

## चेक लिस्ट क्रं.सं. 08

प्रोजेक्ट पर विस्तृत टीप ।



सत्यमेव जयते

# भारतीय राष्ट्रीय राजमार्ग प्राधिकरण National Highways Authority of India

(सड़क परिवहन और राजमार्ग मंत्रालय, भारत सरकार)  
(Ministry of Road Transport and Highways' Govt. of India)

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**Project Name-** Development of Economic corridor, Inter Corridors, Feeder Routes and National Corridors to improve the efficiency of freight movement in India under Bharatmala Pariyojana [Lot-3/Chhattisgarh/Packge-1(Urga- Pathalgaon Section of NH-130A Raipur Dhanbad Economic Corridor)]

## JUSTIFICATION FOR LOCATING THE PROJECT IN FOREST AREA

The proposed project shall enhance and improve the current route between Urga and Pathalgaon which is two lane and proposed for 4- lane with paved shoulder. There is some of the locations present road is very narrow and zig-zag and thus needs to be straightened and propose widening from 2- lane to 4- lane which reduce the traffic congestion and enhance the traffic safety and mobility of the road users.

The current route between Urga and Pathalgaon measures about 106 km which shall be reduced up to 87.545 km (17.5 % reduction) with re-alignment/by-passes.

The Project will further have following benefits at national and regional level:

- **High-speed connectivity and access:** The projected corridor is a proposed economic corridor. This will avoid traffic congestion and speed-up the freight movement.
- **Aiding economic growth:** The seamless connectivity will provide better access to vehicles. The Project will reduce travel time and provide boost to trade and commerce linked to the regions connected through this economic corridor.
- **Growth of backward areas:** The biggest strength of the alignment is that it plans to cover backward districts of Chhattisgarh. As a result of connectivity and access to other parts of the country, these backward areas will be aided to integrate with rest of the world. Further, freight and passenger traffic on the economic corridor will help promoting ancillary economy of these regions.



- **Decongestion of existing Highways:** The proposed corridor will take away traffic pressures from existing highways passing through various cities. Also, long-distance traffic will shift to the proposed corridor, thereby leaving the existing NH and SH for regional and local usage.

- **Usage shift:** Long-distance traffic will shift from existing roads to the proposed Economic Corridor, resulting in lesser congestion on these highways.

- **Improved safety:** Due to access control, the Roadway & Travel Safety of the traffic connecting the cities will be enhanced as there will be minimum distractions & conflict zones.

- **Support to industry:** Different types of industries like Manufacturing, Tourism etc. along the proposed corridor will be facilitated in their business operation and reachability.

Hence, the proposed RoW which crosses the Reserve forest involving an area of 169.0231 ha has been chosen for the following reason s: -

- The proposed RoW involves minimum forest area.
- The proposed RoW involves minimum tree felling.
- The proposed RoW involves minimum number of crossings over streams, canals, and rivers.
- The proposed RoW involves minimum demolition of private and government structures.
- The proposed Road gradients are suitable for traffic.

Date:- 12/05/2023

Place:- Korba




(D.D.Parlawar)  
Project director  
NHAI, PIU Korba



## **Executive Summary**



|   |   |
|---|---|
| Development of Economic Corridors, Inter Corridors, Feeder Routes to improve the efficiency of freight movement in India (Lot-3/Chhattisgarh/Package-1) under Bharatmala Pariyojana |   |
| Urga - Pathalgaon section of NH-130A (Raipur-Dhanbad Economic Corridor)   |  Transys |
| Executive Summary   |   |

## E. Executive Summary

### E.1 General

- The Ministry of Road Transport & Highways (MoRT&H), Gov. of India, has announced a comprehensive programme to improve road connectivity across the nation under proposed Bharatmala Pariyojana. Many defined highway stretches totalling about 50,000 km are proposed to be developed as "Economic Corridors, Inter Corridors & Feeder Routes" under "Bharatmala Pariyojana".
- The Consultancy Services for preparation of DPR for development of Economic Corridors, Inter Corridors & Feeder Routes to improve the efficiency of freight movement in India (Lot-3/Chhattisgarh/Package-1) under Bharatmala Pariyojana for a total length of 405.04 km was awarded to M/s. Transys Consulting Pvt. Ltd., in association with Accrete Consulting Engineers (P) Ltd. by the National Highways Authority of India.
- The project road under consideration aims at developing Urga-Pathalgaon section of NH-130A in the state of Chhattisgarh to four lane access controlled Highway. The project highway alignment is green field in most of the length and starts from Chitapali village at ch 8/150 of SH-04 and terminates near Turua Ama village, 10km away from Pathalgaon along NH-43 towards Jharkhand border. Length of proposed alignment is 87.545 km, whereas the existing length is 107.3km. This section is a part of Raipur Dhanbad economic corridor

### E.2 Present Submission

- Final Feasibility Report (DFR) was submitted on 10/01/2019. This report had been prepared as per office memorandum no. NHAI/ Planning/ EC/ DPR/ 2016 dated 03.05.2018 issued by MORTH regarding "Design specifications for various category of roads under Bharatmala Pariyojana including Economic corridors and cost optimisation". Proposed ROW was 70m in Final feasibility stage.
- Subsequently, The Consultants presented the Final Feasibility Report in the presence of CGM, GM and PD PIU Bilaspur at NHAI HQ Delhi on 14.09.2018. Once the TOR for Environmental Clearance has been granted on 13 Aug 2019, it has been mentioned that the proposed ROW shall be restricted to 60m in general and 30m in forest area. The same has been approved from LA committee during the meeting held on 27.12.2019. Finally RO Raipur instructed to propose 45m ROW in forest area and 60m ROW in general vide letter to NHAI HQ dated 13.02.2020. Final Feasibility Report was submitted incorporating the above observations.
- Later on amendment in TOR (environmental clearance) was issued on 28.12.2020 stating that in general ROW shall be 60m and in forest area ROW may varies from 30m to 65m as per annexure 1 of amended TOR. The same has been approved from LA committee.





- Peer review has been made with Mr. A. K. Pandey and joint site visit was made on 28 and 29 of Aug 2021. Peer review observation was placed on 04.09.2021 and compliance of the observation replied by consultant on 24.09.2021.
- With a view of safety issue and maintenance issues in cutting stretch during operation stage, PD PIU Korba also suggested vide PIU letter 1254 dated 27.09.2021, to replace overpass with VUP so that main carriageway will be on embankment than on cutting. Also since the project road is passing through the forest area, it has been mandatory to provide elephant underpass on forest area, forest department suggested 12 nos of elephant underpasses where as earlier there are only 4 nos. Meanwhile CGM Tech NHAI HQ also visited site on 01.10.2021 and inspection note has been issued for compliance. So for these reasons, profile of the project road has been redesign.
- Hence ROW of the project road has been revised and proposals are made fit to the amended ROW and **Final Detailed Project Report has been prepared. For present submission.**
- This Final Detailed Report is being submitted in response to the Terms of Reference Clause 10.7, Stage 4 – Final Detailed Project Report. This report contains the findings of survey and investigations, design of highway, pavement, bridges, CD structures and grade separated structures, cost estimate etc. The consultants throughout the preparation of this report has endeavoured to ensure safety of road users and enhanced operational efficiency of the highway.
- Several meetings were held to come up with finalisation of improvement proposals with its cost implication on 03.10.2019, 07.10.2019 with CGM, GM NHAI HQ. Finally it has been instructed to follow IRC: SP: 84-2019 and since project IRR is low so mode of construction has been change from EPC to HAM mode. Also pavement design also referred from IRC: 37-2018.
- Following changes have been incorporated in this report:

|   |   |
|---|---|
| 1 | IRC:SP:84-2019 – to be followed.  |
| 2 | As per IRC:SP:84-2019, Paved shoulder – 2.5m and earthen shoulder – 1.5m  |
| 3 | <b>ROW boundary stone</b> – As per IRC:SP:84-2014, para 9.8 which states that Road boundary stones shall be provided on both sides of Right of Way. These shall be spaced at 50m. The boundary stones shall be of cement concrete as per Type Design given in IRC:25. |
| 4 | ROW width – 60m in general and 30m-70m in forest area   |
| 5 | Construction mode – HAM mode  |
| 6 | Pavement Design – IRC:37-2018 and pavement crust are as follows:<br>BC – 40 mm<br>DBM – 120 mm<br>WMM – 150 mm  |





|   |  |
|---|--|
|   | CT GSB – 200 mm  |
|   | <b>Total – 510mm</b>   |
| 7 | 12 nos of elephant underpass/Overpass with aggregate span length of 1290m has been introduced as per requirement of MOEF&CC. |

The project has been appraised by Project Appraisal and Technical Scrutiny committee (PATSC), NHAI in its meeting held on 17.01.2022.

The project has been sanctioned during the SFC (Standing Finance Committee ) meeting held on 23 March 2022.

### E.3 Project Description

- Existing road is a section of Urga-Hati-Dharmjaygarh-Pathalgaon road which starts at its junction with NH-149B, near Urga, and terminates at its junction with NH-43 near Pathalgaon. Total existing length of the Project Road is 105.000 km as per RFP. The project stretch lies geographically within three districts Korba, Raigarh & Jaspur in the State of Chhattisgarh. The existing road is a State Highway (SH-04) and recently been declared as National Highway (NH-130A) vide Gazette notification dated 5th Dec 2017. This road is proposed to be developed as an Economic corridor of Raipur - Dhanbad section.
- Stretch of project road from Urga to Hati from exist. Km. 0/000 to 46/800 and from Dharmjaigarh to Pathalgaon from Km. 71/500 to 105/000, falls under jurisdiction of (CCRDC) Chhattisgarh Road Development Corporation Limited, Raipur. Balance portion i.e. from Hati to Dharmjaygarh is under State PWD NH Division-02, Bilaspur, Chhattisgarh.
- Existing Carriageway width is two lane from Urga to Dharmjaygarh for length of 70km. and intermediate lane carriageway from Dharmjaygarh to Pathalgaon for a length of 35km. The alignment passes through plain terrain with isolated sections of rolling terrain. The existing geometry is very substandard and requires geometric correction at many locations. The pavement condition for most of the stretch is very poor. The existing ROW from 12m to 18m.
- The existing road passes through various major/minor built-up areas with restricted RoW. These settlements require bypasses at frequent interval. The geometry of existing road is also very sub-standard and improvement of this road to National Highway standards requires major geometric corrections/re-alignments at many locations. Hence, to improve the geometry of existing road to National Highway standards and to avoid bypasses at frequent intervals and to provide shortest possible alignment, green field alignment has been proposed in most of the length.
- The proposed alignment starts from km 8.15 of SH-04 near Bhaisma (Chitapali) village and terminates near Turua Ama village, 10km away from Pathalgaon along NH-43 towards Jharkhand border. Length of proposed alignment is 87.545 km, whereas length of existing road is 105 km. The proposed alignment follows existing





road in a length of 12.8 km with required geometric improvements and in remaining length of 74.745 km it is green field.

- The proposed alignment runs through nearby villages of Bhaisma, Nonbira, Kartala, Kudmura, Hati, Bayasi, Dharmjaygarh, and Pathalgaon etc. bypassing all major/minor built-up areas en-route. The proposed alignment passes through three districts namely Korba, Raigarh and Jaspur. The terrain along proposed alignment is mostly plain, with an isolated locations of rolling terrain. The proposed alignment runs through cultivated/barren land except at the following stretches, where it passes through forest area.

Table E-1 : Summary of Forest Area along proposed alignment

| S. no. | Design Chainage |        |               | Forest area (Ha) | District | Remarks   |
|--------|-----------------|--------|---------------|------------------|----------|---|
|        | From            | To     | Length (km)   |                  |          |   |
| 1      | 71090           | 106094 | 17.589        | 73.0969          | Korba    | forest areas are in patches in between said chainages |
| 2      | 106650          | 144949 | 20.998        | 95.1262          | Raigarh  |   |
| 3      | 155532          | 155860 | 0.328         | 0.77027          | Jaspur   |   |
|        | <b>Total</b>    |        | <b>38.915</b> | <b>168.9934</b>  |          |   |

#### E.4 Traffic

- Korba, which is located at approx. 9km from Urga is an industrial area. It is famous for coal fields and power plants. It is the power hub of Chhattisgarh state. It boasts of the gevara mines which are India's largest open cast mines catering 11% of the nation's coal needs. Major power plants such as NTPC, CSEB, and Bharat Aluminium Company (BALCO) are located at Korba. The major traffic in the project influence area is bound to Korba.
- The traffic along existing road is varying between 2431 to 6030 PCU. Traffic in the initial section up to Hati junction is 2431 PCU and gradually increases due to the addition of traffic from Kharsia-Hati road and Raigarh-Dharmjaygarh road. At present the traffic on project road is less due its single lane configuration and poor pavement condition. Following table gives details of present traffic along Urga – Pathalgaon road section:

Table E-2 : Present Traffic along existing road/parallel routes

| Sl. No | Homogenous Section         | Existing Chainage |         | Length (km) | Present Traffic |           |           |             |
|--------|----------------------------|-------------------|---------|-------------|-----------------|-----------|-----------|-------------|
|        |                            | From              | To      |             | ADT (pcu)       | Car (Nos) | LCV (nos) | Truck (nos) |
| 1      | Urga to Hati               | 0+000             | 46+800  | 46800       | 2431            | 291       | 29        | 235         |
| 2      | Hati to Dharmjaygarh       | 46+800            | 71+400  | 24600       | 4952            | 242       | 58        | 801         |
| 3      | Dharmjaygarh to Pathalgaon | 71+400            | 105+300 | 33900       | 6030            | 452       | 106       | 878         |





- As the project road is being developed as part of Raipur-Dhanbad corridor and in continuation to Bilaspur-Urga section, the traffic on the project road will increase because of reduced distance and improved connectivity. The likely amount of diverted traffic have been assessed considering the road network in the project influence area and Inter-zonal movements on the basis of O-D. The following table gives details of expected traffic on to the proposed alignment once open to traffic.

Table E-3 : Summary of expected traffic on proposed alignment

| Year         | 2018  | 2021  | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Tollable     |       |       |       |       |       |       |       |       |
| AADT (Nos)   | 5514  | 7116  | 10290 | 14072 | 18232 | 23269 | 29698 | 37903 |
| AADT (pcu)   | 13393 | 16714 | 23240 | 30804 | 39609 | 50552 | 64518 | 82313 |
| Non-Tollable |       |       |       |       |       |       |       |       |
| AADT (Nos)   | 2464  | 2852  | 3467  | 4425  | 5648  | 7208  | 9199  | 11741 |
| AADT (pcu)   | 1377  | 1595  | 1938  | 2474  | 3157  | 4029  | 5143  | 6563  |
| Total        |       |       |       |       |       |       |       |       |
| AADT (Nos)   | 7978  | 9969  | 13757 | 18497 | 23880 | 30477 | 38897 | 49644 |
| AADT (pcu)   | 14771 | 18308 | 25178 | 33278 | 42766 | 54581 | 69661 | 88907 |

| Year | AADT (nos) |          |     |      |          |          |          |       |
|------|------------|----------|-----|------|----------|----------|----------|-------|
|      | Car        | Mini Bus | Bus | LCV  | 2A Truck | 3A Truck | MA Truck | Total |
| 2018 | 2552       | 0        | 139 | 483  | 285      | 267      | 1787     | 5514  |
| 2021 | 3454       | 0        | 177 | 654  | 336      | 325      | 2170     | 7116  |
| 2025 | 5253       | 0        | 250 | 997  | 441      | 436      | 2914     | 10290 |
| 2030 | 7454       | 0        | 335 | 1415 | 562      | 560      | 3746     | 14072 |
| 2035 | 9742       | 0        | 427 | 1849 | 718      | 715      | 4780     | 18232 |
| 2040 | 12434      | 0        | 545 | 2360 | 916      | 913      | 6101     | 23269 |
| 2045 | 15869      | 0        | 696 | 3012 | 1169     | 1165     | 7787     | 29698 |
| 2050 | 20254      | 0        | 888 | 3844 | 1492     | 1487     | 9938     | 37903 |

| Year | AADT (pcu) |          |      |      |          |          |          |       |
|------|------------|----------|------|------|----------|----------|----------|-------|
|      | Car        | Mini Bus | Bus  | LCV  | 2A Truck | 3A Truck | MA Truck | Total |
| 2017 | 2552       | 0        | 418  | 724  | 855      | 802      | 8042     | 39    |
| 2021 | 3454       | 0        | 531  | 982  | 1009     | 974      | 9764     | 45    |
| 2025 | 5253       | 0        | 749  | 1495 | 1322     | 1308     | 13113    | 55    |
| 2030 | 7454       | 0        | 1004 | 2122 | 1687     | 1681     | 16855    | 70    |
| 2035 | 9742       | 0        | 1282 | 2773 | 2153     | 2145     | 21512    | 89    |
| 2040 | 12434      | 0        | 1636 | 3540 | 2748     | 2738     | 27456    | 114   |
| 2045 | 15869      | 0        | 2088 | 4518 | 3508     | 3494     | 35041    | 145   |
| 2050 | 20254      | 0        | 2665 | 5766 | 4477     | 4460     | 44722    | 185   |



- Level of service (LOS) 'B' (Design service volume for LOS B - 40000 pcu per day) offered by the proposed 4-lane facility will cease by year 2034 and Level of Service (LOS) 'C' (Design service volume for LOS C - 60000 pcu per day) will be cease by year 2042. Hence, 6/8-lane facility shall be required by the end of 2042.

#### E.5 Proposed Cross-Sectional Elements

- The project road is to be developed as fully access controlled highway with 4-lane configuration at present and the proposed RoW is 60m in general and varies from 30m to 70m in forest area as per amended TOR (environmental) dated 28.12.2020. Accordingly following typical cross sections have been developed in accordance with the 4 lane manual and directions from NHAI HQ. Drawings of these cross sections are given at the end of this chapter.

Table E-4 : Typical Cross Sections

| S. no. | TCS type | Description  | Length (m) |
|--------|----------|--|------------|
| 1      | TCS 1A   | 4-lane Divided Highway without Service Road (in Embankment)                                | 40345      |
| 2      | TCS 1B   | 4 lane Divided Highway without Service Road (in Cutting)                                   | 2170       |
| 3      | TCS 1C   | 4-lane Divided Highway with Service Road on both sides                                     | 1460       |
| 4      | TCS 1D   | 4-lane Divided Highway with Service Road on one side                                       | 1810       |
| 5      | TCS 1E   | 4-lane Divided Highway with RE Wall on both sides  | 2400       |
| 6      | TCS 1F   | 4-lane Divided Highway with RE Wall on one side  | 420        |
| 7      | TCS 1G   | 4-lane Divided Highway with Service Road on both sides                                     | 420        |
| 8      | TCS 1H   | 4-lane Divided Highway with Service Road on both sides (Both MCW & SR in Cutting)          | 300        |
| 9      | TCS 1I   | 4-lane Divided Highway with Service Road on both sides (MCW in Cutting & SR in Embankment) | 1210       |
| 10     | TCS 1J   | 4-lane Divided Highway with Service Road on both sides (in Embankment)                     | 0          |
| 11     | TCS 1K   | 4-lane Divided Highway with Service Road on both sides (MCW in Cutting & SR in Embankment) | 0          |
| 12     | TCS 1L   | 4-lane Divided Highway with Service Road on one side (in Embankment)                       | 1380       |
| 13     | TCS 1M   | 4-lane Divided Highway with Service Road on one side (in Embankment)                       | 1950       |
| 14     | TCS 1N   | 4-lane Divided Highway with Service Road and RE Wall on both sides                         | 0          |
| 15     | TCS 2A   | 4-lane Divided Highway without Service Road (in Embankment)                                | 22130      |
| 16     | TCS 2B   | 4-lane Divided Highway without Service Road (in Cutting)                                   | 4390       |
| 17     | TCS 2C   | 4-lane Divided Highway (Embankment on one side and Cutting on other side)                  | 410        |



| S. no.           | TCS type | Description   | Length (m)   |
|------------------|----------|---|--------------|
| 18               | TCS 2D   | 4-lane Divided Highway with Service Road on both sides                                    | 100          |
| 19               | TCS 2E   | 4-lane Divided Highway with Service Road on RHS   | 2020         |
| 20               | TCS 2F   | 4-lane Divided Highway with Service Road on LHS - MCW in cut and Service Road in Emb.     | 660          |
| 21               | TCS 2G   | 4-lane Divided Highway with Service Road on LHS - Both MCW and Service Road in Embankment | 1140         |
| 22               | TCS 2H   | 4-lane Divided Highway With Service Road - Both MCW and Service Road in Embankment        | 930          |
| 23               | TCS 2I   | 4-lane Divided Highway With RE wall on both sides   | 1900         |
| <b>Total (m)</b> |          |   | <b>87545</b> |

#### E.6 Access Control Measures

- The project road cuts across Nationals Highways, State Highways, and Major District Roads at a number of locations. In addition, there are many crossings of village roads. Since the project road is being developed as fully access controlled highway, access to project road has been provided at NH/SH crossings and any other road connecting to major built-up areas. At all other roads only crossings have been provided with suitable grade separated structures. The type and span grade separated structures have been decided based on the classification of cross road.

##### *Rationalisation of grade separated structures:*

- Maintaining the existing mobility or better at cross roads, controlled access to Project Highway and minimum rise and fall along the Project Highway are the primary guiding factors while deciding the type of grade separation facility.
- At all NH crossings interchanges have been provided with Overpass as per the terrain condition. At SH/MDR crossings VUP/LVUP/ Overpass has been provided with at-grade junction below the VUP/LVUP. At all other 2-lane roads 1x12x4m, (1x20m, 2x20m), 6x30m, 2x30m span LVUP, VUP, Flyover and Overpasses respectively has been provided. For single-lane village roads, if any other connecting road exists for the village 1x7x4.0m span small vehicular underpass has been provided. At all cart track crossings, 1x7x4.0m span small vehicular underpass has been provided. If any road is not provided with grade separation facility due to site condition, the same is connected through service road with the nearest grade separator. Span arrangement and total length of flyovers, VUP, LVUP and SVUP are proposed as per requirement of highway geometry to facilitate smooth flow of traffic. For grade separated structures overall width shall be equal to width of approaches.
- Since the project alignment passes through the forest area in a aggregate length of 39km. There is a movement of elephant within the forest area as per forest official. Probable location of elephant underpass has been proposed.





The details of proposed grade separated structures are given below:

Table E-5 : Summary of Grade-Separated Structures

| Type of Structure |   | Nos.      |
|-------------------|---|-----------|
| EUP               | (2x30x7, 3x30x7, 4x30x7, 5x30x7 & 8x30x7) | 11        |
| EOP               | 2x25x5.5                                  | 1         |
| VUP               | 2x20x5.5                                  | 1         |
| VUP               | 1x20x5.5                                  | 10        |
| Flyover           | 6x30x5.5                                  | 1         |
| LVUP              | 1x12x4                                    | 6         |
| SVUP              | 1x7x4                                     | 18        |
| Overpass          | 2x30x5.5                                  | 2         |
| <b>Total</b>      |   | <b>50</b> |

#### E.7 Slip roads/Service roads

- Slip roads have been provided to provide access to Project Highway at certain grade separated structures.
- The service roads were proposed under 2 scenarios: a) At built-up areas to facilitate the movement of local traffic. b) If any road is not provided with grade separation facility due to site condition, the same is connected through service road with the nearest grade separator.
- Total length of slip road/service road is 22.190 km in total comprising 12.840 km on LHS and 9.35 km on RHS respectively. Details are given below:

Table E-6 : Details of Slip/Service Roads

| Sl. No    | LHS              |        |            |                | RHS    |        |            |                |
|-----------|------------------|--------|------------|----------------|--------|--------|------------|----------------|
|           | From             | To     | Length (m) | Min. Width (m) | From   | To     | Length (m) | Min. Width (m) |
| <b>A.</b> | <b>Slip Road</b> |        |            |                |        |        |            |                |
| 1         | 93750            | 94750  | 1000       | 7.5            | 93750  | 94750  | 1000       | 7.5            |
| 2         | 117600           | 117710 | 110        | 7.5            | 117600 | 117710 | 110        | 7.5            |
| 3         | 117710           | 117790 | 80         | 7.5            | 117710 | 117790 | 80         | 7.5            |
| 4         | 117790           | 117850 | 60         | 7.5            | 117790 | 117850 | 60         | 7.5            |
| 5         | 117850           | 117930 | 80         | 7.5            | 117850 | 117930 | 80         | 7.5            |
| 6         | 117930           | 118190 | 260        | 7.5            | 117930 | 118190 | 260        | 7.5            |
| 7         | 118190           | 118270 | 80         | 7.5            | 118190 | 118270 | 80         | 7.5            |
| 8         | 118270           | 118330 | 60         | 7.5            | 118270 | 118330 | 60         | 7.5            |
| 9         | 118330           | 118410 | 80         | 7.5            | 118330 | 118410 | 80         | 7.5            |
| 10        | 118410           | 118470 | 60         | 7.5            | 118410 | 118580 | 170        | 7.5            |
| 11        | 143480           | 143590 | 110        | 7.5            | 143480 | 143590 | 110        | 7.5            |
| 12        | 143590           | 143620 | 30         | 7.5            | 143590 | 143620 | 30         | 7.5            |



| Sl. No   | LHS   |         |              |                | RHS          |         |             |                |
|----------|---|---------|--------------|----------------|--------------|---------|-------------|----------------|
|          | From  | To      | Length (m)   | Min. Width (m) | From         | To      | Length (m)  | Min. Width (m) |
| 13       | 143620  | 143680  | 60           | 7.5            | 143620       | 143680  | 60          | 7.5            |
| 14       | 143680  | 143710  | 30           | 7.5            | 143680       | 143710  | 30          | 7.5            |
| 15       | 143710  | 144450  | 740          | 7.0            | 143710       | 144450  | 740         | 7.0            |
| 16       | 144450  | 144480  | 30           | 7.5            | 144450       | 144480  | 30          | 7.5            |
| 17       | 144480  | 144540  | 60           | 7.5            | 144480       | 144540  | 60          | 7.5            |
| 18       | 144540  | 144570  | 30           | 7.5            | 144540       | 144570  | 30          | 7.5            |
| 19       | 144570  | 144730  | 160          | 7.5            | 144570       | 144730  | 160         | 7.5            |
|          |   |         |              |                |              |         |             |                |
| 20       | 155990  | 156080  | 90           | 7.5            | 155990       | 156080  | 90          | 7.5            |
| 21       | 156080  | 156160  | 80           | 7.5            | 156080       | 156160  | 80          | 7.5            |
| 22       | 156160  | 156220  | 60           | 7.5            | 156160       | 156220  | 60          | 7.5            |
| 23       | 156220  | 156300  | 80           | 7.5            | 156220       | 156300  | 80          | 7.5            |
| 24       | 156300  | 157050  | 750          | 7.5            | 156300       | 157050  | 750         | 7.5            |
| 25       | 157050  | 157130  | 80           | 7.5            | 157050       | 157130  | 80          | 7.5            |
| 26       | 157130  | 157190  | 60           | 7.5            | 157130       | 157190  | 60          | 7.5            |
| 27       | 157190  | 157270  | 80           | 7.5            | 157190       | 157270  | 80          | 7.5            |
| 28       | 157270  | 157360  | 90           | 7.5            | 157270       | 157360  | 90          | 7.5            |
|          | <b>Sub total</b>                                |         | <b>4490</b>  |                |              |         | <b>4600</b> |                |
| <b>B</b> | <b>Service road in lieu of existing NH-130A</b> |         |              |                |              |         |             |                |
| 1        | 70+200  | 70+720  | 520          | 7.0            | 70+200       | 70+720  | 520         | 7.0            |
| 2        | 70+720  | 71+100  | 380          | 7.5            | 70+720       | 71+200  | 480         | 7.5            |
| 3        | 78+900  | 79+030  | 130          | 7.0            | 83+670       | 84+830  | 1160        | 7.0            |
| 4        | 81+200  | 81+400  | 200          | 7.0            | 122+600      | 123+650 | 1050        | 7.0            |
| 5        | 130+350   | 134+630 | 4280         | 7.0            | 124+450      | 124+870 | 420         | 7.0            |
| 6        | 136+260   | 136+700 | 440          | 7.0            | 125+300      | 125+600 | 300         | 7.0            |
| 7        | 136+700   | 137+270 | 570          | 7.5            |              |         |             |                |
|          |   |         |              |                |              |         |             |                |
|          | <b>Sub total</b>                                |         | <b>6520</b>  |                |              |         | <b>3930</b> |                |
| <b>C</b> | <b>Other Service roads</b>                      |         |              |                |              |         |             |                |
| 1        | 71+100  | 71+620  | 520          | 7.0            | 78+360       | 78+460  | 100         | 7.0            |
| 2        | 87+620  | 87+700  | 80           | 3.5            | 111+870      | 112+290 | 420         | 7.0            |
| 3        | 114+430   | 114+850 | 420          | 7.0            | 126+630      | 126+810 | 180         | 7.5            |
| 4        | 128+310   | 128+430 | 120          | 3.5            | 128+290      | 128+430 | 140         | 3.5            |
| 5        | 129+520   | 129+630 | 110          | 3.5            | 129+560      | 129+630 | 70          | 3.5            |
| 6        | 149+600   | 150+090 | 490          | 7.0            | 137+180      | 137+270 | 90          | 7.5            |
| 7        | 154+520   | 154+610 | 90           | 3.5            | 154+520      | 154+640 | 120         | 3.5            |
|          |   |         |              |                |              |         |             |                |
|          | <b>Sub total</b>                                |         | <b>1830</b>  |                |              |         | <b>1120</b> |                |
|          | <b>Total (A+B)</b>                              |         | <b>12840</b> |                | <b>Total</b> |         | <b>9650</b> |                |



## E.8 Exit/Entry ramps

- Since the project road is being developed as fully access controlled highway access to project road has been provided at NH/SH crossings and any other road connecting to major built-up areas. Entry/Exits have been provided at 6 locations at proposed toll plaza. Details are given below. Details are given below:

Table E-7 : Entry/Exit locations

| Sl.No | Design Chainage | LHS   | RHS   | Remarks                |
|-------|-----------------|-------|-------|------------------------|
| 1     | 70620           | Exit  |       | At Toll Plaza location |
|       | 70620           |       | Entry |                        |
| 2     | 94110           | Exit  |       | At Toll Plaza location |
|       | 94110           |       | Entry |                        |
|       | 94500           | Entry |       |                        |
|       | 94500           |       | Exit  |                        |
| 3     | 117820          | Exit  |       | At Toll Plaza location |
|       | 117820          |       | Entry |                        |
|       | 118300          | Entry |       |                        |
|       | 118300          |       | Exit  |                        |
| 4     | 143650          | Exit  |       | At Toll Plaza location |
|       | 143650          |       | Entry |                        |
|       | 144510          | Entry |       |                        |
|       | 144510          |       | Exit  |                        |
| 5     | 156190          | Exit  |       | At Toll Plaza location |
|       | 156190          |       | Entry |                        |
|       | 157160          | Entry |       |                        |
|       | 157160          |       | Exit  |                        |

## E.9 Proposed Pavement

- The design traffic for 20 year design period is given below:

Table E-8 : Design MSA

| Sl. No | Section                                  | Minimum Design MSA |
|--------|--|--------------------|
| 1      | Main Road                                | 150                |
| 2      | Slip Road/                               | 60                 |
| 3      | Service road in lieu of existing NH-130A | 60                 |
| 4      | Other Service Roads                      | 10                 |



- Three options have been explored for the type of pavement to be adopted for the project road. The details of the options and proposed crust in each option is given below:

Table E-9 : Proposed Pavement Crust

|  | MCW   | Service Road | Present Const. Cost | % w.r.t to option 2 |
|--|-------|--------------|---------------------|---------------------|
| <b>Option 1 – Conventional - BC+DBM+WMM+GSB (Flexible)</b> |       |              |                     |                     |
| Bituminous Concrete (BC)                                   | 0.040 | 30           | 442.78              | 115%                |
| Dense Bituminous Macadam (DBM)                             | 0.166 | 60           |                     |                     |
| Wet Mix Macadam (WMM)                                      | 0.250 | 250          |                     |                     |
| Granular Sub-base (GSB)                                    | 0.200 | 200          |                     |                     |
| <b>Option 2 – CTSB - BC+DBM+WMM+CTGSB (Flexible)</b>       |       |              |                     |                     |
| Bituminous Concrete (BC)                                   | 0.040 | 30           | 386.59              | 100%                |
| Dense Bituminous Macadam (DBM)                             | 0.120 | 50           |                     |                     |
| Wet Mix Macadam (WMM)                                      | 0.150 | 250          |                     |                     |
| Cement Treated GSB (CTGSB)                                 | 0.200 | -            |                     |                     |
| GSB  | -     | 200          |                     |                     |
| <b>Option 3 – PQC+DLC+GSB (Rigid)</b>                      |       |              |                     |                     |
| PQC  | 0.300 | 280          | 450.39              | 117%                |
| DLC  | 0.150 | 150          |                     |                     |
| GSB  | 0.150 | 150          |                     |                     |

- The option selected is based on the principle of minimum net present value of costs, estimated by adopting life cycle cost analysis method. The estimated NPV at 12% interest rate and 5% inflation for 30 years life cycle of the project is as given below:

Table E-10 : Life Cycle Costing of Pavement Options

| Options           |          |                | Pavement Layers                                   | NPV of Const. Cost | Percent age (%) |
|-------------------|----------|----------------|---|--------------------|-----------------|
| Flexible Pavement | Option 1 | Conventional   | BC+DBM+WMM +GSB<br>40+155+250+200 = 645 mm        | 586.09             | 114%            |
|                   | Option 2 | CTSB           | BC+DBM+WMM + CT<br>GSB<br>40+120+150+200 = 510 mm | 521.14             | 102%            |
| Rigid Pavement    | Option 3 | Rigid Pavement | PQC+DLC+GSB<br>300+150+130 = 600 mm               | 511.99             | 100%            |



As the NPV of Option 2 and option 3 is nearly equal at 30 years of life, Option 2 – Flexible pavement with cement treated subbase layer has been recommended.

#### E.10 Bridges and Culverts

- 27 nos of bridges are required along the project road consisting of 6 major bridges and 21 nos minor bridges on main carriageway. Overall deck width of 2x13.5 m has been proposed as per 4-lane manual. One major bridge at km. 82+560 and one minor bridge at km. 80+985 has been converted into elephant underpass cum bridges.

Table E-11 : Details of Major Bridges

| Sl.No | Design Chainage | Name of Nallah   | Span (m) | Total Length (m) | Total Width of Structure (m) |
|-------|-----------------|------------------|----------|------------------|------------------------------|
| 1     | 89+150          | Kortimasara Nala | 3x30     | 90               | 2x13.5                       |
| 2     | 92+520          | Dhawan Nala      | 2x30     | 60               | 2x13.5                       |
| 3     | 99+825          | Chuiya Nadi      | 6x30     | 180              | 2x13.5                       |
| 4     | 106+375         | Mand River       | 11x30    | 330              | 2x13.5                       |
| 5     | 120+170         | Chikatwani Nala  | 6x30     | 180              | 2x13.5                       |
| 6     | 146+408         | Dharari Nala     | 3x30     | 90               | 2x13.5                       |

Table E-12 : Details of Minor Bridges

| Sl. No | Design Chainage | Name of Nallah | Span (m) | Total Width of Structure (m) |
|--------|-----------------|----------------|----------|------------------------------|
| 1      | 72+054          | Dom Nala       | 2x25     | 2x13.5                       |
| 2      | 73+630          | Nala           | 1 x 10   | 2x13.5                       |
| 3      | 74+200          | Nala           | 2x8.5    | 2x13.5                       |
| 4      | 74+376          | Canal          | 1x10     | 2x13.5                       |
| 5      | 86+510          | Nala           | 2x10     | 2x13.5                       |
| 6      | 86+880          | Nala           | 2x11     | 2x13.5                       |
| 7      | 88+420          | Nala           | 2x12     | 2x13.5                       |
| 8      | 93+965          | Nala           | 2x10     | 2x13.5                       |
| 9      | 97+620          | Nala           | 2x7.5    | 2x13.5                       |
| 10     | 100+230         | Diwan Nala     | 2x25     | 2x13.5                       |
| 11     | 101+723         | Nala           | 2x8.5    | 2x13.5                       |
| 12     | 104+580         | Nala           | 2x11     | 2x13.5                       |
| 13     | 119+610         | Nala           | 1x12     | 2x13.5                       |
| 14     | 120+960         | Nala           | 1x10     | 2x13.5                       |
| 15     | 127+150         | Nala           | 2x12     | 2x13.5                       |



| Sl. No | Design Chainage | Name of Nallah | Span (m) | Total Width of Structure (m) |
|--------|-----------------|----------------|----------|------------------------------|
| 16     | 128+768         | Canal          | 1x10     | 2x13.5                       |
| 17     | 129+302         | Canal          | 1x10     | 2x13.5                       |
| 18     | 129+463         | Nala           | 3x10     | 2x13.5                       |
| 19     | 129+723         | Nala           | 1x10     | 2x13.5                       |
| 20     | 139+840         | Nala           | 1x10     | 2x13.5                       |
| 21     | 142+443         | Nala           | 1x10     | 2x13.5                       |

Table E-13 : Summary of cross-drainage structures

| Culvert type | Culverts size | Cross drainage works | Cross roads | For junctions | Total      |
|--------------|---------------|----------------------|-------------|---------------|------------|
| Box          | 2x2           |                      |             | 69            | 69         |
| Box          | 1x2x2         | 2                    | 0           |               | 2          |
| Box          | 1x3x3         | 106                  | 1           |               | 107        |
| Box          | 1x5x3         | 1                    | 4           |               | 5          |
| Box          | 1x5x4         | 17                   | 22          |               | 39         |
| Box          | 1x6x4         | 0                    | 0           |               | 0          |
|              | <b>Total</b>  | <b>120</b>           | <b>33</b>   | <b>09</b>     | <b>220</b> |

#### E.11 Summary of proposed improvements

- Salient features of the proposed road are given below.

Table E-14 : Summary of proposed improvements

| S. No. | Description              | Unit | Total                               |
|--------|--------------------------|------|-------------------------------------|
| 1      | Length of Main Road      | Km   | 87.545                              |
| 2      | Length of Slip Road      | Km   | 9.090<br>4.49 (LHS) + 4.6 km. (RHS) |
| 3      | Length of Service Road   | Km   | 13.40<br>8.35 (LHS) + 5.05 (RHS)    |
| 4      | Lane Configuration       |      | 4-lane                              |
| 5      | Mode of construction     |      | HAM                                 |
| 6      | Proposed Crust thickness |      |                                     |
|        | MSA                      |      | 150                                 |
|        | BC                       | MM   | 40                                  |
|        | DBM                      | MM   | 120                                 |
|        | WMM                      | MM   | 150                                 |
|        | CTGSB                    | MM   | 200                                 |
| 7      | No. of Entry/Exits       | Nos  | 9 entry / 9 exist                   |





| S. No. | Description                                 | Unit       | Total     |
|--------|---|------------|-----------|
| 8      | Overpass (2x30x5.5)                         | Nos        | 2         |
| 9      | Flyover (6x30x5.5)                          | Nos        | 1         |
| 10     | EUP (2x30, 3x30, 4x30, 5x30 & 8x30x7)       | Nos        | 11        |
|        | EOP (2x25mx55m)                             | Nos        | 1         |
| 11     | VUP (2x20x5.5)                              | Nos        | 1         |
|        | VUP (1x20x5.5)                              | Nos        | 10        |
| 12     | LVUP (1x12x4)                               | Nos        | 6         |
| 13     | SVUP (1x/x4)                                | Nos        | 18        |
| 14     | <b>Total No. grade separated Structures</b> | <b>Nos</b> | <b>50</b> |
| 15     | ROB   | Nos        | 1         |
| 16     | Major bridges                               | Nos        | 6         |
| 17     | Minor bridges                               | Nos        | 21        |
| 18     | Box culverts                                | Nos        | 159       |
|        | Box culvert for Junctions                   | Nos        | 69        |
| 19     | Toll Plaza on Main road                     | Nos        | NIL       |
| 20     | Toll Plaza on Entry/exit                    | Nos        | 18        |
| 21     | Truck Lay Bye                               | Nos        | 4         |
| 22     | Rest Area                                   | Nos        | 2         |

#### E.12 Environmental & Social Impact Assessment

- Environmental Screening – Since this is green field alignment, Environmental clearance is required and the same is in progress
- Social Screening – Since the project corridor is green field alignment, minimum RoW of 60m in general and minimum 30m to 70m in forest area are to be acquired as per the Directives of NHAI, which would result in an acquisition of approximately 508 ha of land and displacement of around 55 households. The Entitlement Framework shall provide for adequate compensation and assistance. During design, adequate care has been taken to minimize impacts on structures adjacent to the road.

#### E.13 Cost Estimate

- The cost estimate has been worked out using quantities of different items of works derived from the preliminary designs and drawings. The cost estimate has been prepared both with the rates as per PWD Chhattisgarh Schedule of Rates (SOR) for Road Works 2021 and analysed rates. The items which are not listed in the SOR, analysed rates have been adopted.





Executive Summary

- The machinery rates are adopted based on the rate given in Standard Data Book of MoRT&H 2009. Material rates have been referred from PWD Chhattisgarh Schedule of Rates (SOR) for Road Works 2021, internet sources like inampro.nic.in (from MORTH), IOCL website, and SAIL web site etc. Labour rates have been referred from minimum wages rule in Labour Commissioner of Chhattisgarh w. e. f 01.04.2021. Since Urga, - Pathalgaon in Chhattisgarh falls on category C, minimum wages of industrial labour under category C has been adopted for analysis rates
- GST has been excluded from materials rate and has been used in the Item rate analysis. In the abstract of cost estimate 12% GST has been added in the total cost of construction.
- Depending on the location of the quarries, the following average lead of materials for the project road were worked out and considered in the rate analysis

| Sl.No. | Description                                | Unit | Total Lead | Source                                       |
|--------|--|------|------------|--|
| 1      | Average lead from plan location to site    | Km.  | 24.00      |  |
| 2      | Borrow earth                               | Km.  | 11.00      | Private land                                 |
| 3      | Sand                                       |      |            |  |
|        | Average lead from source to plant location | Km.  | 12.00      | Maand River                                  |
|        | Average lead to site                       | Km.  | 19.00      |  |
| 4      | Stone Material                             |      |            |  |
|        | Average lead from source to plant location | Km.  | 40.00      | Kharsia village, Tejpur and Chaparni village |
|        | Average lead to site                       | Km.  | 36.00      |  |
| 5      | Bitumen                                    |      |            |  |
|        | Average lead from source to plant location | Km.  | 669        | Haldia, WB                                   |
| 6      | Cement                                     | Km.  | 146.00     | Bilaspur                                     |
| 7      | HYSD/TMT Bars                              | Km.  | 275.00     | Bhilai                                       |
| 8      | Fly ash                                    | Km.  | 57.00      | NTPC Korba                                   |

- The summary of cost as per SoR rates is given below and abstract of cost estimate is given in the next page.

|       | Cost (in Rs. Crores) |                       |           |                    |         |  |                |                    | Total   |
|-------|----------------------|-----------------------|-----------|--------------------|---------|--|----------------|--------------------|---------|
|       | Civil Works          | Utility shifting cost | Cent ages | Contingencies @ 1% | 12% GST | Supervision charges on Utility shifting cost | LA and RR Cost | Environmental cost |         |
| Total | 1591.24              | 70.88                 | 77.19     | 15.91              | 190.95  | 1.77   | 267.13         | 46.22              | 2261.30 |



Development of Economic Corridors, Inter Corridors, Feeder Routes to improve the efficiency of freight movement in India (Lot-3/Chhattisgarh/Package-1) under Bharatmala Pariyojana

Urga - Pathalgaon section of NH-130A (Raipur-Dhanbad Economic Corridor)

Transys

Executive Summary

Urga-Pathalgaon section of NH-130A (Ch. 70+200 to 157+745)

**GENERAL ABSTRACT OF COST**

| Bill No. | Item of works   | Cost (Rs. Cr.) | %              |
|----------|---|----------------|----------------|
| <b>A</b> | <b>Highways</b>   |                |                |
| 1        | Site Clearances   | 3.78           | 0.24%          |
| 2        | Earthwork   | 262.09         | 16.47%         |
| 3        | Granular Sub-Base & Base Courses                        | 148.89         | 9.36%          |
| 4        | Flexible pavement (Bituminous courses)                  | 259.91         | 16.33%         |
| 5        | Drain Work  | 40.20          | 2.53%          |
| 6        | Protection Works  | 203.16         | 12.77%         |
| 7        | Traffic Signs, Markings & Road Appurtenances            | 111.18         | 6.99%          |
| 8        | Miscellaneous works                                     | 44.97          | 2.83%          |
| 9        | Toll plaza including Rigid Pavement on its approaches   | 23.88          | 1.50%          |
|          | <b>Subtotal (A)</b>                                     | <b>1098.07</b> | <b>69.01%</b>  |
| <b>B</b> | <b>Structures</b>                                       |                |                |
| 10       | Culverts  |                |                |
| 10.a     | Pipe Culverts for junctions                             | 2.84           | 0.18%          |
| 10.b     | Box culverts  | 80.16          | 5.04%          |
| 11       | Minor Bridges   | 65.00          | 4.14%          |
| 12       | Major bridges   | 117.05         | 7.36%          |
| 13       | SVUP  | 14.20          | 0.88%          |
| 14       | LVUP  | 7.97           | 0.50%          |
| 15       | VUP   | 33.29          | 2.09%          |
| 16       | EUP   | 117.30         | 7.37%          |
| 17       | VUP/Flyovers  | 24.05          | 1.50%          |
| 18       | ROB   | 30.08          | 1.89%          |
|          | <b>Subtotal (B)</b>                                     | <b>493.18</b>  | <b>30.99%</b>  |
| <b>C</b> | <b>Base Civil Construction Cost without GST (A+B)</b>   | <b>1591.24</b> | <b>100.00%</b> |
| D        | Utility shifting cost (except supervision charges)      | 70.88          |                |
| <b>E</b> | <b>Total Civil Construction Cost (in Crores) (C+D)</b>  | <b>1662.12</b> |                |
| F        | IC/Pre-operative expenses @ 1% of (E)                   | 16.62          | 1%             |
| G        | Financing expenses on Debt                              | 5.97           |                |
| H        | IDC (Interest During Construction) on Debt              | 54.60          |                |
| <b>I</b> | <b>Estimated Project Cost as on Bid Date (E+F+G+H)</b>  | <b>1739.31</b> |                |
| J        | Contingencies @1% on (C)                                | 15.91          |                |
| K        | GST @ 12% of Civil Construction Cost (C)                | 190.95         | 12.0%          |
| L        | Supervision charges @ 2.5% on Utility shifting cost (D) | 1.77           | 2.5%           |
| M        | Land Acquisition Cost and R&R Cost                      | 267.13         |                |
| N        | Environmental cost                                      | 46.22          |                |
| <b>O</b> | <b>Total Project Cost (J+K+L) (in Crores)</b>           | <b>2261.30</b> |                |
|          | <b>Length of the project road</b>                       | <b>87.545</b>  |                |
|          | <b>Civil Cost per km. length (in Crores)</b>            | <b>18.18</b>   |                |
|          | <b>Total Project Cost per km. (in Crores)</b>           | <b>25.83</b>   |                |

