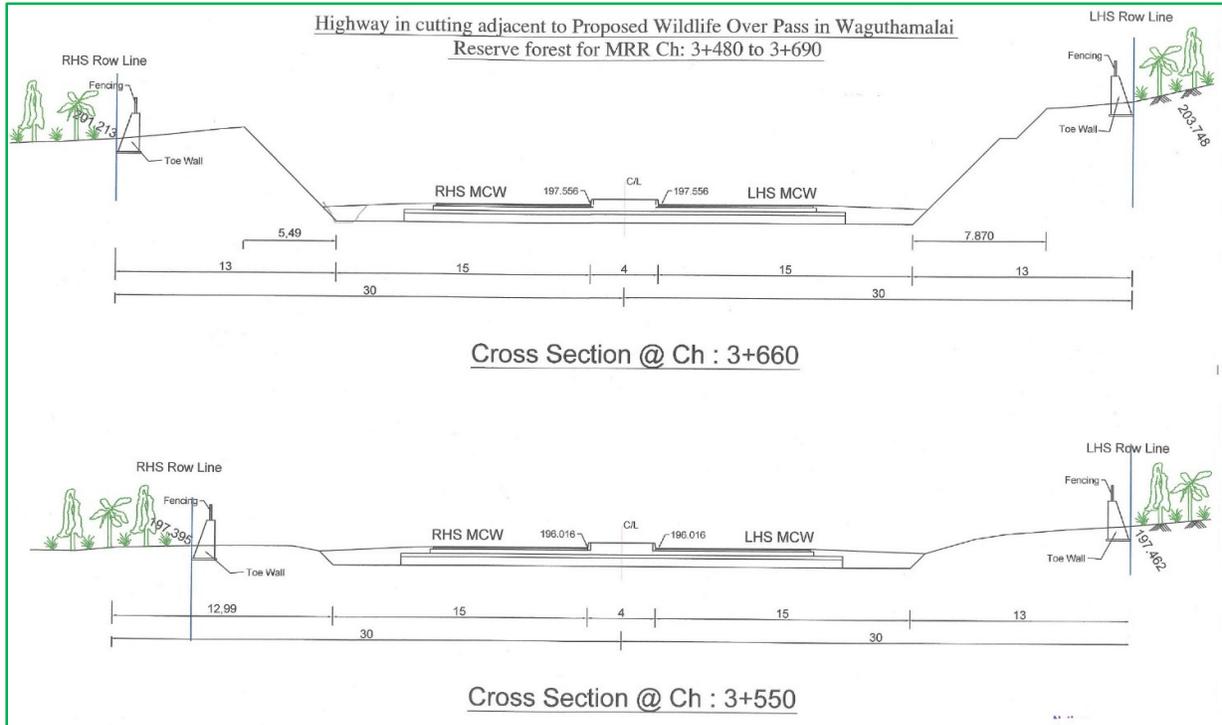


Figure 6: Protection Wall and Fencing

V. Drainage Arrangement:

Toe Drain along the highway proposed to drain off storm water and discharge into the natural stream for which minor bridges have already been constructed with the following specifications:

S.No	Chainage at KM	No. of span	Width of Span in M	Vertical clearance in M	Distance from the RF in M
1	3+203	1	12.00	3.60	280
2	4+240	2	7.50	3.50	550

The longitudinal section and cross section of minor bridge proposed for drainage

connectivity is shown in Fig-7 and Figure-8.

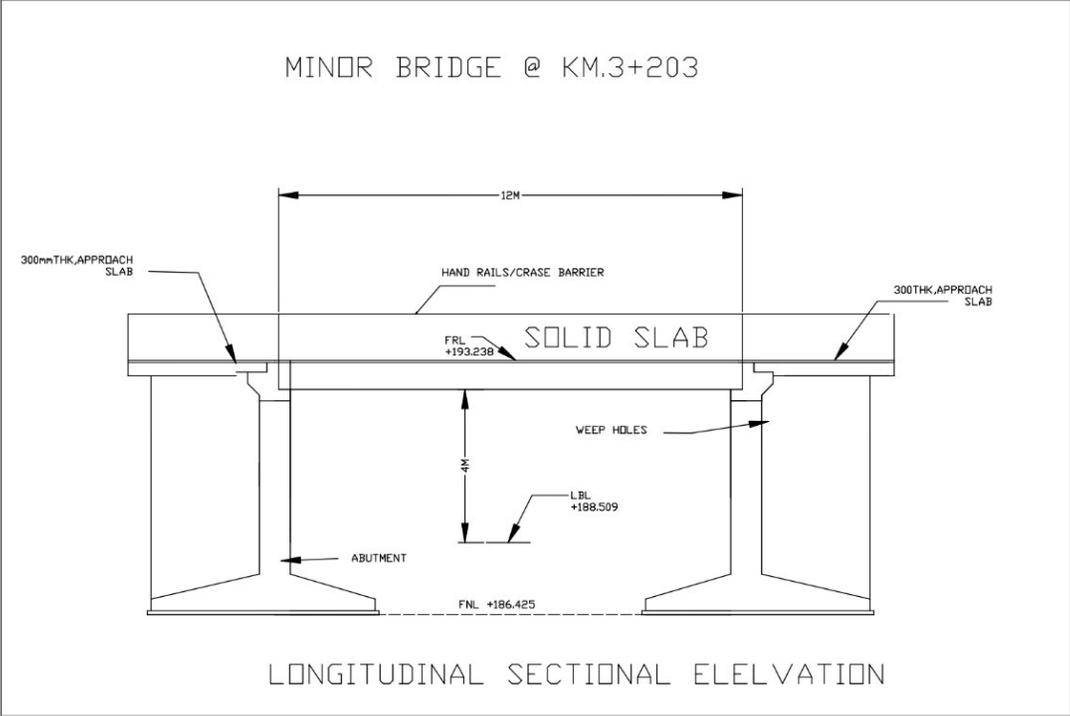


Figure 7: Longitudinal Section of MINOR BRIDGE @ Km.3+203

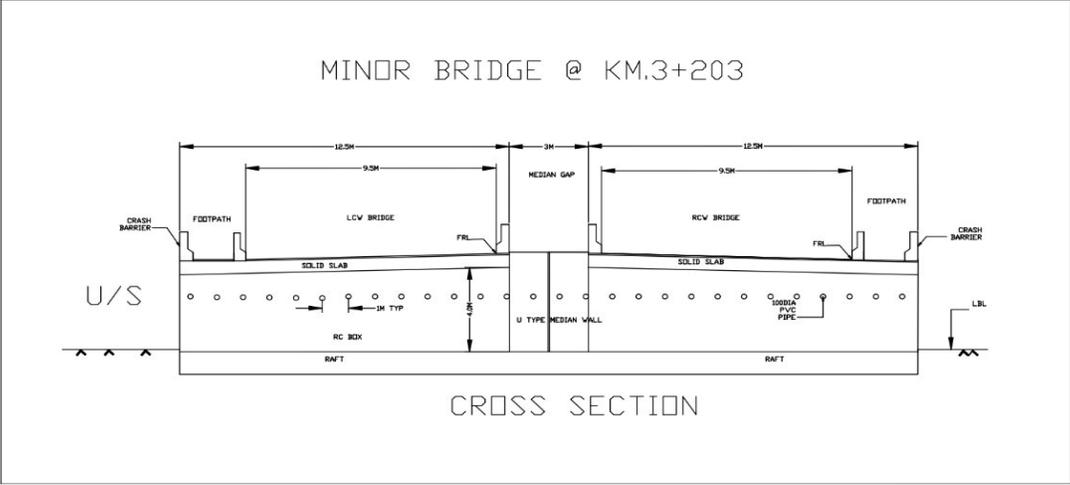


Figure 8: Cross Section of MINOR BRIDGE @ Km.3+203

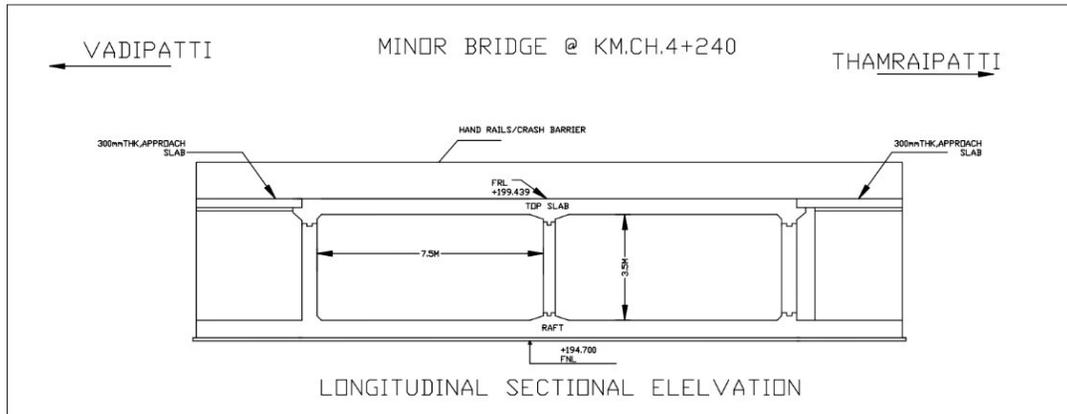


Figure 9: Longitudinal Section of MINOR BRIDGE @ Km.4+240

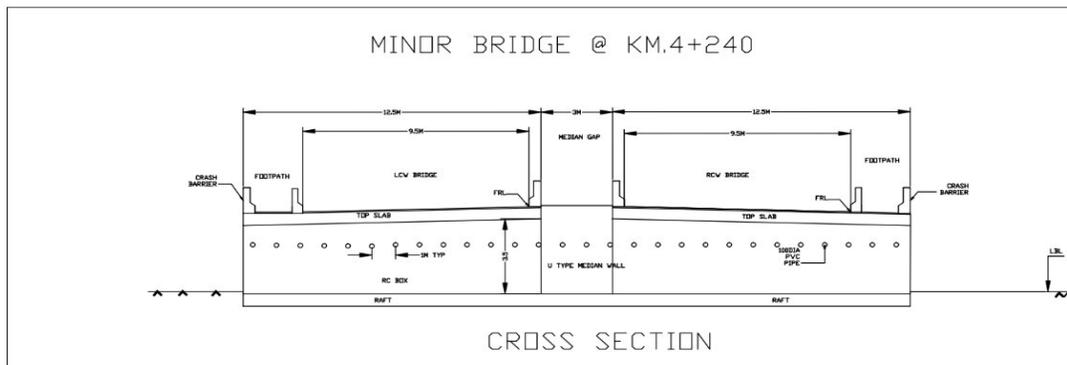


Figure 10: Cross Section of MINOR BRIDGE @ Km.4+240

Vi. Slope Protection:

The slope of the cutting portion in the Reserve Forest will be maintained at stable slope by considering the nature of the existing soil. Further, necessary environment friendly slope protection measures shall be provided.

Vii. Signages:

Sign boards for warning shall be erected on both sides with “no honking”, “use of low beam” etc. from approach of 200m on both sides.

Justification:

Consideration of Elevated Corridor for taking the proposed project highway in Waguthamalai RF is difficult on account of:

- (i) Topographical constraint due to steep gradient.
- (ii) Consumption large construction material like Cement, Steel etc.,
- (iii) Involves huge change in vertical profile of project highway adjacent to the RF stretch.

- (iv) Though better in unrestricted movement for Wildlife, Elevated Corridor seems environmentally less friendly.
- (v) More Carbon footprint due to higher consumption of construction material.

In addition to above, the cost analysis carried out reveals that elevated corridor recommended by Forest Department, cost works out to about 56.02 Crores Wildlife overpass & underpass costing about Rs.11.36 Crore. Therefore, it is justified that the later option of Wildlife overpass & underpass is techno-economically a viable, environmentally friendly and hence a preferable option. The cost comparison is annexed to the report (Annexure – 1).

Impact of the proposal:

The environmental friendly measures adopted including Wildlife Overpass and Underpass in the proposed project highway certainly will minimize environmental impact and also these measures help in sustainable development.

Conclusion:

In continuation of the query raised for taking the project highway in Reserve Forest area from Km 3+480 to 3+690 as Elevated Corridor and also on the basis of joint visit to site on 08-Feb-2022 and deliberations held thereon, it is observed that an elevated corridor in Reserve Forest stretch involves much higher cost and consumption of large quantities of construction materials, due to topographical constraints which is not an environmental friendly solution as well.

In view of above and to preserve the connectedness of Reserve forest area bisected by the proposed highway so as to facilitate movement of wildlife, both Wildlife overpass and underpass are being proposed which certainly expected to meet the requirement of various species. In addition, the locations of Wildlife Overpass and underpass being proposed at km 3+680 and 3+490 are chosen based on topographic suitability within the Reserve forest.

Further, appropriate provisions like fencing, light and sound proof barrier, protection wall, stable slope, etc., being proposed is expected to make the mitigation measures conducive to the environment and wildlife friendly, so as to facilitate the movement of wildlife within Reserve Forest.

Therefore, in place of elevated corridor insisted earlier, the provision of wildlife overpass and underpass may please be considered and accordingly necessary forest clearance be accorded.

Annexure-1

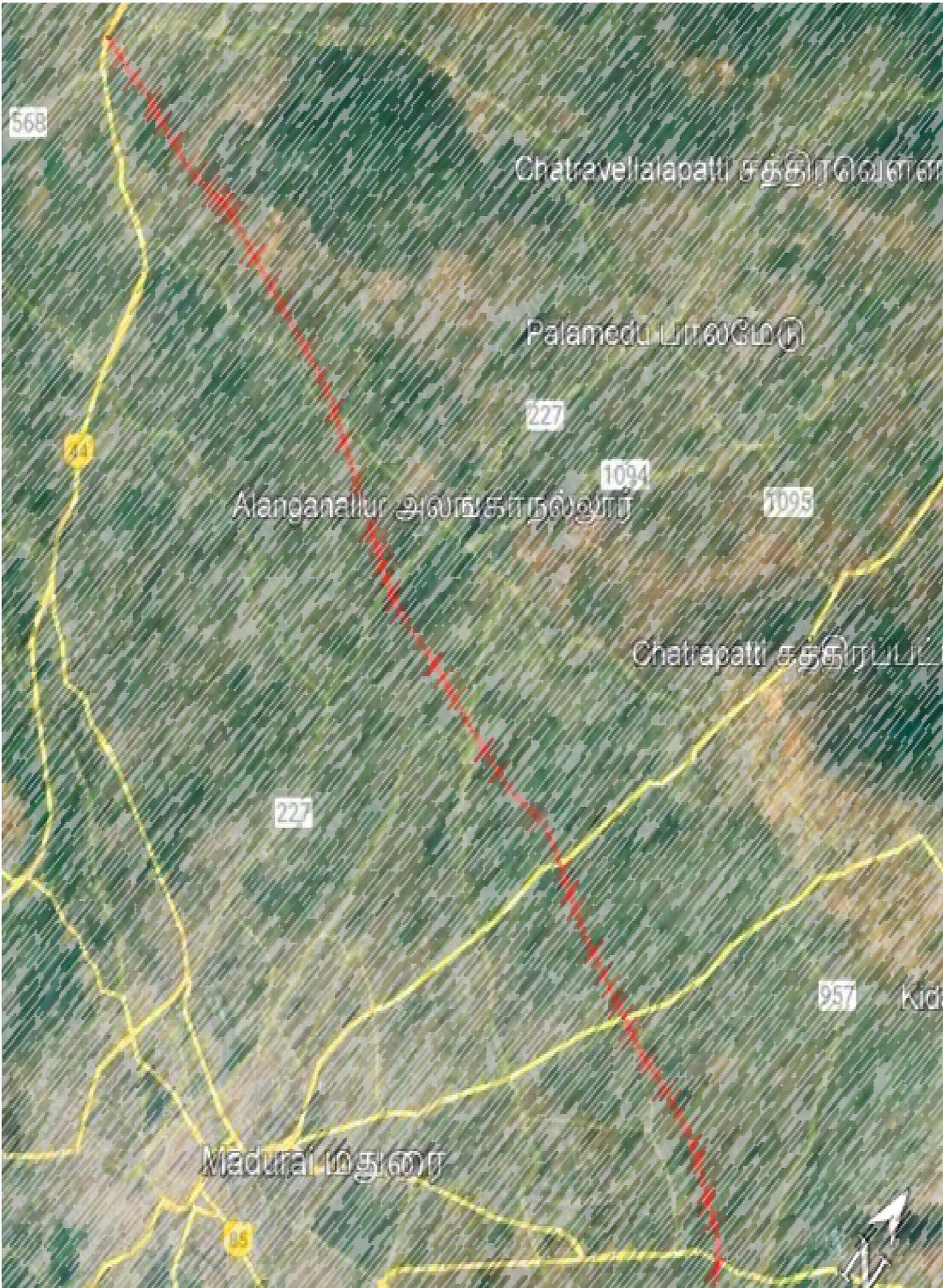
MRR PROJECT**ABSTRACT ESTIMATE FOR ALTERNATE PROPOSAL OF WILDLIFE OVER PASS & UNDERPASS (3X2m)**

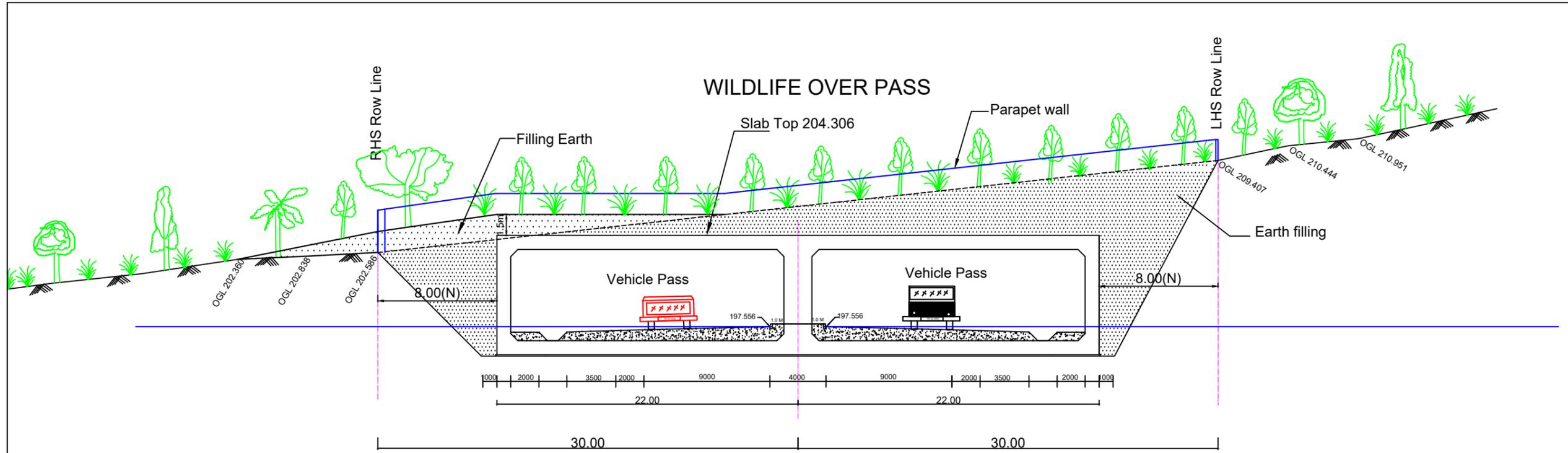
S.No	Description of the work	Units	Rate	Qty	Amount	Remarks
1	Hard rock Excavation	Cum	1162.70	5346.00	6,215,794	
2	PCC M15	Cum	6978.40	204.45	1,426,706	
3	RCC M35 For Foundation	Cum	8407.30	1507.55	12,674,425	
4	RCC M35 For Walls	Cum	8979.30	1029.49	9,244,100	
5	RCC M35 Roof Slab	Cum	9678.90	1426.59	13,807,822	
6	M20 For Toe Wall	Cum	6939.90	1136.03	7,883,900	
7	Reinforcement Steel	MT	69518.90	611.96	42,542,689	
8	For Chainlink Fencing	Sqm	1334.30	1188.00	1,585,148	
9	Back filling available materials	Cum	271.39	4686.00	1,271,724	
10	Providing and laying boulders apron on river bed for protection	Cum	1478.00	15.84	23,412	
11	Environmental amenities and misc works	LS			5,000,000	
	Total Amount				101,675,719	
	Add GST 12%				12,201,086	
	Grand Total				113,876,806	

MRR PROJECT

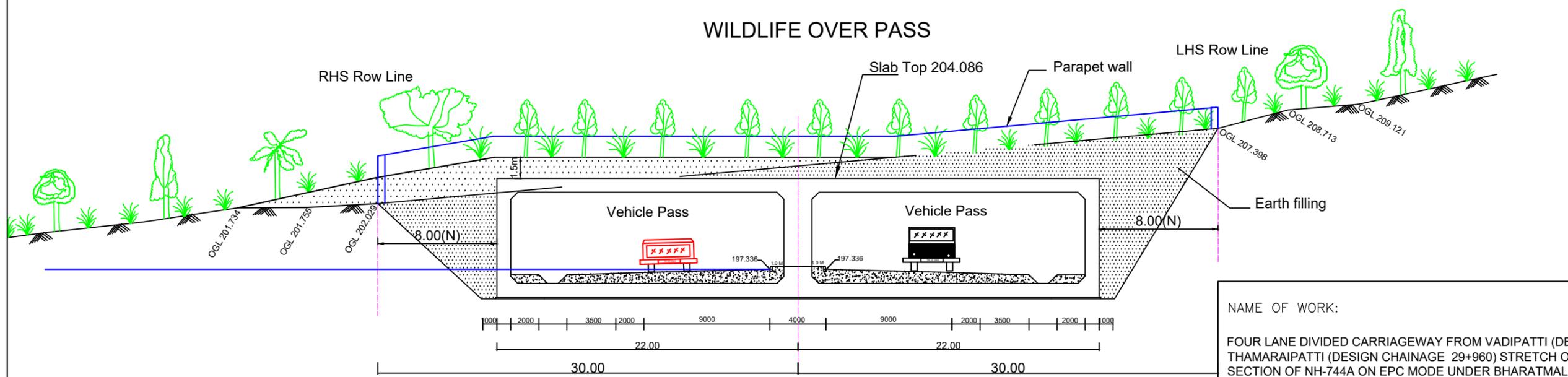
ABSTRACT ESTIMATE FOR ELEVATED CORRIDOR AT RESERVE FOREST AREA

S.No	Description of the work	Units	Rate	Qty	Amount	Remarks
	AS PER SCHEDULE "H" RATES					
1	Foundation	Rmt	134002.63	210.00	28140553	
2	Sub Structure	Rmt	135459.19	210.00	28446430	
3	Super Structure	Rmt	406741.70	210.00	85415758	
4	Wearing Coat including Expansion Joint	Rmt	32772.38	210.00	6882201	
5	Miscellaneous item like Hand rail/ crash barrier / Road Marking	Rmt	7646.89	210.00	1605847	
6	RE Wall Panel Casting	Sqm	3628.85	12640.00	45868639	
7	RE Wall Erection	Sqm	3628.85	12640.00	45868639	
8	Friction slab Casting & Erection including Crash Barrier	Rmt	17258.87	2000.00	34517736	
9	Construction of Embankment Work	Cum	570.00	368000.00	209760000	
10	Earth work Excavation	Cum	171.00	80000.00	13680000	
	Total Amount				500,185,802	
	Add GST 12%				60,022,296	
	Grand Total				560,208,099	





Cross Section @ Ch : 3+690



Cross Section @ Ch : 3+670

NAME OF WORK:
 FOUR LANE DIVIDED CARRIAGEWAY FROM VADIPATTI (DESIGN CHAINAGE 0+000) TO THAMARAIPATTI (DESIGN CHAINAGE 29+960) STRETCH OF MADURAI RING ROAD SECTION OF NH-744A ON EPC MODE UNDER BHARATMALA PARIYOJANA PHASE-I IN THE STATE OF TAMIL NADU.

TITLE: GAD OF WILDLIFE OVER PASS

DETAILS:

DATE:	SCALE:	DRAWING NO.:	REV.